

Evidence for Climate Change Adaptation and Disaster Risk Reduction Synergies of Interventions: An Inductive Approach



March 2015



**Asia Pacific Adaptation Network
Institute for Global Environmental Strategies**

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Institute for Global Environmental Strategies

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Preface and Acknowledgements

The Asia-Pacific region is one of the most vulnerable regions to climate change impacts because millions of people in the region dwell in rural areas, are poor households and are dependent on agriculture and related sectors for their livelihoods. Addressing climate change impacts for these communities requires moving away from business-as-usual practices towards practices that have high net positive benefits in terms of disaster risk reduction (DRR) and climate change adaptation (CCA). Measuring the CCA and DRR costs and benefits of various forms of interventions can help in identifying the most effective approaches suitable to the most vulnerable and ultra-poor people.

Recognizing the above need, the Asia-Pacific Adaptation Network (APAN) has funded the small stock-taking project ‘Climate change adaptation and disaster risk reduction: Synergies and opportunities’ with the objectives of identifying the synergies between CCA and DRR, to elicit ways to identify these synergies in specific interventions, to understand the opinions of various stakeholders on the synergies between CCA and DRR and to identify ways and means of maximizing these synergies. This report is a first step in meeting these objectives. We believe that this report will raise awareness of the need to evaluate the CCA and DRR outcomes of various interventions and stimulate discussion and research to address climatic and non-climatic risks that most vulnerable communities face in the developing parts of the world.

We are thankful to Dr. Puja Sawhney, Coordinator, APAN for funding and for providing valuable support to this activity. We are also thankful to APAN and IGES staff for being cooperative throughout the process. We acknowledge that part of this study was carried out with financial support from the Asia Pacific Network for Global Change Research (APN) through ARCP project on risk insurance (ARCP2014-08CMY-Prabhakar). We also sincerely acknowledge and thank the valuable help received from various stakeholders in implementing the case studies and for sharing their valuable experiences and expertise through participating in the online survey implemented by the authors.

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Acronyms

AAP	Africa Adaptation Program
ALCCAR	Anticipatory Learning for Climate Change Adaptation and Resilience
CBO	Community based organizations
CCA	Climate change adaptation
CCIS	Comprehensive Crop Insurance Scheme
CRED	Center for Research on Epidemiology of Disasters
DRM	Disaster risk management
DRR	Disaster risk reduction
EPA	Environmental Protection Agency
FGD	Focused group discussion
GEF	Global Environment Facility
GFDRR	Global Facility for Disaster Reduction and Recovery
HFA	Hyogo Framework of Action
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IPCC	Intergovernmental Panel on Climate Change
LAPA	Local Adaptation Plan of Action
MDA	Ministries, departments and agencies
MESTI	Ministry of Environment, Science, Technology and Innovation
NADMO	National Disaster Management Organization
NAIS	National Agricultural Insurance Scheme
NAPA	National Adaptation Programs of Action
NCCAS	National Climate Change Adaptation Strategy
NCCC	National Climate Change Committee
NCCPF	National Climate Change Policy Framework
NGO	Nongovernmental Organization
NREG	Natural Resources and Environmental Governance Program

NSDRM	National Strategy for Disaster Risk Management
PIAs	Project implementing agencies
SD	Sustainable development
TWG	Thematic working group
UN	United Nations
UNDP	United Nations Development Program
UNFCCC	United Nations Framework Convention on Climate Change
UNISDR	United Nations Office for Disaster Risk Reduction
VDC	Village Development Committee
WBCIS	Weather Based Crop Insurance Scheme

Executive Summary

Climate change adaptation (CCA) and disaster risk reduction (DRR) have emerged as two most important disciplines out of our efforts of addressing the impacts associated with climate change and nature disasters. DRR has long history, took several years to emerge as a discipline out of centuries of responding to natural disasters and has received much needed impetus only after the Johannesburg Plan of Action has called for mainstreaming DRR into development in 2002. Though societies have been adapting to change since time immemorial, adaptation to climate change can be considered a relatively new discipline, has rapidly developed during recent years and took much less time to emerge as an important consideration to be mainstreamed into development. Today, both CCA and DRR are two important aspects, apart from environment, that most development partners (governments, NGOs, bi- and multi-lateral organizations, aid agencies etc.) consider in their interventions. These questions have often been asked by various stakeholders while mainstreaming CCA and DRR into development: a) what are the synergies between CCA and DRR, b) can CCA interventions have DRR outcomes and vice versa, c) to what extent these synergies be maximized and d) what approaches will help maximize these synergies. Addressing each of these questions can be a dedicated research topic in itself. However, here, a modest effort was made by the research team to address some of these questions through a combination of approaches.

The study on CCA and DRR synergies of interventions was carried out with a combination of approaches consisting of country-specific case studies in Nepal and India in South Asia and in the Republic of Ghana in the West Africa (Figure 1), an online survey eliciting responses from the stakeholders engaged in CCA and DRR and literature review (Please refer to Figure 2). The case studies in Nepal consisted of conducting focused group discussions (FGDs) with project beneficiaries in two DRR and two CCA projects to elicit the benefits accrued from these projects. In the case of the Republic of Ghana, the FGDs were conducted in three CCA, two DRR and one CCA-DRR project representing major interventions in the Republic of Ghana. The FGDs conducted in these countries followed a common guideline developed for the study (please see Annexure I). The case study in the Andhra Pradesh state of India was focused on evaluating insurance interventions. For eliciting various insurance benefits, a detailed household questionnaire survey was developed targeting the beneficiary and non-beneficiaries of insurance (please see Annexure III and IV). In addition to theses, an online survey with closed-ended and open-ended questions was conducted to elicit responses on CCA-DRR synergies of interventions from researchers and practitioners representing NGOs and governments (please see Annexure II). The questionnaire was posted on an online survey

website and the request to participate in the survey was sent to professional contacts of the study team, social media platforms and mailing lists.



