

WORKING PAPER

ISET-INTERNATIONAL AND ISET-NEPAL

Catalyzing Transformative Changes for Resilience

Integrated Land-Use Planning for
Enhanced Social Capital

NEPAL

July 2018



A young child with dark hair, wearing a red long-sleeved shirt, is shown in profile, drinking from a green water bottle. The child is standing next to a traditional stone water fountain. The fountain has a large, ornate stone spout that is carved to look like a mythical creature. Water is flowing out of the spout. The fountain is set against a wall made of reddish-brown bricks. There is a metal grate or screen behind the fountain. The overall scene is outdoors, and the lighting suggests it is daytime.

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1 Introduction

Recovering from disasters is a difficult process. This is particularly true in the context of a least developed country such as Nepal, where recurrent disasters lead to significant losses of lives and property. Despite much work, efforts at risk reduction have not contributed to achieving the goal of reducing disaster risks. Historically, the responsibility for disaster recovery has fallen mostly on the affected communities themselves as is the case in Nepal, which faces multiple hazard risks. However, Nepal is undergoing a large-scale transformative change, which has the potential to impact the community-based structure of disaster recovery.

Twenty years of urban to rural migration, international remittances, a transformation in agriculture, and the end of civil conflict, have contributed to the growth of Nepal's middle-class (Liechty, 2003). However, with all the positive qualities that come with increased wealth, also come challenges. The value of social capital has decreased as wealth has increased urbanization, mechanization and the ability to pay for others to do labor. In any context, these changes have both positive and negative attributes. However, in Nepal – which has a long history of a struggling central government response to disasters, and little action on recovery – social capital at the local level continues to be the central pillar to the country's resilience. Though strides were made to improve disaster risk management, including recovery, two high magnitude earthquakes in 2015, a series of minor disasters and a major flood in 2017 encumbered progress. Further, changes in

governance are not keeping pace with these shifts in social relationships and the transformation of long-standing social institutions. As such, these changes have the potential to substantially undermine the nation's resilience, namely social capital, by weakening a core area of its governance and disaster response.

Internationally, progress has been made in organizing around new sets of goals for development and disaster risk reduction. The Sustainable Development Goals (SDGs) call for development to work toward the end of poverty and for protecting the planet. The Sendai Framework for disaster risk reduction (Sendai), calls for recovery work to “build back better.” Complicating both the SDGs and Sendai work is the need to adapt to climate change, which adds substantial uncertainty to hazard risks, particularly in the case of Nepal, where the extreme elevation variation challenges even the best climate models. Hence, there is a need to build back with resilience. The unique qualities of Nepal's history, geology, geography, and cultural milieu, provide substantial challenges relating to balancing institution building and economic development with social equity and environmental sustainability. However, the work in Nepal building toward the SDGs and Sendai provides valuable lessons that can be applied there, in other LDCs and other, less challenging contexts.

These lessons will be essential for Nepal to address their environmental and social challenges. Indeed, the country's new constitution emphasizes social, economic,

and ecological well-being, and governance through new local, provincial and federal institutions. Today, however, the narrative of development has transformed into that of prosperity and the focus de jure is on achieving higher economic growth mainly through investment in infrastructure. The narrative we present here aims to counter this emphasis on solely infrastructural investments by illustrating that social and community development, and building on natural and social capital addressing the social needs of communities, are vital components of prosperity.

In Nepal, the community-based organization (CBO) is an integral actor that supports social, economic, and ecological well-being. While Nepal has its challenges, it also has a history of success that fits its context, namely the community-based organization. CBOs have been vital to natural resource management, maintaining success even through the ten years of civil conflict and the transformation of national governance structures. CBOs also enhance social capital (Acharya, 2015).

In this paper, we suggest that ISET-Nepal's proposed integrated land-use planning program will help to prevent the weakening of these CBOs through its emphasis on both the social and ecological aspects of land-use in Nepal and discuss what that might mean for disaster recovery. We use the case of disasters in Nepal to highlight the importance of transformative change. Moreover, we argue that ISET-Nepal's integrated land-use planning is transformative because, in their approach, the concept is extended beyond its traditional ecosystem-centric focus to include an emphasis on the social and cultural aspects of communities as well.

Traditionally, integrated land-use planning, which emerged in Canada, emphasized the needs of ecosystems (primarily forests) that were under pressure from over-extraction and the kind of overuse experienced in national parks. While this approach works for ecosystems that primarily consist of natural resources, for social-ecological systems, where people and the land interact, there is a need to include both the ecological, and the social aspects of the system in land-use planning. Nepal – which has a high density

of people and where over 80% of the population depends on the forests and crop and livestock-based farming for their livelihoods (UNPEI, 2016) – is an example of such a system where ecological and social aspects are of equal importance. Given this greater “social density,” ISET-Nepal's integrated land-use planning pays particular attention to the social aspects than do more traditional approaches. What this means in practice is that the program addresses both the ecological and social/cultural aspects of a system that brings value to people's lives.

The paper draws insights on how hazards exacerbate risks and affect the country's journey towards prosperity. Though the spark for our work was the 2015 Gorkha earthquake, we will explore the history of disasters in Nepal using literature available in the public domain. We also use our ongoing activities on disasters in Nepal: The Audit of the 2014-2015 disasters, our work with Community Rural Electrification Entities (CREEs), with the Jarayatar community, and review of earthquake response, our work with government partners on the preparation of National Strategy for Resilient Local Community (NSRLC) and the lived experiences of studying Gorkha. We also draw on a small survey of 20 randomly selected houses, under construction in Kathmandu, with the aim of assessing a homeowner's behavior concerning their home's structural safety. From this, we frame ISET-Nepal's integrated land-use planning as transformative in that it counters the weakening of community-based organizations by diversifying livelihoods and fostering social capital at the community level.

1.1. NEPAL: RISKS AND UNCERTAINTY

Due to geologic, climatic and geographic reasons, Nepal faces severe threats from multiple natural hazards which occur with regularity, including earthquakes, floods, and droughts. The country also faces problems related to disease outbreak, wildfire, road accidents, air pollution and uncertainties surrounding the impacts of climate change. In addition to these threats, Nepal's geology and geography present challenges to centralized governance and the

provision of essential services such as electricity. Taken together, these known and unknown risks contribute to uncertainty regarding the impacts of future disasters and the government's response.

Situated over the Indian and the Eurasian Plate subduction zone, Nepal is exposed to high seismic activities and has experienced large and small earthquakes across recorded history including the Gorkha Earthquake which struck central Nepal in 2015. A 7.6 on the Richter scale earthquake, the epicenter was located in Barpak, in the Gorkha district. The main shock was followed by a series of low-intensity tremors and two significant aftershocks on April 26 and again on May 12. This collection of earthquakes was designated the Gorkha Earthquake.

Overall, the earthquake affected thirty-one districts in central Nepal, with fourteen of those districts reporting extensive damages. Total losses have been estimated at over \$10 billion U.S. dollars or roughly 50% of Nepal's annual GDP. The quake led to 8,789 deaths and about 22,300 injuries. Property losses were extensive, with an estimated USD 750 million needed for the reconstruction of damaged infrastructure and livelihoods over a five-year period (GoN, 2015). Overall, the earthquake directly affected more than 8 million people, many of whom were left without shelter, livelihoods, and access to essential services.

Not only is Nepal situated on the youngest subduction zone, which increases its earthquake risk, but the Himalayas also contribute to other climatic stresses. The geologic features of the mountain range, characterized by great height, rugged and steep relief, and deep river canyons interact with the atmosphere to create circulation patterns that drive the monsoons and create unique weather patterns. Climate hazards such as flood and droughts are frequent. Other unexpected and sporadic events, such as heavy hail, occasionally destroy cereal and horticultural crops which contribute to food deficits and income loss in remote districts of the country.

The mountainous geography of Nepal also presents a built-in challenge to the mindsets of modern centralized

governance and to the point-source infrastructure systems that provide services such as electricity. Further, the geographic remoteness of communities and transportation and communication difficulties in Nepal have been challenging to overcome.

Nepal will also face threats exacerbated by climate change. However, given how challenging it is to account for the influence that mountains may have on climatological parameters within climate models, the impacts of climate change are uncertain. This leads to a great deal of uncertainty about the implications of disasters and climate change on infrastructure and critical services and the role of governance in dealing with these impacts.

Uncertainty is thus a central theme in thinking about natural hazards in Nepal. Moreover, given the hurdles of geography, governance and the unknowns of climate change in Nepal, any efforts to address these issues will be challenging. The concept of resilience is increasingly used to address such challenges and uncertainties.

1.2. RESILIENCE

The concept of resilience emerges from multiple disciplines. From engineering to psychology, and to ecology, resilience generally refers to a capacity to recover from a shock or stress “quickly.” In a broadly scoped and diverse field such as development though, such concepts can have subtle meanings in theory but lead to widely divergent outcomes when applied. Resilience is one such example. As a commonly held concept, resilience is seen as the ability to “bounce back” or return quickly to “how things were” before a shock or stress. This understanding can set-up a post-disaster mindset where resilience becomes the need to return to the same conditions as before a disruption. However, sometimes, the existing system itself promotes the vulnerability.

In engineering, the term is used and held in such a way that, in application, resilience has a more sector-specific, project-focused nature that usually aims to build resilience to one or perhaps two known hazards. This would be a case for what Walker and Salt call, in their book “Resilience

Practice,” “specified resilience” (2012, p 18). Though specified resilience is useful for reasonably well-known system interactions and known hazards, it is less well suited for uncertain futures and complex (highly dynamic) systems. In fact, the sector-project focus of specified resilience with a very narrow focus, if applied to a system near its tipping point, can build in fragility. We would argue that developing human systems at the dawn of the Anthropocene fits the description of working with a complex system facing a suite of unknown risks. As such, it is a case for the application of general resilience.

1.2.1. General Resilience

Walker and Salt identify “general resilience” as “the capacity of a system that allows it to absorb disturbances of all kinds, including novel, unforeseen ones” (2012, p. 18). General resilience is better suited for the complex contexts that development operates in and for the uncertainties associated with climate change. The challenge for general resilience though – with a large capacity for recovery and a focus on whole systems of sectors – is that it is not well aligned with how current sector focused structures of finance and decision-making work. However, to some degree, this is the point of doing general resilience work since many of the challenges for resilience building are centered around breaking down sector silos of communication and decision making.

We aimed to operationalize general resilience in our project by taking a holistic, landscape-scale tact. In our work, we use the concept of resilience as it emerged from ecology (Holling, 1973, Walker et al., 2004). Here, the concept focuses less on a return to the exact prior state of a system and more so to the system’s overall, emergent function and to the qualities, services, and role that it serves within a larger system. For example, a forest ecosystem provides multiple services, such as clean air, flood control, wood for fuel, and localized cooling due to transpiration. In the case of a wildfire, those functions would be lost. However, following the fire, trees most likely would regrow and would return to providing those same services. Yet the composition of the forest would not be the same. Its constituent members could be made up of

different species, for example, shifting from hardwoods to softwoods, or made up of an altogether new configuration of species (i.e., a mix of oak trees vs. maples). This example illustrates that in a resilient system the fundamental elements of the system can be transformed due to a shock or stress, but the functional quality and services can return. In this way, ecological resilience can be transformational. However, this is not the commonly held sense of the term “resilience,” and applying the term in the development sector, which has greater ontological diversity than does ecology, requires an awareness of how terms will be framed and used by actors.

As mentioned above, in common usage, resilience implies a relatively quick return to the status quo. However, the primary driver of development is a focus on improving, not maintaining, current conditions. This dissonance between approaches is underscored by the use of the term “system” in resilience thinking as it is often used in reference to an entrenched political economy that acts as a barrier to improved social, economic, and environmental conditions. Thus, both the word “resilience” and the word “system” have strong epistemological and ontological headwinds against their uptake as an unquestioningly positive attribute within development. Due to this, the concept of transformation as an effort distinct from resilience has emerged in recent years.

1.3. TRANSFORMATION

Similar to resilience, the concept of transformation stems from complex systems theory, is usually larger than a single project or structure, and is concerned with system-level dynamics (the influence and interaction of multiple nested systems on an outcome of interest). At its most theoretical, transformation in ecology occurs when a system moves from one basin of attraction to another on a fitness landscape. However, increasingly scholars have applied the concept of transformation to socio-ecological systems. Though the term has a diversity of meanings, put simply, transformation is change, natural or forced, (Nelson et al. 2007; O’Brien 2011; Pelling 2011). To some, transformation is “deep social change” within a resilient system (Chapin et al. 2009) or change to the “scale” of a

resilient social-economic system. Abel et al. (2006) and Schlüter and Herrfahrdt-Pähle (2011) propose a typology that distinguishes adaptive maintenance (i.e., resilience) where changes do not alter the prevailing system’s logic or functions, from transformation when they involve such changes. Walker et al. (2004, 2006) define transformation as “the capacity to create a fundamentally new system when changes in ecological, economic, or social structures make the existing system untenable.” It is a change in the “state of the system,” reflected when goals, scale, and cross-system connections in space and time change (i.e., panarchy). Transformation may occur in response to the occurrence of unexpected events or as a result of deliberate processes.

Ultimately, transformation, as compared to resilience, emphasizes moving beyond the status quo to an altogether new system. Within this paper, we approach transformation as having both negative and positive connotations for system change. This distinction is vital as any change can have both winners and losers and could perpetuate inequities, reallocate them within the new system or make them worse. Thus, as is the case for this paper, a transformative intervention, in addition to promoting a more desired state, can also work to prevent changes that would degrade resilience or other sought for outcomes.

Scholars describe a preset of conditions for transformations, including actor networks and capital particularly as they relate to facilitating the 3-phase process through which transformations occur (Olsson et al. 2004, Folke et al. 2010). Olsson et al. (2004) delineate a 3-phase process through which transformations occur including: “1) preparing the system for change, 2) seizing a window of opportunity, and 3) building social-ecological resilience of the new desired state.” Social capital and building networks and connections between actors facilitate “preparing” for and “navigating” the first two phases of the transformation (Olsson et al. 2014; Pelling and Navarette 2011, Westley et al. 2013). The last phase is somewhat counterintuitive given the shortcomings of the concept of resilience we reviewed above. Instead, the context within which the change occurs and the actors involved may be the difference between a resilient system that perpetuates inequities and one that

supports a shift to a novel structure (Pelling and Navarette, 2011).

1.4. AIM

In this paper, we examine the concept of transformation as applied to post-earthquake reconstruction planning in Nepal in ISET-International and ISET-Nepal’s “Recovering to Resilience” program. Specifically, we view ISET-Nepal’s Integrated Land-Use Planning as “transformative” through its inclusion of both the social and ecological aspects of land-use planning. While most integrated land-use planning programs are ecosystem-centric, ISET-Nepal’s program maintains its focus on the ecosystem but also integrates social and cultural aspects.

The transformational aspect of the integrated land-use planning discussed in this paper acts to prevent the impacts of urbanization and mechanization on the disintegration of social capital. It does this through strengthening community-based organizations (CBOs) which have increasingly acted as the country’s primary mechanism of governance as years of civil strife, disasters and Nepal’s geography have all contributed to undermining a strong central government response.

In short, this transformative process is one where the intervention will prevent the degradation of Nepal’s social capital and the dissolution of CBOs in the face of maladaptive social transformation processes. It works to counter the individualization and isolation that these processes contribute to and which can lead to the failure of collective action and governance (i.e., CBOs). As such, ISET-Nepal’s integrated land-use planning builds in community at the design level. It groups households and centralizes services to promote community, and in so doing, incorporates the value of social capital.

In the following sections, we provide a short review of Nepal’s past experiences with disasters and community-based organizations using the lens of ISET’s System-Agents-Institutions (S-A-I) resilience framework to contextualize this history within resilience and transformation work. A more detailed exploration is available in Appendix 1.

2 History

The history of governance in Nepal is wrought with the challenges of governing a socially and geographically diverse nation. It is a story of the forging of national identity and the maintenance of independence in the face of imperialism, and of the use of the fear of imperialism to grow and maintain political power. It is a history of continuous waves of demands for democracy, which waxed and waned over the decades. It is a history of isolationist policies so strict that automobiles destined for Kathmandu were hand carried over hills. It is a history of near feudal governance structures trying to persist during modernization while modernizing and a people pushing it forward. Today Nepal is a land of friendly and welcoming people with a burgeoning middle-class and a new, albeit cautious, optimism in its new republican structure. Through all this, most resource governance has been done by communities using cultural and informal institutional structures. The history of disaster preparation and recovery in Nepal is a largely unwritten history of community-level governance. Despite this, some disasters were of such import because of their proportion and timing that they did get recorded.

2.1. DISASTERS THROUGH THE RANA PERIOD

2.1.1. The 1934 Nepal-Bihar Earthquake

The records of earthquakes in Nepal reveal the country's long history of living with earthquakes, which also provide some context to the history of governance and disaster risk reduction in Nepal. The earliest recorded earthquake in what is present day Nepal occurred in 1255 CE. This earthquake was followed by numerous other earthquakes in the centuries that followed in 1260, 1408, 1681 and 1767. Importantly, the 1767 earthquake occurred just a year prior to the formation of the nation-state of Nepal. In 1934 Nepal suffered the worst of all recorded earthquakes. While the loss of life and physical impact of the 1934 earthquake were severe, central government rose to the

challenge. Just after the earthquake hit, the prime minister mobilized the army to begin rescue operations and dispatched troops to towns where all communications had been lost. In the aftermath of response, the king provided financing for reconstruction. This is the earliest record of disaster response in Nepal and is still highly regarded today. What is particularly interesting about the response is that it was spearheaded by a government not known for providing for its general population. Importantly, the earthquake struck at a critical time in South Asian history as challenges to British rule in India, which was used as a justification for the Rana Regime's extreme isolationist policies, was facing popular resistance. The Earthquake and response proved to be a rallying point for Nepal that would carry the Rana regime through World War II.

BOX 1. CHITWAN VALLEY RESETTLEMENT

The next state-organized response to disaster mitigation in Nepal took place in 1954. Following landslides and flooding in the mid-hills of Central Nepal, impacted families were encouraged to resettle in the Chitwan Valley. This response, however, was not simply in response to the events of that year, but rather the culmination of several previous initiatives identified by the state and USAID. Before the landslides and floods of 1954, the government had identified the Chitwan Valley as ideal for land reclamation and development and in 1953, USAID had planned to conduct aerial, topographical, and soil surveys of the Valley (Skerry et al., 1991). Further, USAID was assisting Nepal in a program of malaria eradication and the 1954 initiative fell within the purview of this proposition. That same

year, the Chitwan Valley Development Board was created to establish an institutional basis for resettling the affected families in the Valley. Though the United States had previously denied development and relief aid to Nepal, it became evident that ‘significant favorable political impact’ could be gained under the guise of flood relief programs for the Chitwan Valley (Ghimire and Robinson, 2015). This set off a competition among Cold War powers for political influence in the form of aid programs. However, the results were mixed largely because donors did not understand the existing context, but also because of Nepal’s precarious political situation and in part because of disorganization on the part of the government to receive aid and implement programs (Ghimire and Robinson, 2015).

2.2. THE POST RANA PERIOD - THREE DECADES WITHOUT ORGANIZED DISASTER RESPONSE

With the notable exception of the 1954 Chitwan Valley Resettlement (see Box 1), the three decades from the fall of Rana rule in 1951 to 1980 were a period without an organized response to disasters.