Figure 1. Focused discussions with projects beneficiaries in case study countries

From the case studies conducted in Ghana and Nepal, it was concluded that most of the interventions have resulted benefits that have high potential to lead to CCA and DRR outcomes. In Ghana, the CCA pilot projects implemented in Xedzozdoekope (grasslands) and Odomasi (wooded to semi-wooded area in the Afram Plains) were similar even though some aspects were tailored to suit the different geographic features. The pilot project in Kankama was a CCA project with DRR components in the official document while the pilot project in Apam was a CCA project but, unlike the other three projects, the only one related to health.

It could be seen that in the two Afram Plains projects, different benefits to meet different needs (i.e., erosion control of slopes through tree planting in Odomasi and mulching for soil dryness in Xedzozdoekope) were realized in addition to the common benefits realized in both communities. The activities implemented in the Afram Plains, Kankama and Apam were different, yet similar benefits accrued to the communities. Economic benefits (in terms of increased income) were reported in all four communities. Knowledge acquired to address the challenges facing the communities and sharing this knowledge with the future generation was also reported in all the communities. Strengthened social cohesion and increased resilience and adaptive capacity were reported in three communities. It could be said that a higher number of similar benefits were realized from different projects and although only one DRR project (combined with CCA) was used for the comparison, it became evident that both the CCA and DRR projects were only different by name and the ultimate outcomes were similar. Hence no discernible differences can be said to be occurring between these two project areas but rather a high level of linkage is suggested.

In Nepal, the study has focused on assessing the CCA and DRR benefits of four projects. The project sites were visited to observe the activities implemented as well as to interact with the beneficiaries through FGDs. Based on the FGDs, it can be concluded that there are no fundamental differences between CCA and DRR outcomes at the ground level or at the implementation level. The activities being carried out by various agencies, whether under the name of DRR or CCA or other development/livelihood centered projects/programs, were

almost similar. Most of the activities were focused on: 1) increasing and stabilizing income (either by livelihood diversification or using improved varieties of seeds, breeds, using modern technologies etc.), 2) constructing various structures (e.g. water retaining structures, river training structures, slope protection structures etc.), 3) enhancing capacities of local communities through various trainings, awareness raising programs, exposure visits etc. and 4) institutionalizing CCA and DRR at the local level by forming local level committees, disaster management plans etc.

In India, the risk insurance was identified as a focused intervention to study the CCA-DRR synergies. The communities in the study area were vulnerable to climatic disasters such as droughts, agriculture in the area is rainfed and droughts are frequent with a recurrence rate of once in every two years. Losses from disasters were significant and have contributed to poverty. Insurance has been offered from the government and has been made a prerequisite for farmers to obtain crop loans from banks. Some of the local NGOs also offer the agricultural insurance. As a result, the insurance coverage was widespread in the study region. Insurance payout was received almost every year; it was primarily used for immediate recovery from disaster impacts including providing for household necessities and agricultural inputs for the next season. It has been observed that the insurance payouts often do not completely cover disaster losses. However, it did aid in decreasing the informal borrowing from money lenders and the distress sale of livestock which helped in the preservation of assets. In the absence of other DRR measures in the study area, insurance acted as a partial DRR mechanism, it helped in absorbing the initial shocks from the disaster but may not have been sufficient to cover all the losses from the disaster. Supporting initiatives from the government and DRR strategies are necessary to effectively manage disasters in the community.

The study revealed most farmers associating insurance with increased confidence to take riskier cropping decisions. Farmers were aware, to a certain degree, of the impacts of climate change associated with irregularities of rainfall and increasing drought. In light of this, farmers have begun to adopt better farm management strategies. However, the main deterrent has been the lack of sufficient finances with farmers. Presence of insurance positively influenced farmers' decisions to take up adaptation strategies, this was partly because of the fact that they received capacity building from the insurance providers (particularly NGOs) in better crop management strategies. Capacity building, knowledge enhancement and availability of weather information provided along with the insurance seem to be considerably more effective in adaptation than the insurance alone. Regular insurance payouts during disaster years have resulted in reduced livelihood variability along with the preservation of assets leading to reduced vulnerability to some degree. Savings and overall development of the community have improved over the last ten years but cannot be directly attributed to insurance. Insurance in association with enabling government and NGO

programs have helped in building resilience to climate change albeit at a very slow pace which may not be sufficient to cope with climate change impacts.

From this study, it could be concluded that most CCA and DRR interventions have synergistic impact on communities. It was evident that both CCA and DRR addressed the underlying vulnerabilities and sought resilience as an outcome. However, while some of the benefits tend to have direct linkage with CCA and DRR outcomes, the linkages between benefits and outcomes are not very obvious in other cases i.e. these accrued benefits need proper facilitation to result in CCA and DRR outcomes. For example, high income doesn't necessarily mean that the communities could automatically adapt to climate change and be able to reduce the disaster risks. However, higher income certainly provided them a greater opportunity to do so than in a poverty situation. Better income helped communities to uptake some DRR initiatives better than when in poverty. However, uptake of risk reduction measures can only happen if they are present and are within reach of communities. Same explanation can be made about other benefits such as increased savings, growth in assets etc. Hence, there is a need to put in place proper enabling conditions that would ultimately convert these benefits into CCA and DRR outcomes. Interventions such as capacity building, awareness generation and insurance can help channel these benefits towards fuller CCA and DRR outcomes as revealed from the stakeholder surveys in this study.

It is important to acknowledge that there is a scope to improve this study. Firstly, the study faced limitation in accessing CCA and DRR projects by direct interaction with the project beneficiaries. The project team couldn't access some CCA and DRR projects due to physical and financial limitations; and poor cooperation from some of the project implementing agencies (PIAs). Secondly, a decision was made not to screen projects to be assessed based on some pre-set criteria of what could be a CCA project and DRR project but the classification of projects was based on what the project implementers defined. This was done to facilitate an inductive approach where bottom-up and evidence based synergies can be found from the real-world examples instead of theorizing first and trying to fit the real world into the theory. The team realized that, for such an approach to work properly, there is a need to include an extensive number of projects beyond the numbers that could be included in this study. Lastly, post-in surveys could have helped in reaching out to bigger number of projects and help comparing the results with the intended outcomes envisaged in the respective project proposals to clearly delineate the direct and co-benefits of interventions. However, such post-in surveys need much more cooperation by the PIAs than the cooperation that the project team could get.