The three decades from 1950 to 1980 were marked by an absence of organized response to disasters and an increased awareness of the impacts of environmental degradation and population growth on environmental risk. The emergence and consolidation of the Theory of Himalayan Environmental Degradation in the 1970s, which suggested that upland deforestation was the reason behind lowland flooding, shifted the focus of governments and donors to mitigating the harmful impacts of erosion by implementing watershed conservation projects. Additionally, during the 1970s, Nepal’s social and economic challenges began to receive greater academic attention. As Blaikie et al. write in their classic work, *Nepal in Crisis*, “There are frequent

famines and the processes of erosion and ecological decline, coupled with continuing population growth, that will contribute to an increase in apparently ‘natural’ disaster in the future” (1980, p. 5)

Even given these challenges and increased awareness the government treated each disaster on a case-by-case basis, and the response was at best ad hoc and sporadic. An indication of how the government in Kathmandu responded to disasters is captured in geographer Harka Gurung’s account where he reminisces about his travels to the affected Far-West development region to provide relief to the victims of the 1966 earthquake. As he writes:

The worst affected areas by the previous year’s earthquake were in the hills, and we left... for Doti... We had the task of estimating the requirements of food aid to the affected population in addition to what had already been airdropped the previous autumn. (1980, p. 19).

The first visit of the Red Cross took place a full year after the 1966 earthquake disaster.

2.2.1. Institutional Changes: 1980-1982

With limited DRR governance at the national level and no institutional structure and policy directed towards disaster events, response to disasters remained ad hoc and relief based until the Natural Calamity and Relief Act was promulgated in 1982. Although it is difficult to pinpoint the exact reason for the promulgation of the Act, it seems to be the result of several events. In 1980, there was a major earthquake in Bajhang in the far-western region of the country, which resulted in over 100 deaths and tens of thousands of impacted structures. One year later, in 1981, South Kathmandu faced a cloudburst that devastated Lele Valley. Further, cloudburst triggered floods washed over Dauretol, Butwal in Central Nepal.

As Manandhar and Rylander describe it, response to the 1980 earthquake continued to be mainly relief based, which faced distribution and corruption challenges. As they relate,

“the first cartel of help in the form of food, clothing, and tents had arrived with the help of the Red Cross. The local officials and the politicians were given the responsibility of these materials. While relief itself was received with support of the Society, the challenge was more in the distribution of the materials to the needy... Favoritism was perhaps unavoidable and those who sided with the local politicians received the gifts more handsomely than others did... The poor, of course, almost always got the worst deal” (Manandhar and Rylander, 1985, p. 38).

Citing a resident, the author notes, “We found some blankets, received as a form of relief for the victims, being sold across the border in India.” The relief was used to solicit political and other types of support. While to some level this practice continues, the level and international attention garnered by the embezzlement of relief materials in 1980 reached the corridors of power in the capital, thereby initiating the process leading to the 1982 Act.

The efficacy of the 1982 Act was tested in 1987 and again in 1988 when a major flood and an earthquake struck

Nepal. In 1987, a massive flood ravaged East Nepal and the following year, a 6.5 Richter scale earthquake hit Udayapur in the same region killing 721 people and damaging 66,382 homes. The impact of the flood and earthquake exacerbated the long-term vulnerability of the people affected. In 1989, the 1982 Act was revised to include preparedness and rehabilitation aspects of disaster management. That year, Nepal also began the National Building Code (NBC). Disaster management mostly continued to be guided by relief as an ad hoc and a one-off event. The 1982 Act was again amended in 1993.

The 1980 earthquake and the creation of the 1982 Natural Calamity and Relief Act illustrate the potential of disasters to create opportunities for transformative change. Yet, as is the case with the 1980 earthquake, the potential was not sufficient to beget such change.

2.3. DEMOCRATIC RESTORATION AND PERIOD OF CONFLICT (1990 TO 2006)

The end of the 20th century and beginning of the 21st century was marked by a transition towards democracy that stalled with the onset of a civil conflict that ultimately impacted the structure and provision of DRR throughout the country. Even given the civil and political challenges during this time period, Nepal did begin to pass and implement policies and guidelines aimed at preparedness. However, on the ground DRR continued to be largely reactive.

In 1990, the first people’s movement took place. This movement resulted in the reestablishment of a multiparty democracy and brought the institution of the monarchy within the constitutional ambit. Nepal’s 1991 constitution allowed for multi-party organizing, granted freedom of the press, broadened the legal protection of rights, and introduced the non-discriminatory right to vote. On the economic front, the government pursued a market-oriented policy that allowed for participation of the private sector in domestic air transport, in the financial sector such as banking and insurance, in health and education, and in hydropower development. Other policy reform measures

included the elimination of price controls on products, reducing subsidies, removing the license of imports as well as the establishment of a convertible currency for all current account transactions.¹ Additionally, the government replaced the existing sales tax with a value-added tax to make the taxation mechanism practical and transparent and to increase revenue.

Soon, as was experienced in the 1950s after the fall of the Rana Regime, political factionalism began stalling this transformation of the country from elitist rule to democracy. Horse-trading, along with intra and inter party disputes, heightened instability. Other structural challenges began to emerge including fragmentation, dis-coordination, and lack of accountability and limited regulatory capacity of the government, a weak information base, as well as limited in-country employment opportunities and institutional dysfunctions.

While the major political parties started operating through a patron-client network further perpetuating the rent-seeking state, the grievances of the country's socially and geographically marginalized populations remained unaddressed. As a result, the hinterland simmered with discontent. In February of 1996, the Maoist Party declared the "People's War," which posed security and constitutional challenges and which led to the deaths of more than 17,000 people.

The June 2001 palace massacre came as a devastating shock to the Nepali social and cultural psyche ultimately eroding the legitimacy of the institution of monarchy among the people. The late monarch's brother, Prince Gyanendra, assumed the throne. A year later, in 2002, following recommendations from the then prime minister, the new king dissolved the existing elected local bodies, compounding political uncertainty.

In the resultant political void, officials of the Ministry of Local Development and all-party committees were entrusted with the responsibility of overseeing local

development activities including disaster management. These bureaucratic measures prevented and arguably derailed the institutionalization of the grassroots electoral democracy. This lack of capacity at the local level meant that implementation of disaster management and recovery tasks remained ineffective.

In the early 2000s, the new king hoped to assert his right to rule, as his late father King Mahendra had done in 1960. His desire to acquire state power in the face of Maoist violence was construed as an attempt to stifle the country's multiparty democratic journey. The Maoists sought to abolish the monarchy, while mainstream political parties and civil society groups objected to the king's direct rule, but supported the 1991 constitution. In 2005, the Maoist party and the mainstream political parties signed a peace deal in New Delhi to end the civil war. A year later, Nepal underwent a second People's Movement that resulted in the ousting of the institution of the monarchy. In 2008, Nepal formally became a democratic federal republic.

The Maoist conflict claimed a heavy toll on rural communities. It displaced up to 150,000 people and led to thousands of disappearances. After the peace treaty was signed, some Maoist fighters were integrated into the Nepal Army and the international community began to channel financial resources into the country to support peace-building efforts. However, many of the contentious issues of the conflict remained unaddressed for the decade following the signing of the peace treaty. Issues of citizenship, federalism, inclusion, and representation in the Tarai became contentious, and Nepal faced a new cycle of violence and instability, characterized by frequent changes in the government.

While these processes continued, changes in the DRR landscape were evident. Nepal amended the 1982 Disaster Act in 1993. The same year central Nepal was ravaged by a significant cloudburst that led to massive landslides and devastating floods. Additionally, in the face of many large and small disasters, the government prepared a plethora of guidelines and strategies. Thus, in theory, Nepal had laws, policies, and organizational arrangements to respond to disasters and minimize their impacts. Yet its basic

approach continued to be reactive, executed only after an event had occurred.

This reactive response was evident in the year before the Gorkha earthquake when Nepal faced seven climatic and non-climatic disasters (Dixit, 2016). As in the past, the focus of post-disaster response was guided by providing relief while vital social and economic recovery tasks became peripheral. Further, because structural inequalities were not addressed, the most vulnerable communities remained outside the ambit of recovery programs, however ineffective they were.

The condition of those affected by previous disasters continues to remain what it was before the occurrence of a specific disaster and efforts at recovery are far and few. Moreover, the general political context made the challenges of disaster mitigation more daunting. Further, these efforts were not anchored in the processes of achieving transformative changes. When the Gorkha earthquake struck in the midday of 2015 April, these political and social conditions and DRR actions had not significantly changed.

2.4. THE GORKHA EARTHQUAKE

The Gorkha Earthquake hit Nepal as the country was still reorganizing itself after ten years of civil conflict. When the earthquake struck, institutional arrangements and processes were in flux as the new Nepali constitution, recently completed by the Second Nepalese Constituent Assembly, was still being promulgated. As a result of this governance restructuring, while large amounts of humanitarian assistance were provided, the response was fragmented and chaotic.

Having produced and promulgated the new constitution, the primary challenge today for Nepal is in setting a new cultural tone within Nepali institutions. This is a difficult task as without an institutional history and the momentum and clarity such histories provide, some agencies are experiencing high levels of top staff turnover and internal politics. However, there are positive signs within Nepal that agency cultures are transforming. The

case of the electric power system in Nepal provides insight into this change. In 2010 the electric power system in Nepal was infamous for its unreliability and scarcity. Even in locations where the supply system was in good repair, "load shedding," the process of turning off supply to whole segments of the power grid, had, at one point, grown to 21 hours per day. Today load shedding in Kathmandu is rare.

Nonetheless, institutional change is difficult and takes time as is the case with Nepal's institutional response to the Gorkha Earthquake. However, what these changes hope to address is, at the core, a lack of coordinated state level response and reconstruction actions following disasters. Nepal's history is one marked by disasters and political conflicts, which have impacted the structure of national DRR activities. As a result, it is the community and community based-organizations that have stepped in to fill the gap left at the national level.

¹ The 1980's Structural Adjustment Program of IMF and the World Bank had initiated market-oriented economy and privatization of public sector entities.

3 *Community-based Organizations*

What is not well captured in Nepal's written history of disasters and their response is the history of community-level governance and their value to disaster recovery. While social capital was strong at the community level and played a crucial role in disaster response and recovery during many of the disasters mentioned in the previous section, there was little interaction between the emergent, informal, governance structure of the village and the national level government in Kathmandu. However, this changed with the movement of Community-based Organizations (CBOs) in the 1980s, which provided structure and formalization to community-level responses to disasters.

CBOs are organizations that are built for, and at the scale needed, to address community needs. For our work, we define CBO communities as those communities with households that have geographic proximity and a shared livelihood resource around which CBOs are, at least initially, developed. Guthi (religious and cultural trusts), Kulo Samiti (irrigation user groups), Parma and Mela (labor exchange in farming) Ban Samiti (forest user groups) and Sajha (cooperatives) are example of early CBOs in Nepal. These have undergone transformations, and while institutional arrangements now are more formal than in the past, the ethos of collective decision making and action remains unaltered. Community Forest User Groups (CFUGs) are the most discussed CBOs in Nepal. They are usually founded and sometimes supported with external assistance, though in Nepal many no longer

need the external support to maintain themselves. This is particularly true for the Community Forest User Groups (CFUGs).

3.1. CFUGs IN NEPAL

CFUGs emerged in Nepal in the 1970s when International Non-Governmental Organizations (INGOs) identified discrepancies in the health of forests, noting that forests with better health were managed by the local community engaged in a commons' governance. This recognition resulted in shifting the management of the forests away from national control to the local communities, and under the responsibility of the CFUGs.

Before the consolidation and nation-building of the 18th century, Nepal's forests were traditionally managed (Acharya, 2015) in a non-formalized process of resource management that had been practiced by human communities since prehistory (Gilmour, 2016). However, the onset of the Rana Regime in the 1700s shifted the management of the forests away from the local communities as the Rana Regime gave away forest land for political gain. During the Rana Regime community forest lands began to be deeded to politically important people in Kathmandu when the regime faced internal challenges, it began a process of land grants in the countryside to build support among the elite for the regime. The central government increasingly enforced these land rights. While communities countered these actions through

organized, non-violent resistance, the number of land grants to members of elite families continued. However, with the departure of the British from India and with them, one of the status quo supporting threats to Nepalese independence, Rana rule fell in 1951.

With the fall of the Rana Regime and the global ascendancy of a more “scientific” management paradigm, the central government took possession of all of Nepal’s forests with the “Private Forest Nationalization Act” of 1957. Within this paradigm, one that emphasized a centralized, top-down, technical and expert-driven approach to resource management, communities were seen as incapable of managing their resource. As Dakin (2003) points out; “Unfortunately [... non-technocratic] types of knowledge and ways of knowing are deemed less valid and are rejected (implicitly and unquestioningly), in environmental management processes, including [by] those espousing ‘citizen’ or ‘public’ participation” (p. 96). For the next 25 years, the management of the forests remained within this paradigm, with centralized management located in Kathmandu.

Though many saw the 1957 act as a move toward justice after land seizures and enforcement by the elites during the Rana period (Pokharel et al., 2007), many of the forests started to degrade over time as bureaucratic processes and incentives overwhelmed the needs of the forests. In response, by the 1980s efforts to put communities back in charge of governing the forests had succeeded in transferring the most degraded forests to community-led CFUGs (Pokharel et al., 2007). Eventually, the CFUGs were so successful that they expanded on their own without external assistance (Acharya, 2015; Pokharel et al., 2007).

3.2. EXPANSION OF CBOs

Though CBOs (like the CFUGs) initially focused on livelihoods and natural resources, they quickly expanded to begin to address other development needs including energy infrastructure, roads, savings institutions, and education (Pokharel et al., 2007) even engaging in and enhancing the peace process (Acharya, 2015). Through these services, the CBOs also contributed to maintaining and strengthening

social capital in communities across Nepal (Pokharel et al., 2007).

An example of the social capital value built by CBOs was given by Acharya (2015) where he recounted the story of Kriparam (no last name). During the civil conflict of the 2000s, Kriparam joined the police department in a rural community in Nepal. His family received multiple threats, including threats of death or abduction by the Maoist rebels in the area. But due to his poverty, he felt compelled to continue to hold the relatively well-paying position. On September 3rd, 2003 he was abducted. However, the local CBO organized and worked intensively for his release. He was released five days later without conditions and he returned to his job (Acharya, 2015).

While this anecdote tells a story of one individual and his family, it illustrates the broader role that CBOs play within rural communities in Nepal. In addition to supporting livelihoods, development and involving themselves in civil and societal issues, they also play a role in disaster recovery and response.

3.3. SOCIAL CAPITAL AND POST-DISASTER RECOVERY

A key to disaster recovery, and thus a central part of resilience to disasters, is social capital. However, to date, the standard response to disasters, to make financial capital more readily available, suggests that decision-makers continue to view disaster recovery primarily as an issue of access to money. For example, governments will often offer low-cost loans to households and businesses following disasters as well as financing for local governments towards infrastructure reconstruction. Further, much cutting-edge work today continues to focus on the financial aspects of recovery: examining how to bring insurance products to communities, and reinsurance and catastrophe bonds to the national level across much of the developing world.

Research shows that the availability of financing is not the only variable that allows communities to recover quickly. Another important aspect of recovery is a community’s social bonds. As Aldrich (2012) notes, positive social

capital, regardless of financial wealth, provide people with the capacity to recover more quickly than those without. Therefore, if resilience is the capacity to recover quickly, then social capital is one of its critical characteristics.

Social capital, or the “ties that bind us together” (Aldrich, 2012), includes those interpersonal relationships that provide value to a community. The concept has been receiving increasing interest in the disaster community because of its value in disaster recovery. Pelling and High (2005), for example, emphasize the impact of social relationships on the capacity of people to adapt following disasters and Chamlee-Wright & Storr highlight its value both before and after a disaster:

Before a disaster, social capital facilitates community-level planning for disaster mitigation and preparedness as well as evacuations and the provision of shelters as hazards approach. After a disaster, community members deploy social capital as they work to coordinate emergency management and community return, to provide material resources (in the form of potable water, food, clothing, shelter, etc.) to the vulnerable, and to rebuild damaged houses, businesses and other social spaces in their communities (2011, p. 266).

Collective narratives which contribute to group identity and in assessing status and rights also foster social capital (Chamlee-Wright & Storr, 2012). Such narratives can set the tenor of the community’s post-disaster mindset and influence community members by either empowering or dissuading pro-recovery behaviors and actions.

Daniel Aldrich (2012) uses his family’s experience of a move to New Orleans two weeks before the city’s flooding during Hurricane Katrina and their capacity to recover as the impetus to expand on what is known of the value of social capital in disaster recovery. In examining the 1923 Tokyo Earthquake, the 1995 Kobe Earthquake, the 2004 Indian Ocean Tsunami, and Hurricane Katrina in 2005, he finds that social capital has a positive impact on recovery. For example, in Tamil Nadu, days after the Indian Ocean

Tsunami, villages with strong uur panchayats (caste/tribal councils) organized their communities to begin search and rescue and clean-up, recording the number and names of the dead in the lead up to the Indian government official’s arrival. These strong village level social networks, or “bonding” social capital, were further reinforced by a form of “linking” social capital, whereby these networks were connected to higher institutional levels of collective *uur panchayats*. (Aldrich 2012, 91).

However, Aldrich also finds the benefits of social capital often do not translate for the most marginalized. For example, even though the strength of the *uur panchayats* were essential for quick recovery (there was no sign of any response or recovery in the villages where the uur panchayats either did not exist or were weak) those outside of the network, such as Dalits, widows, and other marginalized people, did not receive any benefits from recovery efforts either prior to or for months after the government’s response (Aldrich 2012, 91-92, 128-129).

3.4. SOCIAL CAPITAL IN NEPAL

Historically, social capital has served as the linchpin in Nepal’s resilience to impacts. However, recent demographic and economic transformations are weakening these social arrangements. Today, Nepal is in many ways transforming. Like much of Asia, Nepal’s wealth is increasing, and they have a growing urban population. The civil conflict, which started in 1996, provided a push that started the process of urbanization. However, even after the conflict ended, access to services and financial capital are providing a pull for people, while stability allows other areas to begin urbanizing.

Further, with greater stability, money is being invested, and wealth within the country is building. Though scholars often view urbanization through both a positive and negative lens, increased wealth and access to services are improving people’s lives and future trajectories. However, both urbanization and wealth have a negative side which is starting to become more apparent in Nepal, namely, the weakening of social capital. This breakdown of the “ties that bind” is apparent in people’s increased remote



4 Integrated Land-use Planning as Transformational

Through the Global Resilience Partnership and Rockefeller Foundation Supported “Rebuilding with Resilience” program, ISET-International and ISET-Nepal worked together with local communities and NGOs on the post-earthquake recovery process in Nepal. The work formally started in March 2016.

Through a process of Shared Learning Dialogues (SLDs), the program first sought to understand community needs while also integrating them with an understanding of the hazard landscape. From the lessons learned, the program would then facilitate a small pilot effort and produce further proposals.

However, delays in the approval process, as the government reorganized and grappled with both the impacts of the earthquake and the influx of assistance, also had an impact on community aspirations and patience. By the time of approval, the time for formal dialogue process had passed. Nonetheless early informal discussions with the community suggested a desire to focus on capacity development with the aim of supporting livelihood options. Aligning the desire for livelihood options with the need for shelter could quicken the pace of reconstruction efforts while also building resilience. This work resulted in several suggested projects such as a tools library and associated training, a community center, and savings cooperatives, which supported the diversification of livelihoods as well as reconstruction efforts.

While most programs were on hold, two Nepali actors, well-known for their daytime television program, were given clearance to fund and implement a “model reconstruction community.” These homes included all elements of seismic engineering. They also included “middle-class” amenities, such as cookstoves and appliances that are sought after symbols of success and progress. However, these appliances are expensive to supply to all affected households and were not well suited to the low infrastructure, low service environment found in most of rural Nepal. Nonetheless, it was the aspirational qualities of the housing and its wide media coverage that instilled within communities a sense of the “benchmark” for reconstruction efforts. ISET- International and ISET-Nepal’s efforts occurred within this context of shifting expectations and a building sense of frustration with the lack of progress.