1. Introduction

1.1 The context

The climate change has brought multiple implications to development in general and disaster risk reduction (DRR) in specific. The implications for DRR are in terms of change in the intensity, duration and severity of natural disasters. This changes the hazard profile, vulnerability and risk profiles of societies and countries. Growing trend of disasters undermine the DRR capacities of countries especially in managing the extreme events for which a little experience and expertise exist in most countries (e.g. Bangkok floods, Typhoon Bopha and Haiyan that hit Philippines and Bangladesh floods). In turn, repetitive natural disasters, climatic or non-climatic, can impact the ability of people and natural systems to adapt to climate change. The implication for the underlying vulnerabilities of communities, natural systems and institutions is that climate change influences the ability to respond to and recover from natural disasters.

The present day DRR planning largely aims at reducing the current disaster risks, i.e. those risks emanating out of current hazards and vulnerabilities. Often, these risk assessments heavily rely on the historical data of hazards at a given location. However, the future is not always the repetition of the past. Moreover, the assessments from historical data often fail to look into the future vulnerabilities and risks and hence cannot incorporate them in terms of added strength in planning. In addition, the current static DRR plans may fail to take into consideration the ever changing hazard and vulnerability.

The linkage between climate change (CCA) and DRR has been a subject of intensive formal and informal debates worldwide. In the context of climate change, some consider DRR as one of the CCA options. The ‘Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters’ identified climate change as one of the threats posing the world future and identified DRR planning as one of the key points of entry to tackle the climate change threats (UNISDR, 2005).¹

CCA and DRR could also be seen as a means of achieving sustainable development (SD). It is now universally accepted that poverty lies at the root of disaster vulnerability and sustainable development process can no longer exclude hazard reduction as one of its goals. As the World Disaster Report indicates, 97 percent of all disaster-related deaths occurred in the poorest of the developing countries, while only 2 percent took place in the industrialized societies. This differential impact of disasters is a cause of concern to the developmental

¹ Available at <http://www.unisdr.org/we/inform/publications/1037>

prospects of developing countries. Hence, the linkage between development and disasters is undisputable.

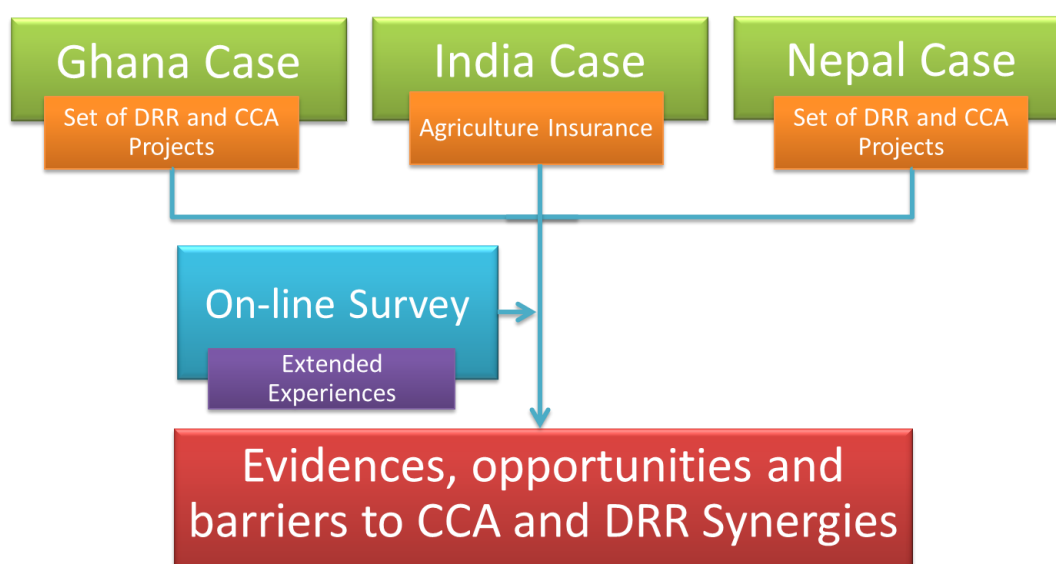
At the operational level, the CCA and DRR community may not always be working together and may even be speaking same language with different meanings or different languages with same meaning. There is a greater synergy to be harvested by bringing these two communities together and exchange solutions and tools available with each other.

Recognizing the need for integrating CCA into DRR, the Hyogo Framework of Action (HFA) has suggested to “*Promote the integration of risk reduction associated with existing climate variability and future climate change into strategies for the reduction of disaster risk and adaptation to climate change, which would include the clear identification of climate related disaster risks, the design of specific risk reduction measures and an improved and routine use of climate risk information by planners, engineers and other decision-makers*” (UNISDR, 2005). Similarly, the processes under the United Nations Framework Convention on Climate Change (UNFCCC) make references to DRR. For example, the Bali Action Plan (BAP) makes the note of Hyogo Framework for Action (HFA), the Cancun Agreements devotes one paragraph about climate change related DRR strategies and the Warsaw international mechanism for loss and damage associated with climate change calls for greater integration by suggesting the need to identify risk management strategies to reduce loss and damage associated with climate change.

1.2 An inductive approach

Keeping the above context in view, a project entitled ‘Climate change adaptation and disaster risk reduction: Synergies and opportunities’ was carried out comprising of a) an online survey of experts engaged in CCA and DRR to elicit their opinions on synergies and b) three case studies aimed at bringing out the evidence for the CCA synergies of DRR interventions and DRR synergies of CCA interventions.

The objectives of this project are to a) delve into the stakeholder perceptions on CCA and DRR synergies of interventions; and to b) find possible evidence for synergies through case studies. An inductive approach was followed where in an effort was made not to screen projects to be assessed based on a pre-set criterion of what could be a CCA project and DRR project but the classification of projects was based on what the project implementers defined (Figure 2). Here, the emphasis was to identify bottom-up and evidence based synergies from the real-world examples instead of theorizing first and trying to fit the real world into the theory.