Once official recognition of the project was awarded, further work with the community led to the integration of the community’s new aspirations with their current livelihoods and their plans to diversify, all with an eye toward social, economic, and environmental sustainability. With these lessons learned, ISET-Nepal worked with the local earthquake affected community at Jarayatar in preparing a pilot effort at integrated land use planning, which the community submitted to the National Reconstruction Authority (NRA). The NRA has approved the proposal for implementation.

interaction as well as a decrease in their willingness to participate in what used to be communal activities such as house building (M. Hammer, personal communication, May 12, 2018). Meanwhile, the social change brought on by the growth of the middle-class has had a profound impact on the social capital that had been embedded in the caste system (Liechty, 2003, p. 100). This deterioration of social capital is occurring without a concomitant growth in the effectiveness of higher levels of government to meet people’s disaster risk reduction and recovery needs (Jones, 2014), thereby compromising Nepal’s resilience to disaster impacts.

Throughout Nepal’s history, community-level actions and organizations have contributed to DRR and to meeting people’s social and economic needs through fostering social capital. Thus, actions at the community level are needed

to shore-up this loss. ISET-Nepal’s integrated land-use planning is an example of one such community-level action that can counter the trend and enhance social capital and which, we argue, is transformational for its focus on both the social and ecological needs of the community.



4.1. INTEGRATED LAND-USE PLANNING

As originally envisioned, integrated land-use planning (ILUP) sought to bring ecosystem needs front and center through incorporating ecosystem functions, such as groundwater recharge, into rural land-use decisions. It was initially designed to be used in developed contexts where human-ecosystem interactions have a different character than in developing settings. A core component of integrated land use planning includes convening a broad scope of stakeholders to 1) enhance understanding of the Social-Ecological System and 2) to work through an analysis of potential trade-offs. Ideally, the assembled stakeholders would represent all current users of the resource including those that use it for aesthetic purposes and/or those who advocate for its use as an environmental public good.

4.2. PROPOSED INTEGRATED LAND-USE PLANNING PROGRAM

Expanding on this traditional conceptualization of ILUP, ISET-Nepal's approach to integrated land-use planning takes a step back from the ecosystem focus of the more traditional ILUP to also integrate social and cultural aspects of land-use into decision making. Thus, in the context of ISET- Nepal's program, the concept of integrated land-use planning is extended beyond its

original scope. In Nepal, there is a higher density of people, and more of them use the various land types for their day-to-day livelihoods. Given this greater "social density" within the social-ecological system, ISET-Nepal's program gives more attention to the social aspects than does traditional integrated land use planning thus addressing the aspects of the system that bring value to people's lives.

Specifically, ISET Nepal's approach to ILUP focuses on balancing all areas of value and incorporates the latest technical and socio-cultural information. Their process integrates technical and non-location specific ("expert") knowledge with the knowledge narrative of the end users and of those whose livelihoods are situated within the landscape. Fully integrated land-use planning is established through a clear dialogue process, with multiple stakeholders, whereby trade-offs are assessed and mitigated. As with any process of engaging a complex system, new stakeholders emerge, and new understandings of the system are revealed over time. Thus, the process is also expected to be iterative.

In this case, we highlight the value of integrated land-use planning in improving social capital in villages just as forces in the larger Nepali society are beginning to degrade community cohesion. As noted in the introduction, in fostering social capital this work improves the resilience of communities and acts as an example of how Nepali society overall can move forward.

4.3. HOW IT IS TRANSFORMATIONAL

The key transformational aspect of integrated land use planning is that it promotes social capital through the creation of shared building and maintenance objectives. This enhancement in social capital, essential to past and present Nepali DRR governance, will help to counter the movement away from collaborative and shared institutions that has emerged as urbanization and increased individuation bring on associated change in social interaction.

4.3.1. Middle-Class Aspirations

In recent years, Nepali society has undergone a transformation. As the middle class has grown, and wealth and urbanization have increased, there has been a shift in expectations. The growing ubiquity of televisions, even in some of the more remote areas, has contributed to increased exposure to the images of middle-class life. These include the images of material possessions and what they symbolize within the social hierarchy. They also include the behaviors associated with social and cultural cues of middle-class lifestyles and behaviors that are more individualistic (Liechty, 2003, p. 183). In such mindsets, collective efforts are seen as more old fashioned and backward. Though tight-knit communities can indeed be oppressive, particularly for residents who are marginalized (e.g., Aldrich's uur panchayats), they are also central to resilience and as evidence from Nepal shows, they need not be exclusionary.

4.3.2. Social Capital

One of the first actions taken in the Jarayatar community was the organization of the Permanent Reconstruction and Rehabilitation Committee (PEREREC), a community-based committee focused on reconstruction and constituted by earthquake affected families of Jarayatar. In ISET-Nepal's ILUP work, PEREREC's role will be to coordinate the pooling, shaping, grading, reallocation and distribution of land among householders in each settlement. Householders are expected to recover the

construction materials (stone, timber elements, doors, and windows etc.) from their damaged houses and to implement the land grading (either on their own or with additional labor). Once they have recovered the construction materials and finished land grading, land for the development of each homestead will be pooled, a layout of access roads/walkways marked, and plots mapped for each settlement. The boundaries of the homestead plots will then be superimposed on the settlement level map.

While households will be allocated land at their original location, the boundaries of the land will be altered, as available land needs to be readjusted to fit the needs of the minimum size of a homestead. Some houses may have to shift to a new location due to the limitation of the land size or for other reasons. Such readjustments will be implemented through consensus among the householders. Once the readjustment and redistribution are accomplished, the pooled land will be redistributed and re-registered in the District Land Revenue Office following the norm set by the National Reconstruction Authority (NRA).

A key house construction attribute will be Sociability: Integration of livelihood and considerations of local style, culture, and traditions.

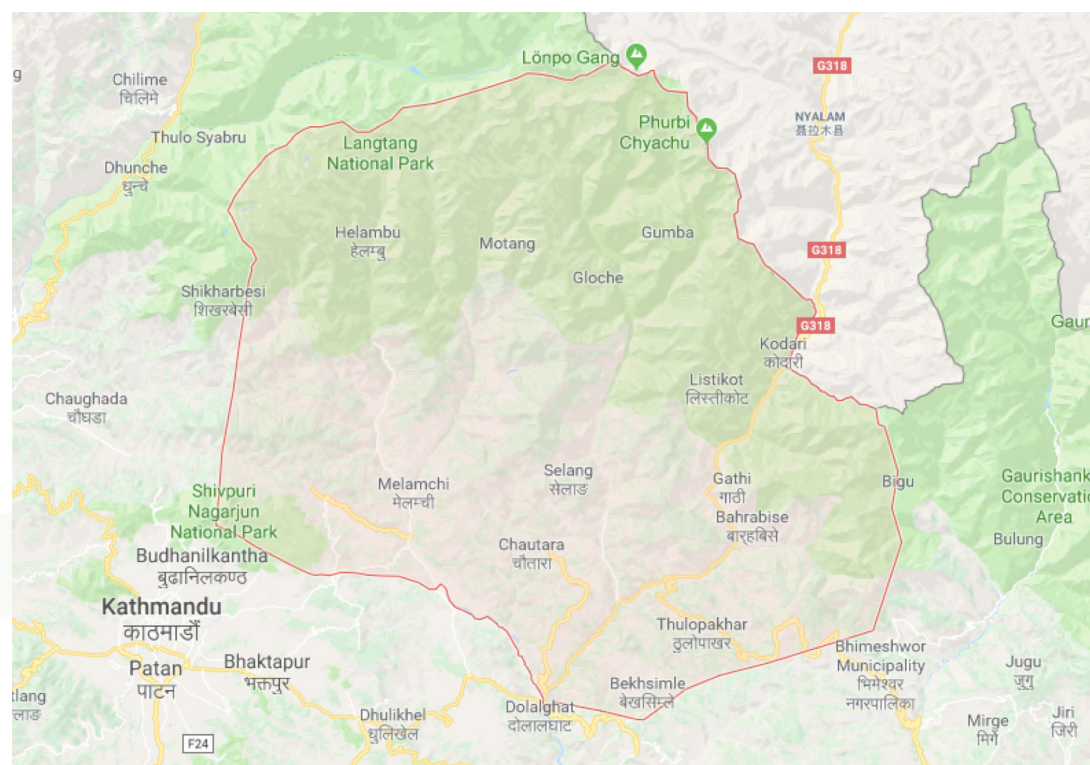
4.4. HOW WILL IT BE DONE

The integrated land use planning program is designed to put the needs and aspirations of families who were affected by the earthquake at the center of recovery efforts and to help them take ownership of the reconstruction. The project will engage with the affected families in Jarayatar, also known as Ward No. 11, of Melamchi Municipality in Sindhupalchok District. The work includes the following:

1. A reconstruction plan for replacement of damaged houses.
2. Rebuilding and improvement of infrastructure.
3. The development and diversification of income and livelihood options.
4. The conservation and management of natural resources to support ecosystem-based service options.

FIGURE 1

SINDHUPALCHOK DISTRICT. NOTE MELAMCHI IS LOCATED IN THE SOUTH WEST



4.4.1. Location and Physical Setting of Jarayatar

The earthquake severely affected Sindhupalchok (Figure 1) and 14 other districts (Gorkha, Dhading, Rasuwa, Nuwakot, Kathmandu, Lalitpur, Bhaktapur, Kavrepalanchok, Dolakha, Sindhuli, Makawanpur, Ramechhap and Okhaldhunga) with another 17 districts facing moderate damage. In total 32 districts were affected by the earthquake with Sindhupalchok facing the worst of the damage.