(Source: Authors)

Figure 2. An inductive approach to seek evidences for CCA and DRR synergies of interventions

The case studies were carried out in India, where the risk insurance was studied as an intervention with CCA and DRR synergies and Nepal and Ghana where a set of CCA and DRR projects were evaluated to assess the CCA and DRR synergies. The assessment consisted of conducting structured questionnaire survey (in the case of India) and focus group discussions with project beneficiaries (in case of Nepal and Ghana). The Annexure I provide the template used for conducting FGDs in the case stud countries. The community consultations focused on listing the benefits that communities obtained in the specific interventions included for the assessment and finding linkages with possible CCA and DRR outcomes. These linkages are shown in flow diagrams in each of the case studies included in the report.

The report initially discusses the literature on synergies between CCA and DRR, then presents the findings from the on-line survey on CCA-DRR synergies and subsequently elaborates on case studies and related conclusions for maximizing the synergistic outcomes of CCA and DRR interventions. The report ends by synthesizing important conclusions emerging from the study. Efforts were made to present the qualitative evidences as clearly as possible.

2. Stakeholder Perceptions on Synergies

2.1 Introduction

There are growing evidences for longer droughts in tropics and subtropics, increasing frequency of heavy rainfall events on most land areas and increasing intensity of tropical cyclones in North Atlantic as a result of climate change (Prabhakar et al., 2009).² These changes are expected to have multi-fold impacts in the form of floods and droughts in various parts of the world. The extreme events can be devastating for the developing countries which have less capacity to adapt (Intergovernmental Panel on Climate Change, 2007). This establishes an undeniable unholy alliance between climate change, disasters and development. This calls for better understanding the impacts of climate change in terms of disasters and what it means to disaster risk reduction (DRR) and climate change adaptation (CCA) professionals and policy makers.

Climate change has potential to bring considerable change in the hazard profile and its interaction with the dynamic vulnerability and risk profiles of countries. It includes change in the kind of disaster that a region is vulnerable to (e.g. from no disasters in the past to more disaster events), changes in type of hazards (e.g. from more floods to more droughts) or changes in hazard intensities and magnitudes. The debate on impacts of climate change vis-à-vis disasters conclusively establish the possibility of rise of extreme weather events resulting in disasters due to increased energy within climate system. There are numerous examples stating disaster related impacts such as typhoons and hurricanes (Landeas et al., 2006); floods (Milly et al., 2002); droughts (Wood et al., 2004); sea level rise (Gornitz, 1995) and health hazards (Kovats and Haines, 2005) due to climate change. It shows that the hydro-met disasters are mostly influenced due to their close linkage with the hydrological cycle which is consecutively closely linked with global atmospheric circulations and heat balance dynamics (Helmer and Hilhorst, 2006). Many of these impacts may not be uniform across spatial and temporal scales (McCarthy et al., 2001).

There is a clear evidence for growing trend of disasters undermining the DRR capacities of countries. The data available from the Center for Research on Epidemiology of Disasters reveals a staggering increase in number of hydro-met disasters during the period of 1900 to 2006 (CRED, 2007). During this period, the number of hydro-met disasters had risen from

² Much of the discussion presented in this section heavily borrows from the earlier work done by the lead author of this report (Prabhakar et al., 2009).

single digit number to nearly 343 per year with corresponding increase in the number of people affected. Though the number of lives lost does not follow the similar trend, the economic losses out of these disasters had risen to nearly USD 16,338 million with a peak in 2004. According to Munich Re, the frequency of natural disasters has more than doubled between 1960 and 2005 out of which more than 55% were caused by earthquakes and volcanic eruptions. A closer look at the developed, developing and under developed countries reveals a more disappointing performance of developing and underdeveloped nations in terms of disaster losses. While the economic losses were higher in developed countries, the deaths are concentrated in less developed countries (OBrien et al., 2006). While considering the role of combination of growing population, expanding infrastructure, propensity to locate new development in areas of high hazard, Burton (1997) raised the apprehension that they may be indicators for onset of climate change. There are also apprehensions that the impacts felt till-to-date are not yet severe and that the consequences are likely to be incremental and cumulative (Burton et al., 2002). Examining some of the highly disaster prone countries gives an indication of changes happening in their disaster profiles (CRED, 2007). For example, among other disasters, the number of drought events had raised during recent times in Vietnam. Similar rise could be seen in the number of extreme temperature events in India. There was a steep increase in number of floods in both the countries (Prabhakar et al., 2009).

Surprises in terms of extreme events have become common. The year 2004 proved to be most devastating for Japan as 10 intense typhoons landed in the same year, while the earlier record used to be landing of 6 typhoons in 1990 and 1993, surprising many (Yatsuka, 2006). Climate change was attributed to this behavior (Japan Meteorological Agency, 2004). The year 2004 also saw many other natural disasters including drought like conditions in the Indian subcontinent, devastating floods in South Asian countries of Bangladesh, India, Nepal and Pakistan; typhoon in Philippines and a series of hurricanes in Florida reflecting impacts of changing climate (Asian Economic News, 2005). The hurricane Katrina and Rita which occurred in August and September 2005 respectively further reaffirm the debate on their linkage with the global climate change (Anthes et al., 2006). In the case of hurricane Katrina, the risk being known couldn't make much difference in terms of how quickly the local residents and governments could react and reduce the impacts (Travis, 2005). This shows how human designed physical and social protection systems could fail when a catastrophic event have to occur (Bohannon and Enserink, 2005).

While attributing all the above changes only to climate change is a much debated issue, it is safe enough to conclude that the disaster profiles of countries are changing for sure. This affirms the need for the DRR and developmental world to address the growing threats in its planning as they could undermine the development of nations and communities. It is not only about more emphasis on DRR but also about how differently it should be done than before.