The village (Figure 2) is at an average elevation of 1,349 meters above sea level. Situated northeast of Kathmandu, it takes about 3 hours to reach Jarayatar via Melamchi Bazar by motor vehicle. A 5-km all-weather Melamchi-Daduwa Road connects Melamchi Bazar with Jarayatar. The village has four clusters: Pande Gaun, Upper Dhital Tol, Lower Dhital Tol, Sapkota Tol and Chalise Gaun (Purohit Tol) with a population of 315 living in 63 households. These

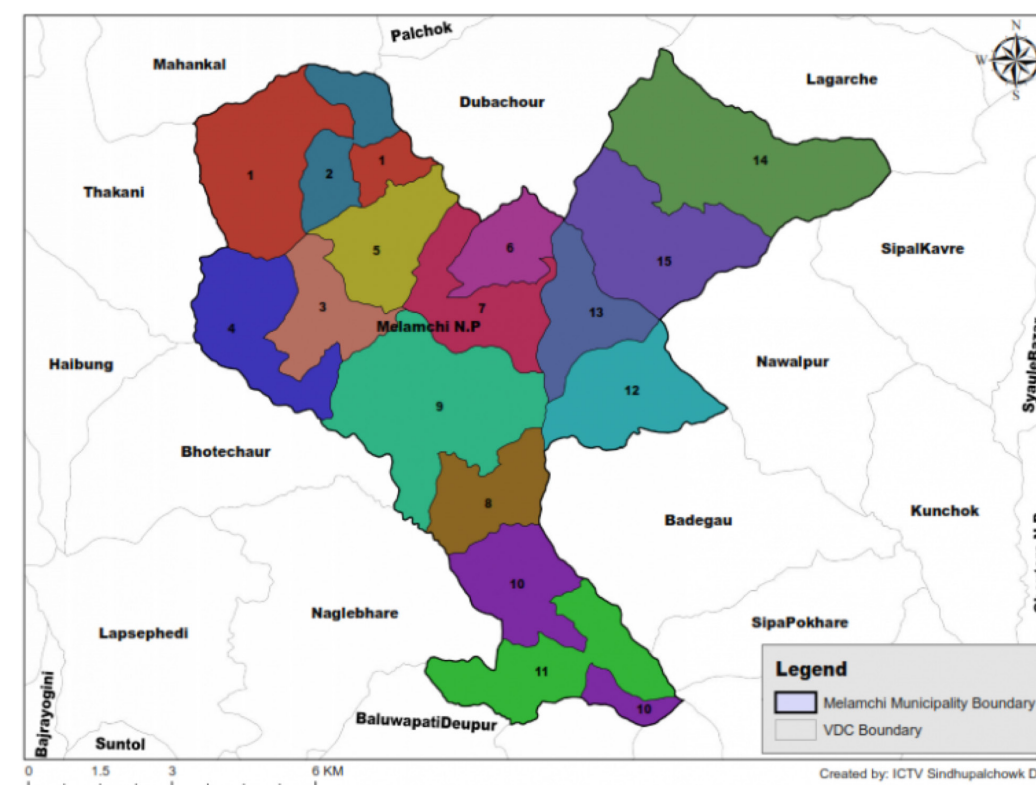
four clusters are located on a landscape with highly diverse soil types. Thus, homestead location can lead to very different opportunities and constraints.

The Melamchi and Indrawati rivers flow from the west to the Melamchi Valley and Melamchi Bazar to the east. Jarayatar, located along the middle ridge of the hills, has a sub-tropical to warm temperature climate. The region receives an annual average rainfall of 1,800 mm of which 80% comes in the monsoon months (mid-June to mid-September). The amount of rainfall at Jarayatar is generally higher than in the valley floor.

The villagers practice crop and livestock-based farming, typical of the Nepali mid-hills. The village has a gravelly soil type that transitions to a loam clay to sandy loam soil as it approaches the river. The soil is moderate in fertility. Together, the climate and soil type are suitable for cultivation of cereals, pulses, oilseeds, fruits, and

FIGURE 2

THE MELAMCHI MUNICIPALITY OF SINDHUPALCHOK SHOWING WARD 11 IN THE SOUTH



vegetables. In the dry season, water scarcity becomes an issue and reduces crop yields. The road connection to Melamchi Bazar, the main urban center of the Melamchi Valley, has created some local jobs and income generating opportunities.

The earthquake flattened most of the houses of the four settlements in Jarayatar. Within the village there were some injuries, but no fatalities and while a few homes survived, they were rendered unsafe to live in. Perhaps the most significant impact for the residents of the community were the losses of livestock, a vital source of income, due to collapsed shelters. Additionally, local infrastructure (roads, water supply, and electrical transmission lines) were damaged, and their services disrupted.

In the years following the earthquake there have been some community and individual efforts toward reconstruction. These efforts have led to learning and awareness of

hazards and have enhanced people's capacity to prevent, prepare, and respond to them. Unfortunately, despite this effort, many families who lost homes are still living in temporary shelters.

4.4.2. Housing

Replacing damaged houses is the most critical need for the affected families of Jarayatar. In interviews, families indicated that they were aware of the risks of poor housing design and construction in addition to the risks from other hazards such as mudslides and rockfall. Specifically, families noted that their houses, made of stone and mud masonry, could not withstand the shaking from the earthquake, leading to widespread damage and the loss of livestock. The families also recognized that even a tremor of a much lower magnitude than the Gorkha Earthquake would likely have flattened their homes. Additionally, they are aware that another high magnitude earthquake, similar

to or greater than the Gorkha Earthquake, could happen again and that they are at risk from other hazards such as mass wasting (mudslide, landslide, and rockfall), and fire, and that their livelihoods are at risk from drought. As a result, they understand that in rebuilding their homes, they must be built back safer and that their livelihoods should be resilient to hazards so that they are not as vulnerable to future events. They do not want to repeat old practices in building houses and dwellings.

When asked if they aimed to rebuild their homes with the traditional mud and stones, yet with earthquake safety elements incorporated into the construction, they said no. Instead, they felt their houses should be built with stone or brick with cement mortar or cement-concrete and steel elements in the foundation as they perceived these materials as providing resistance against seismic shocks. Importantly, however, they desired that their new house maintain the social and cultural ambiance that existed prior to the earthquake.

Additionally, as revealed in the interviews, impacted families felt that, rather than simply reconstructing their damaged houses, it was the right time to develop a planned settlement. Working with these households there emerged a shared vision of the reconstruction, which was integrated into a proposed settlement which would include the following features:

1. All houses are connected to a road, wide enough for the movement of ambulance and fire engines.
2. All houses having access to safe drinking water, electricity with solar PVC as back up, toilets, space for cleaning and washing, disposal of wastewater and adequate rainwater drainage.
3. A biogas plant in each house to reduce dependency on fuel wood and to promote a smoke free environment in the house.
4. An open space centrally located in the community suitable for multiple uses: a playground, a place for public gathering and for evacuation and relief operations in future emergencies, and a temple. The space could also be used for training youth and women to begin cottage industries.

The families also suggested that village-based cooperatives (CBOs), which exist regionally in various forms, could be a viable mechanism in promoting local income-generating activities. A farmers' producer group, a women's group, a dairy cooperative, a saving and credit cooperative, and a marketing cooperative could all help to promote the enterprises they hoped to build based on the crops, livestock, and natural resources available in the area.

Families also identified the conservation of forest, grazing land, soil, and management of water sources (especially springs) as critical issues. Families in all the clusters indicated that spring sources had either dried up or their flow was significantly reduced. Indeed, following the earthquake, many spring sources have dried up, while new ones have emerged. The families noted that these freshwater springs are necessary for meeting irrigation and drinking water needs, but are also crucial to supporting the diversification of production enterprises and new income opportunities. As a result, they prioritized the conservation and management of springs.

Households also identified the possibility of rural and agricultural tourism in the area. They felt that a clear view of the snow-covered Jugal Himal peak and sunrise from the settlement could offer an attraction for visitors from Kathmandu and other parts of the country. They hoped to start a homestay facility to attract local tourists.

4.4.3. Basic Services

In the proposal to the NRA, the project would provide shared facilities, which would be built in collaboration with the community. These facilities will include a health post that would offer services to the 4 clusters, as well a school in Jarayatar that will cater to the children there and in adjoining villages. The plan will also include the possibility of cultural, sports and commercial facilities that can be adopted in staggered efforts in the future. The proximity of the homes to each other will also allow for the more cost-effective provision and maintenance of service infrastructure such as electricity and water supply.

4.4.4. Land Use Plan

Currently, land is divided into residential, agriculture, forest, and pasture land. However, the proposal incorporates several other features, which emphasize social capital, livelihood development and the provision of critical services such as electricity and water into the land use plan. Based on a neighborhood concept, the plan incorporates a residential cluster, community space, Chautari, multipurpose community buildings, a marketplace, and more importantly a focus on preserving cultural heritage. It also includes community-farming zones that incorporate both agriculture and grazing. Further, it highlights a need to define a growth boundary for future expansion.

In regards to essential infrastructure, the land use plan also calls for the development of shelter for livestock, the construction of a biogas plant, rainwater harvesting systems and the implementation of a Solar PVC system. Ultimately, these elements, which the community will help finance, build, and maintain will contribute to building social capital, and livelihood development as well as to ensuring the more sustainable provision of electricity and water.

4.4.5. Livelihoods

In addition to contributing to psychological and emotional hardship, the Gorkha earthquake has also impacted economic opportunity. While reconstruction focused on shelter, physical infrastructure and key services, respite from the hardships imposed by the earthquake will only be possible with an equal emphasis on rebuilding livelihoods. With this in mind, if communities can make incremental improvements in their livelihoods, they can also contribute to a resilient recovery. Productive employment and income diversification can contribute to self-reliance and are mechanisms for achieving these outcomes. These efforts can also produce enough savings to invest in income generating enterprises.

The livelihoods and economy of people in Jarayatar is agriculture based. The majority of households practice maize and millet-based cropping in non-irrigated upland terraces (pakhobari) and cultivate rice in the monsoons in patches of irrigated lowland (khet) in lower terraces. Less

than one quarter of the farmland in Jarayatar has access to irrigation of some form and year-round irrigation is, for the most part, unavailable. Farmers grow vegetables, but only a few of them practice year-round vegetable cultivation for income earning.

In addition to agriculture, livestock rearing is a significant contributor to household income in the area and is a key aspect of farming. Most households own at least one cow or buffalo and three to five goats. The milk collected is sold to a local collection center. Farmers prefer to keep buffalo as they yield milk with a high fat content, which fetches higher prices. Manures are additional gains from animal farming.

Recognizing these traditional elements of livelihood generation in Jarayatar, the following components of livelihood reconstruction are proposed as part of an initiative focused on the development of integrated settlement in Jarayatar:

1. Commercial scale livestock production supported by a resource center in the village.
2. A farmers' cooperative for marketable vegetable production.
3. Skill-based training and enterprise for local youths.
4. Cottage industries for employing women.

Improvement in crop and livestock-based enterprises can enhance and diversify income and livelihood opportunities. They can also be incorporated with integrated settlement and community led initiatives in Jarayatar.

4.4.6. Natural Resources

The livelihoods of people in the mid-hills of Nepal are intricately linked to natural resources. The conservation and management of natural resources is thus the key to sustaining rural livelihoods. Such efforts are especially important in the areas affected by the earthquake because 1) pressure on natural resources intensified following the earthquake due to increased extraction to meet the needs for food and shelter, 2) natural resources were also subjected to damage by the earthquake and 3)

post-earthquake reconstruction has proceeded without considering the impacts on natural resources. A focus on the conservation and management of natural resources in Jarayatar with the goal of ensuring sustained productivity is thus critical for local livelihoods.

Natural resources in Jarayatar include land, soil, water (spring and stream sources), forest on public and private lands and biomass. Of particular concern for the community post-earthquake was a change in the location and production of the springs as a result of shifting geology. Further, over time, as underground sources settled into new paths and forest resources were put under strain, their behavior continued to shift. Some of the spring sources have already dried up while the flow of others has shrunk. Since spring sources are the only means of water for drinking and irrigation, their conservation and management is critical for sustaining the livelihoods of people of Jarayatar.

Narrow patches of land along the creeks and springs create an opportunity for the cultivation of cardamom and broom grass (amriso). Some households have already started planting cardamom and broom grass on sloping land. These efforts need to be more organized to help protect sloping land along the creeks and also to create a source of additional income for the families. Opportunities, such as promoting the collective farming of cardamom and broom grass on public land, can be explored. Additionally, the area under the forest needs to be expanded around the spring sources to increase the recharge of the aquifers that feed into the springs. However, because the areas under public forest are limited, farm forestry, which provides opportunities to integrate trees, field crops and horticulture and forage/ fodder components in the farming system, should be promoted. This effort will support the development of the livestock integral to the proposed recovery and reconstruction plan.

With this in mind the proposed activities for the conservation and management of natural resources include:

1. Spring-shed management, including conservation and management of existing vegetation cover in the spring-shed.
2. Planting of bamboo and other deep-rooted tree species along Melamchi-Daduwa road and the connecting roads to the five clusters.
3. Planting of cardamom, broom grass, bamboo and medicinal herbs along the creeks, both in the public and private lands.
4. Promotion of farm forestry, integrating trees (silviculture), crops (cereals, pulses and spice crops), horticulture (fruits and vegetables) and fodder/forage (tree fodder and cultivated forage) components.

5 Conclusion

Nepal's geography, its history of natural disasters, and its turbulent political history have resulted in more decentralized, community-based governance, especially in regards to disaster risk reduction. A brief look at several disasters that have struck Nepal over the last century, as well as an examination of their governance history illustrates how these past events have shaped current DRR, governance, and livelihood patterns. However, this history also illustrates how increasing wealth, urbanization, and exposure to a new and emerging culture has resulted in decreased social capital at the community level.

With the support of the GRP and the Rockefeller Foundation, ISET-Nepal engaged with local NGOs and the community early on to discover the needs and aspirations of the people of Jarayatar. Since the earthquake struck at a moment of foundational and institutional flux within the Government of Nepal the time allowed for the community's longer-term aspirations to emerge thus informing the proposed integrated land use planning effort.

This work, with Nepal's history of governance success with community-based organizations, is well situated to address the needs of the community and will build in resilience during recovery and reconstruction. Further, the social capital that this community-based effort would generate and will help enhance resilience through stemming the rural to urban exodus of community members that is presently a characteristic of the social change occurring in Nepal. This proposed work, funded by the Government

of Nepal, is a pilot program. However, plans are already underway to expand the work to scale within Nepal, thus expanding its transformational potential.

Ultimately, this program is transformative in its innovative approach to integrated land-use planning and because of its role in stemming negative change processes occurring in Nepal. Returning to Walker et al.'s (2004, 2005) definition of transformation, ISET-Nepal's integrated land-use program acts to counter the negative impacts of Nepal's urbanizing and modernizing society. In so doing it creates a new system, with novel goals and connections that ultimately contribute to building Nepal's resilience.

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Appendix 1

SYSTEM-AGENTS-INSTITUTIONS

We use the System-Agents-Institutions (S-A-I) framework, to understand how each of the elements interacts to help understand vulnerability and the actions needed to build resilience. When integrated with elements of the livelihoods framework, S-A-I links analysis of human vulnerability, institutions and systems dynamics with the five capitals to reveal practical processes for planning and identifying solutions to reduce disaster risks. Insights into the dynamic interactions among human behavior (agency), institutions (governance), ecological, and human built systems can promote alignment of contextual and scientific knowledge and technical expertise.

By examining systemic and behavioral drivers of vulnerability, it is possible to identify entry points in existing programs, policies and plans for achieving transformative changes and DRR by incrementally building capacity of agents and institutions. The entry point can inform policy makers at higher levels as well as those working at lower scales. The characteristics of systems and institutions are a function of behavior and capacities of agents dealing with change processes. As thresholds are approached, the existing system may not be able to tolerate them leading to failure. Agents must recognize these dynamics and work towards reformulating institutional character so that the combination of both can help in the design of infrastructure that help agents adapt as new thresholds approach.

When a critical threshold level at which a system fails or agent behavior changes is approached or reached, impacts on vulnerable populations increase significantly. Reducing vulnerability thus requires a fundamental shift in the agent's strategy and behavior leading to changes and institutional functioning for better design and operation of human built systems. For resilience, the designs of such systems must incorporate characteristics such as flexibility and modularity, and must be fail safe. At the same time, institutions must facilitate learning, practice good governance principles while agents must have equitable access to resources and knowledge so that they can change strategies to adapt when new constraints emerge. When agents are limited by inaccessibility to resources and/or when they are constrained by policy, institutional barriers and power structures, they cannot foresee the need for transformative changes.

How people deal with thresholds is important to be considered. Once thresholds are approached or reached, institutions cease to function normally or in the way they did when thresholds were lower. As thresholds increase, human built systems designed for lesser thresholds fail while the natural ecosystem may undergo serious degradation. The occurrence of low probability and high magnitude events, for example, represents higher thresholds. Occurrence of such events and the disruption they trigger, may to some extent, bring about behavioral changes. Thresholds are a critical point where management change is vital for avoiding failure to cascade with the

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coupled human social system accentuating adverse impacts. In fact, the changes that take place when thresholds are crossed, represent points where populations may be willing to adopt new methods, procedures or technology that such shifts may help to achieve uses at scale. Many times, changes are evident only after certain time lag. In the case of the Gorkha earthquake policy space, the opening for fundamental changes at the level of state seemed to last till the June donor conference of 2015. [when what happened?]

Thus, two months after the first earthquake shock, the collective psyche seemed to have waned; these inflection points are useful for generating insights into the ongoing change processes though much detailed and deeper research is needed. Thus, lessons from past disasters, including those from the Gorkha earthquake, are helpful knowledge in telling how policies and practices have changed when thresholds were crossed. The lessons are important for two reasons. Firstly, societies must put in place measures that will minimize large-scale disruption that reaching of a threshold may bring. Secondly, such measures can usher transformative changes. The following example helps further unpack the conception of transformation. A landslide may affect a forest patch on a hill slope while simultaneously damaging livelihoods dependent on that patch, as well as houses, a bridge, or a section of a highway. If disturbances are prevented, the forest patch could regenerate itself over a period of time. The other scenario is that the patch would degenerate and die out. On the other hand, a damaged house, a bridge and a section of the highway cannot revert back to their pre-landslide state on their own. In other words, they cannot experience transformative changes on their own. They have to be rebuilt. Thus, human agency, policy processes and practices become keys to this endeavor. Since humans set policy and practices, they remain at the center of transformative changes. In the case of human-built systems, the quality of construction as well considerations of their operation and management are important. The human cognition faculties are central to such change process.



SYSTEM

Humans depend on services obtained from natural and human built systems. A system is a combination of “elements connected together which form a whole, thereby possessing properties of the whole rather than of its component parts” (Checkland, 1981). This interaction among elements maintains functioning of the system and by looking at it holistically, its behavior and performance

can be unpacked. Both natural and human built systems consist of components also known as sub-systems. These are entities and parts that are interrelated and interdependent and that directly and indirectly influence one another continually. Human built systems include infrastructure, their services, and functions (e.g. water supply and wastewater treatment, roads, transmission lines, food storage, health services, education and

finance). Natural systems (ecosystems) consist of agricultural land, parks, wetlands, forests, ponds and the atmosphere. Ecosystems help deal with climatic shocks as the first line of defense. Together, the elements of infrastructure, and ecological and social arrangements provide key services such as the production and distribution of energy, food, water and other provisions and can help build resilience (Tyler and Moench, 2012).



AGENTS

Agents are those that act on systems for their services. Agents are usually people but they can also be households, or any collection acting in a coordinated way such as a business, a civil society organization, an academic institution, or a government. Agents’ decisions affect

resources such as land use, food, air and water, and energy. With respect to management of components of ecological and human built systems, understanding the behavior of agents is central to unpack what transformative changes are and how they can help build resilience. Because agents can engage

in deliberation, independent analysis, voluntary interaction and the design of strategic choices in the face of new constraints or new information, developing their capacity further is an important part of the resilience building process (Tyler and Moench, 2012).