2.2 CCA and DRR synergies

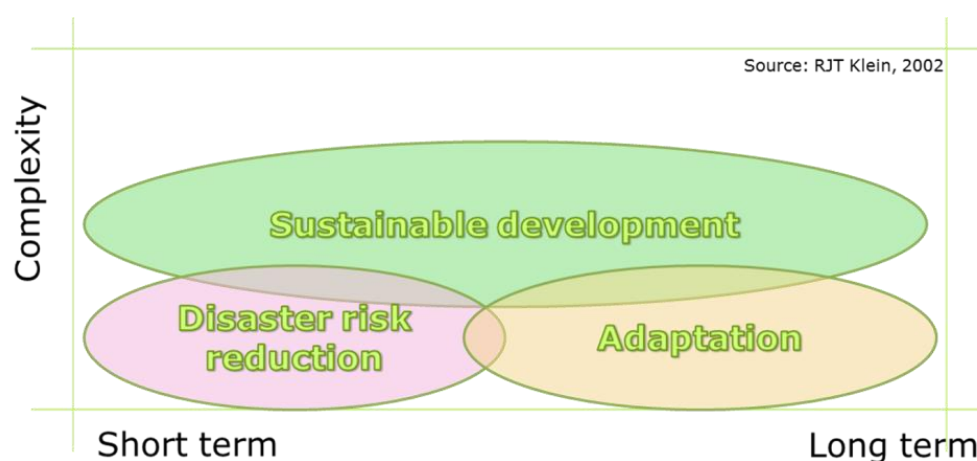
From the foregone discussion, it is evident that the climate change has multiple implications through change in mean, increased variability and change in the symmetry of the distribution of weather events. Not all these changes and related impacts fall under the purview of the stakeholders engaged in DRR. For example, change in pest incidences, steady reduction in farm income over long periods due to decline in crop yields and related impacts on rural economy etc. are often outside the purview of DRR communities. Instead, what DRR communities tend to concentrate is on the disasters³ which, in the parlance of DRR communities, are termed as events that ‘require external intervention’ and where communities do not have capacities to recover on their own. Even then, the traditional DRR communities are not known to engage in instances of high pest and disease incidences but rather these subjects are dealt by agencies associated with agriculture (for pests and diseases related to crops) and health and sanitation (for diseases related to humans).

It is to be understood that the impacts from natural disasters, which originate either from long-term climate change or from the climate variability, are due to the underlying vulnerabilities of individuals, societies, regions and nations. In a way, most vulnerabilities work as common denominators for CCA and DRR and hence for the sustainable development (SD). For this reason, addressing underlying vulnerabilities has to be the first step for achieving any of the outcomes of CCA, DRR and SD. In order to understand this, it is important here for the reader to understand the synergies between CCA, DRR and SD and how some vulnerability can affect these outcomes. CCA, DRR and SD are complementary fields. In order for CCA interventions to be successfully implemented, it is now widely understood that they should be included as part of SD programs. Also, it is injudicious to implement future SD programs without taking CCA and DRR into consideration (IPCC, 2007).

Adaptation is most often regarded as a technical issue rather than a process of change to a new socio-ecological state. The Intergovernmental Panel on Climate Change (IPCC) defines CCA as ‘adjustments in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impacts. It refers to changes in processes, practices and structures to moderate potential damages or to benefit from opportunities associated with climate change’ (IPCC, 2007). On the other hand, DRR is defined as “the concept and practice of reducing disaster risks through systematic efforts to analyze and

³ There is no one single agreed definition for the term ‘disasters’. The IPCC (2012) defines disasters as “Severe alterations in the normal functioning of a community or a society due to hazardous physical events interacting with vulnerable social conditions, leading to widespread adverse human, material, economic, or environmental effects that require immediate emergency response to satisfy critical human needs and that may require external support for recovery.” The UNISDR defines disasters as “A serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources” which clearly indicates the need for external intervention for recovery than the IPCC definition.

reduce the causal factors of disasters” (UNISDR, 2015)⁴ and the disaster risk management (DRM) refers to the systematic management of administrative decisions, organization, operational skills and abilities to implement policies, strategies and coping capacities of the society or individuals to lessen the impacts of natural and related environmental and technological hazards (United Nations Development Program, 2004). DRM planning involves understanding hazards, vulnerabilities and potential losses and developing appropriate preparedness and mitigation strategies to mitigate such losses. DRM encompasses complete realm of disaster related activities. From these definitions, it can be seen that both CCA and DRR address the underlying causes of vulnerability to a hazard or risk. The figure 3 presents how DRR, CCA and SD fall on the time and complexity scales (Klein, 2002). According to Klein, both CCA and DRR are comparable in terms of complexity but the outcomes of DRR could be achieved within a short term compared to the CCA outcomes. In comparison, SD has been regarded as an aspirational goal which spans from short to long term and complex in nature both from the point of understanding and achieving it as an outcome.



(Source: Klein, 2002)

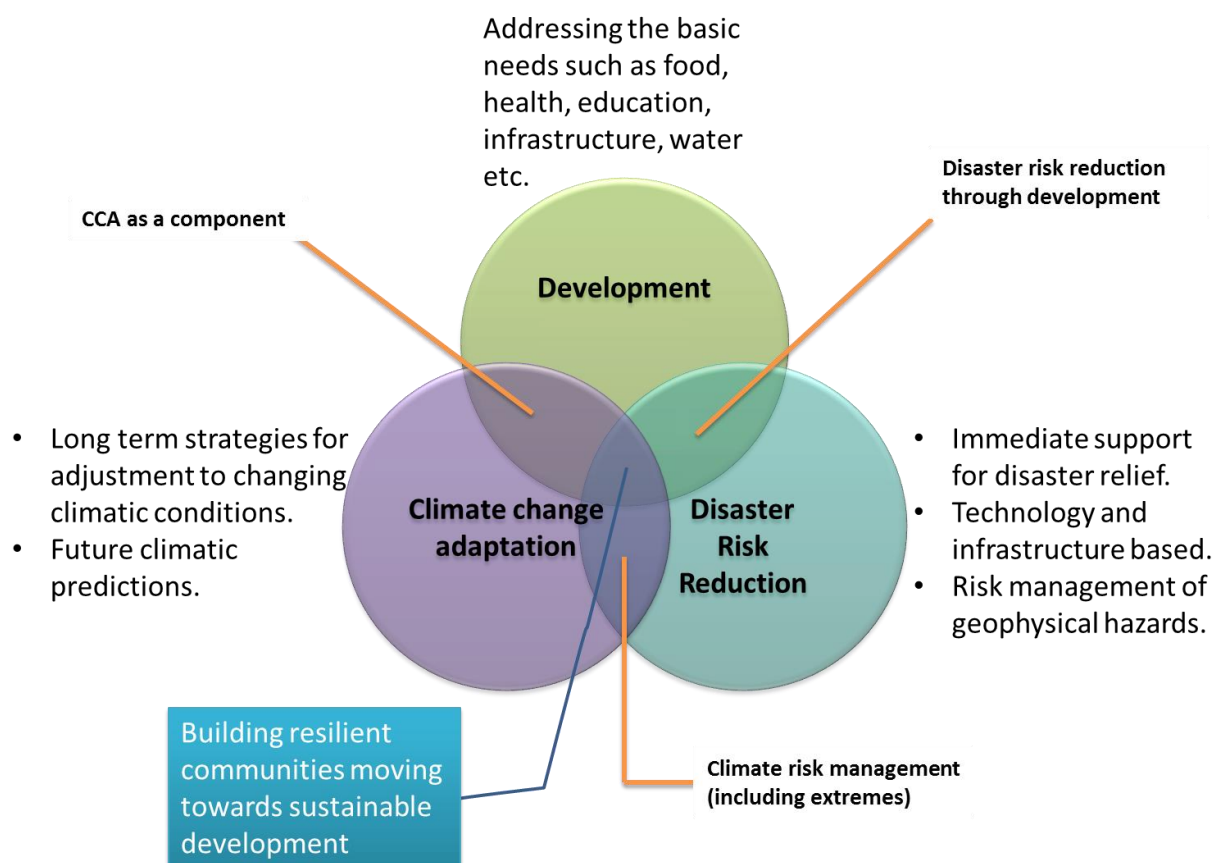
Figure 3. Synergies between CCA, DRR and SD

Our review of literature suggested that various authors have theorized different understandings of concepts of CCA and DRR which are often semantic and ambiguous leading to a variety of understandings regarding synergies between them (Table 1 and Figure 4 shows the synthesis of opinions). This lack of coherent picture is partly explained by separate development of DRR, CCA and SD fields. However, as the effects and causes of climate change are more thoroughly explored in scientific studies, understanding of the intricate linkages between these fields is expected to grow.

CCA and DRR are cross cutting fields that to be efficiently managed must be incorporated into SD strategies at all levels. Climate change has added additional complexity to the nexus

⁴ Available at <http://www.unisdr.org/who-we-are/what-is-drr>

between DRR and SD (International Organization for Migration, 2009). Often, measures adopted for CCA are aligned with those used in the DRR field. The key difference between these two approaches is that in the case of DRR historic data is analyzed, whereas for CCA more emphasis is placed on future predictions (Economic and Social Commission for Asia and the Pacific Committee on Disaster Risk Reduction, 2013).



(Source: Solomon and Prabhakar, 2014)

Figure 4. Synergies between climate change adaptation and disaster risk reduction

SD requires analysis of socio economic, political and demographic issues as underlying causes of vulnerability; these issues are also fundamental to adaptive capacity. SD thus reduces vulnerability, and as a result, resilience and adaptive capacity are strengthened. To achieve SD, it is essential that the developmental initiatives are realigned with CCA and DRR concerns. Some authors suggest that SD itself could serve as a means of CCA as it is directly linked with vulnerability reduction (Suarez and Ribot, 2003).

Building resilience in communities has been found to be an effective way to reduce disaster risks as well as vulnerabilities (World Food Program, 2011). Hence, the concept of resilience may offer a means of breaking down the individual concepts of CCA and DRR, thus presenting a common crosscutting theme (United Nations, 2012).

Table 1. Linkages between climate change adaptation and disaster risk reduction

Author	Context	DRR Elements	CCA Elements
Davies et al., 2011	Combining DRR with social protection for CCA in agriculture	• Immediate disaster compensation • Vulnerability assessment and mapping • Financial social units were used as instruments for resilient economies and livelihoods	• Diversifying livelihoods towards more climate resilient options. • Increasing the economic resilience by introducing micro-insurance and other social protection schemes • Combining DRR and social protection in order to expand time horizons increasing the relevance to long term CCA
Binh, 2010	CCA and DRR to combat salinity intrusion in agriculture	• Infrastructure (e.g. embankments) was built to reduce hazard exposure	• CCA projects such as livelihood diversification • Community based approaches such as migration and changes in crop calendar
Holder, 2011	Hurricane preparedness, mitigation and response in agriculture	• Immediate support and relief to farmers (e.g. monetary relief, providing health and housing services) • Provide water and enhance drainage	• Financial risk management tools • Natural resource management with emphasis on soil management • Livelihood diversification
Gero et al., 2010	Reducing disaster vulnerability through poverty reduction	• Immediate relief • Build infrastructure	• Bottom up approaches for resilience building • Climate change elements incorporated into DRR plans

(Source: Solomon and Prabhakar, 2014)

2.3 Mainstreaming CCA into DRR and vice versa

Despite the previously discussed synergies between CCA and DRR, there will still be need to mainstream CCA into DRR and vice versa for the reason that the DRR in its current form will not be able to address the entire range of issues that climate change has brought to be addressed. For example, the implications of future climate change would have to be taken into consideration for planning DRR in the future. The DRR plans are usually developed by identifying local hazards, risks, vulnerabilities and capacities leading to planned interventions by the governments, corporations and communities to reduce disaster vulnerabilities and risks while enhancing the capacities. The present day DRR planning largely aim at reducing the current disaster risks, i.e. those risks emanating out of current hazards and vulnerabilities. Often, these risk assessments heavily rely on the historical data of hazards at a given location (Dilley, 2005). However, the future is not always the repetition of the past (Quarantelli, 1996). Moreover, the assessments from historical data often fail to provide an insight into the future vulnerabilities and risks and hence cannot help to incorporate them in terms of added strength in the plan.