INSTITUTIONS

Institutions are the “rules in use” that shape who, when, where, how, and how often an agent gains access to the services that a system produces. In response to stress, institutions direct the behavior of agents and modulate interactions among them (Tyler and Moench, 2012). Institutions are both formal and informal. As formal processes they are recognized as policies, laws, and the recorded rules. As informal processes they are habits, cued behaviors, gender roles, social mores, and customs. Both act as constraints or incentives

for use of systems services. Institutional factors can often limit the scope of action which agents take in response to stresses on systems. With regard to livelihood and employment, the patriarchy, caste system and other discriminatory social practices can impede actions for achieving wellbeing, just like constraints such as prices and policies do.

Socially or economically marginalized households, in general, have the most constraining institutions which can greatly limit access to system services. Such is usually the case when system service production is limited (e.g. a drought reduces available clean water) but

can also be the case when institutional incentives promote anti-social outcomes, such as hoarding. Much of the contested space in politics has to do with defining the line between investing and hoarding. Such agents end up becoming among the first affected when hazards disrupt the flow and stock of goods and services provided by the systems. Such population, along with marginalized institutions, also have the least political, economic, and technical ability to address the failure or improve the management of a system. As a result, they are the most vulnerable when shocks disrupt natural and human built systems.




THE HISTORICAL ACCOUNT OF RESPONSE THROUGH THE LENS OF SYSTEM-AGENTS-INSTITUTIONS

TABLE 1




HISTORICAL ACCOUNT OF RESPONSE THROUGH THE LENS OF THE SYSTEMS-AGENTS-INSTITUTIONS RESILIENCE FRAMEWORK




1934 - 1960

 SYSTEMS	Natural ecosystem	<ul style="list-style-type: none">• Wetlands, ponds, open land and forests intact. No major anthropogenic influence. Primary means of sustenance for large section of population.• Nationalization of forest and natural resources-loss of access and control of local population.
	Human built systems	<ul style="list-style-type: none">• Road, water supply schemes, dams for irrigation and power generation deficient. Farmer managed irrigation systems with temporary diversion and locally built water systems (stone spouts, well and springs), mule tracks and water mills primary infrastructures in rural areas.• Most houses in rural and urban areas used stones, locally baked bricks, mud, timber in walls and tile, slate and thatch as roof covering. No major change in the type of materials used and construction technology even after 1934 earthquake.• Small number of higher income households in urban areas used lime and surkhi as binding material. Use of cement and concrete began only after 1960 and increased gradually.
 AGENTS	<ul style="list-style-type: none">• Ruling elites and upper caste/class dominated over decision-making. Dalits, ethnic minorities excluded.• Education limited to ruling elites and affluent class. Low opportunity for education outside Kathmandu.• More than 90% of population dependent on agriculture and natural resources. Industrial and service sector-based employment non-significant.• Collective action institutions manage irrigation, forestry and drinking water supply.	
 INSTITUTIONS	<ul style="list-style-type: none">• Nepal administratively divided into 14 zones, 75 districts, and village councils for governance but top down decision making prevailed. State functions limited to tax collection and maintaining law and order.• People used local knowledge and customary practices to respond to local needs.• Bilateral relationship and engagement with foreign aid agencies began for infrastructure development and institutional changes.• Elected government dismissed and multi-party governance abolished in 1961. Active monarchy and Panchayat system of governance continued until 1990.	

1960 - 1990	 SYSTEMS	Natural ecosystem	<ul style="list-style-type: none">Increasing pressure on wetlands, ponds, open land and forests. Deforestation in pockets.Nationalization of forest and natural resources causes loss of access and control of local population.Participatory management of water, forest and other natural resources started after 1985 improved access and control by local people.
		Human built systems	<ul style="list-style-type: none">Investment in roads, hydropower plants, engineered irrigation systems, telecommunication increased.Urbanization rate increases in Kathmandu and districts headquarters.Ribbon settlements and market centers emerged along major highways.Change in construction materials and technology in urban areas. Complete shift to cement concrete and RCC structures in the urban areas but their penetration in rural areas low.Rapid migration led to haphazard urbanization.
	 AGENTS	<ul style="list-style-type: none">Education awareness level increased. Gender empowerment and social inclusion received policy support and priority.Non-farm livelihoods and consumerism increased but employment and income opportunities did not increase in same proportion.Agricultural productivity started to flatten out and returns from land and labor declined triggering in-country and trans-boundary migration.Increased involvement of state agencies in infrastructure development and delivery of services.Presence of non-governmental organizations with focus on social and community development increased.Market extended into remote areas and hinterland	
		 INSTITUTIONS	<ul style="list-style-type: none">Top down decision-making and planning process failed to meet people's aspirations.Amnesia and ad-hocism in government agencies prevailed.Policies and institutional arrangements for decentralization failed to produce impacts.In 1990 Multi-party democracy reinstated.The GoN promulgated National Calamity and Relief Act 1982.After earthquake of 1988 preparation of National Building Code Project (NBP) started but enforcement remained weak.

1990 - 2006	 SYSTEMS	Natural ecosystem	<ul style="list-style-type: none"> • Theory of Himalayan Environmental Degradation emerges • Community forestry actions improved forest cover. Biodiversity conservation received policy impetus with declaration of natural parks and reserves. • Urban areas faced ecosystem degradation. • Conversion of agricultural land into buildup areas, discharge of wastewater in water bodies and groundwater extraction increased. Rivers flowing through urban areas faced rapid degradation.
		Human built systems	<ul style="list-style-type: none"> • Urban areas expanded haphazardly. • Reinforced cement concrete (RCC) preferred materials for building houses in the rural and urban areas though preparation and workmanship on RCC works remained deficient. • Haphazard construction in the urban areas began producing drainage and traffic congestion, air and water pollution and losses of open space. • Cloudbursts and floods cause damage to built infrastructure in 1993 and 1998.
	 AGENTS		<ul style="list-style-type: none"> • Continued lack of employment and livelihood opportunities for youths entering the job market. • Young man and women began to migrate in large number seeking employment in other countries. • Women, marginalized, ethnic groups and dalits demanded inclusion, voice, identity and representation. • Continued political uncertainty perpetuated institutional dysfunctions and erosion of public accountability.
	 INSTITUTIONS		<ul style="list-style-type: none"> • The GoN pursued market-based approach as its economic policy leading to privatization in hydropower, banking, tourism and airlines operations. • National Calamity and Relief Act revised in 1989 and 1993. • With start of Maoists' armed rebellion in 1996 reforms and development agenda put to backburner. • Elected local level bodies were dissolved weakening presence of the government at local level and local democracy. • People's movement in 2006 abolished Monarchy and after signing of the peace treaty, Maoists joined mainstream politics. • Process of writing new constitution began. • Lack of consensus among political parties delayed constitution writing. • Donors and the government focused on post conflict reconstruction without aligning it with DRR and CCA efforts.

2006 - 2015	 SYSTEMS	Natural ecosystem	<ul style="list-style-type: none"> • Natural ecosystem and services continued to face stresses from haphazard interventions and climate change, creating new sources of vulnerabilities. • Ecosystem based approach recognized as cushion to the negative impacts of climate change while climatic disaster received attention of the government and aid agencies.
		Human built systems	<ul style="list-style-type: none"> • Damages to physical infrastructures, services, livelihoods and economy by floods, landslides, snow avalanche and extreme weather events increased. • Gorkha earthquake results in large scale and widespread damages. • Weaknesses in planning, design and implementation of development programs cause of vulnerability and hazard risks. • National Reconstruction Authority (NRA) formed. Build back better (BBB) as the guiding principle in building the houses and physical infrastructures damaged in the Gorkha earthquake.
	 AGENTS		<ul style="list-style-type: none"> • Penetration of mobile phones and Internet increased. • The GoN, I/NGOs and donors recognize Climate change adaptation (CCA) and disaster risk reduction (DRR) as important arena of engagement for seeking alignment.
	 INSTITUTIONS		<ul style="list-style-type: none"> • Following the floods in Koshi River in 2008, the GoN began cluster approach as its coordinated response with UN agencies, humanitarian organizations and aid agencies for relief, rescue and rehabilitation. • The GoN prepared National Adaptation Program of Action (NAPA), Local Adaptation Program of Action (LAPA), and promulgated Climate Change Policy and adopted National Disaster Risk Reduction Strategy (NDRRS) creating a framework for institutionalized response to CCA and DRR. • Government functionaries and civil society members collaborated in preparing draft Disaster Management Bill to replace the Natural Calamity and Relief Act of 1982. Parliament passed the Act on October 2017.

2015 - ONGOING	 SYSTEMS	Natural ecosystem	<ul style="list-style-type: none"> • Degradation of ecosystems recognized responsible for increased forest fire and drying up of spring sources. • Ongoing efforts inadequate for conservation and promotion of terrestrial and aquatic biodiversity. • Climate change induced extreme events rise and affect natural ecosystem.
		Human built systems	<ul style="list-style-type: none"> • Building of earthquake resistant residential buildings, cultural heritage and public infrastructures is pursued. • Improvement in the integration of safety elements in the private and public buildings in both urban and rural areas. • RCC, pre-fabricated panels and steel elements in buildings increases. • Unregulated infrastructure development in the rural areas and in the flood plains produces fragmentation in ecosystems and their services.
	 AGENTS		<ul style="list-style-type: none"> • Proactive action of people in incorporating elements of earthquake safety in private and public buildings. • Economy, access to material, technology and skilled construction workers remain as major challenge for safe construction in rural areas. • Cement concrete and reinforcement bar recognized inevitable for earthquake safer houses.
	 INSTITUTIONS		<ul style="list-style-type: none"> • Approval of building permits by urban municipal authorities, inspection and certification of construction made mandatory. • Formation and normal operation of NRA faces hurdles. Inter-ministerial and inter-agency coordination is key constrain in expediting reconstruction. • NDRRS proposes formation of National Disaster Management Authority (NDMA).

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