Often, the hazard assessments fail to consider the changing frequencies and magnitudes of disasters in their fine details. We are also limited by our understanding on what proportion of our current vulnerabilities and risks are contributed by the climate change though a broad conclusion is possible that the risks assessed at a given point of time are result of interaction between past climate change impacts and vulnerabilities. It should be noted that the current and future risks are equally important for the risk management professionals as they aim at the welfare of the society from the angle of risks and sustainability. Thomalla and colleagues tried to compare the contexts of CCA and DRR and emphasized that the DRR community focus more on the current risks while the climate change experts look more into the future risks (Thomalla et al., 2006). Independent working of these two communities has largely resulted in continuous increase in vulnerability of communities to natural hazards. It is important that these two communities talk to each other and arrive at a functional plan of DRR that reasonably considers the future risks as well. Hence, it is clearly evident that there is a need for DRR to consider the CCA at various stages of DRR and vice versa.

2.4 Importance of stakeholder perceptions

Perception can be viewed as a process of transforming inputs (e.g. flood warning) to output (e.g. public mitigation response) (Burn, 1999). People who perceive that they are vulnerable are more likely to respond to warnings and undertake protective measures (Michael and Fasil, 2001). Creation of appropriate perception was found to be important for devising and implementing suitable interventions and outcomes. The importance of risk perception in shaping people's behavior and DRR planning is affirmed in several studies. For instance, Slovic (1987) emphasized the role of risk perception by indicating that the public relies on risk perception to evaluate hazard situation. Some studies tried to emphasize the importance of risk perception both in design and operationalization of flood management (e.g., Michael and Fasil, 2001). Similarly, Weber identified public perception and expectations of climate change as important preconditions for technological and economic adaptation to climate change (Weber, 1997).

There are few studies on perception of communities and policy makers about climate change and about actions to mitigate the same. A perception study of global climate change conducted in the Swedish town of Umeå by Löfstedt revealed the belief of the residents about temperatures becoming warmer (Löfstedt, 1991). However, very few interviewees perceived link between global climate change and the energy use. The survey also revealed confusion among the respondents between climate change and ozone layer depletion. Such lack of clear perceptions could lead to failure in any policy response that involves residents. For example, any restriction on energy consumption on grounds of climate change could have led to lack of support.

Perceptions could play an important role in instilling proper responses in the case of climate change. The nature of climate change is such that it is invisible to many as an entity as it can only be identified through some 'proxy' indicators such as 'change in temperatures,' 'change in rainfall intensities' or 'increasing extreme events'. Often the degree of change could have important bearing on how perceptions are formed. For example, the change in a given geographical location may be perceived insignificant in short run but such changes may have compounding impacts which are significant in the long run. This very nature of climate change makes it difficult to create uniform perception across all communities. In a study conducted by the authors, it was revealed that the old members of community are more likely to perceive changes than young members (Prabhakar et al., 2011). The difficulty to form appropriate perception of climate change may also be due to lack of uniformity in the impacts across geographical and time scales. Added to this is the unpredictable nature of the climate change. The unpredictability of climate has led to lack of trust among respondents to forecasts leading to poor response in many situations. Such a poor response to weather forecasts has been cited in literature (Patt and Gwata, 2002). Patt and Gwata (2002), while examining the constraints in effective seasonal climate forecast applications, identified six constraints limiting the usefulness of climate forecasts. They are credibility, legitimacy, scale, cognitive capacity, procedural and institutional barriers and available choices. According to them, these problems arise due to making forecasts in probabilistic sense rather than deterministic, when forecasts help only a group of stakeholders benefited in a preferential manner, inability to downscale the forecasts that would also enhance the accuracy of the forecast, dissemination of forecast information in a format that is not well understood by many due to use of highly technical jargon, when standard operating procedures stand in the way of using the new information which makes it too delayed such that the end users find it useless and finally the choices that ultimate stakeholders make are enormous which may not always be supported by such forecasts. We believe that the climate change information should avoid all these constraints in order to be effective in decision making.

From the above discussion, it is evident that the stakeholder perceptions often determine the direction and success of interventions. Keeping this message in view, an online survey was carried out in order to understand the perceptions of different stakeholders engaged in CCA and DRR about the possible CCA and DRR synergies of interventions, the extent of awareness about these synergies and the means to enhance these synergies. Here, an effort was made to analyze the results and present the trends.

2.5 Survey on stakeholder perceptions

2.5.1 Survey methodology

An online survey was conducted to elicit the responses from various stakeholders engaged in CCA and DRR. The questionnaire consisted of questions related to the background of the

respondent (professional qualification, experience, expertise etc.) and opinions on the CCA-DRR synergies (questions on the knowledge level on CCA and DRR, opinion on synergies, indicators to assess synergies and bottlenecks for realizing and maximizing the synergies). Please refer to Annexure II for the questionnaire.

The online survey request was sent out to various stakeholders in the form of circulation on SE-DRM mailing list of UNDP, Resilience-Cities mailing list of the Proventionweb and various professional contacts of the authors of this report. The survey form was kept active for a duration of one month. The results were analysed in an excel sheet and presented as % of total responses in this report.

2.5.2 Results and discussion

Background of the respondents

The survey was participated by 151 respondents represented predominantly by male respondents (77%) and in the age groups of 25-34 years (33%) and 35-44 years (29%). Respondents from 25 countries have participated in the survey with most living in India (23%) followed by Nepal (18%), Ghana and United Kingdom (8% each), Pakistan and United States of America (5.5% each) and Japan (4%). Most of the respondents possessed their highest qualification in environmental sciences (23%) followed by social sciences (9.6%), urban development (6.8%) and rural development (5.5%). Most respondents had their maximum working experience in India (19%) followed by Nepal (16%), Ghana (11%), United States of America (7%), Pakistan (5.5%), United Kingdom (4%) and Vietnam and Malaysia (3% each). 55% had completed Master's degree, 21% completed PhD and the rest of the respondents fell between graduation from high school to college degree. None were illiterate. 23% of the respondents had claimed as having expertise in DRR, 14% in environmental management, 13% in CCA and 3% in urban planning. While none of the respondents showed expertise in climate change mitigation, very few (2%) have claimed expertise in risk management and expertise in both CCA and DRR. Most respondents had ≥ 25 years (10.5%) of working experience in their respective fields of expertise followed by ≤ 1 years (9.9%) and 2 years (10.5%) and the rest of the respondents fell between these extremes.

Most of the respondents are affiliated with non-governmental organizations (NGOs, 33%) followed by governments (24%), universities (13%) and research institutions (12%). Most of the respondents were researchers (38%) and practitioners (25%) while others are in some kind of managerial (14%) and administrative (10%) positions. Most have the experience of implementing the projects on the ground (46%), which are either research (36%) and research and developmental projects (33%). 29% of respondents had the experience of involving in planning processes while 24% were engaged in action research and piloting projects. Most of

these projects were at the village or community level (54%), district (42%), national (37%) and regional levels (35%).

Majority of respondents (38%) evaluated that they had intermediate level of expertise in CCA, 20% are either novice or had advanced knowledge and 11% claimed having expert level understanding on the subject. Very few claimed to have no expertise (0.6%) or having fundamental awareness (basic knowledge, 10%) in the field of CCA. Responses for expertise on DRR followed similar trends. Most have claimed having intermediate expertise in the field of DRR (32%) followed by novice (20%), advanced (17%), fundamental awareness (16%) and expert (12%) levels.

CCA-DRR Synergies

A series of questions were asked to assess the perceptions on synergies between CCA and DRR outcomes of interventions. A set of questions were included to evaluate the knowledge on CCA and DRR by the respondents by presenting several definitions of CCA and DRR and asking the respondents to choose the most appropriate definition. Followed by this, the respondents were asked to identify the possible synergies, the extent of synergies, indicators to assess synergies and if specific interventions will have higher synergies than other interventions, bottlenecks to promote the synergistic outcomes, if there are any synergies between interventions at the international level such as Hyogo Framework of Action (HFA) and the processes under United Nations Framework Convention on Climate Change (UNFCCC) and what more could be done to promote such synergies. Only selected questions were discussed in greater detail to keep the discussion short and succinct.

Knowledge on CCA and DRR

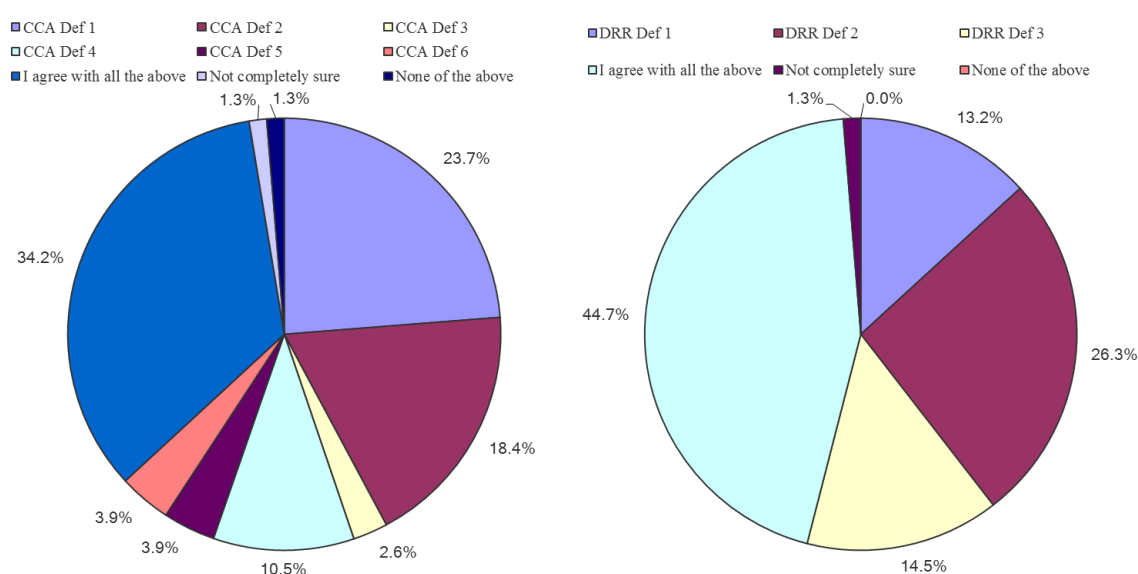
The knowledge on CCA and DRR was evaluated by presenting a set of definitions of CCA and DRR to identify a definition that the respondent agrees the most. This knowledge was important to measure since understanding and evaluating synergies may need little more than basic knowledge on CCA and DRR. While there are no single agreed definition of CCA and DRR, definitions vary in their scope and depth and the idea was to see if respondents will chose the most comprehensive definition among the presented ones. Please refer to the questionnaire (Annexure II) for all the definitions presented to respondents. Respondents were to choose only one option.

Majority of the respondents (34%) chose ‘I agree with all the above’ followed by “Adjustments in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impacts” (definition by IPCC, 2007)⁵ and followed by the EU definition “Anticipating the adverse effects of climate change and taking appropriate

⁵ Available at <http://www.ipcc.ch/ipccreports/tar/wg2/index.php?idp=643>

action to prevent or minimise the damage they can cause, or taking advantage of opportunities that may arise” (European Commission, 2015)⁶.

Regarding the DRR definition, 45% of the respondents chose ‘I agree with all the above’ (45%) followed by the two UNISDR definitions (26%, ⁷ and 14.5%⁸ respectively; Figure 5). None have chosen the option ‘none of the above’ and very few respondents chose ‘Not completely sure’ (1.3%). The results indicate that majority of respondents were able to recognize the definitions corroborating their claims about the expertise in the fields of CCA and DRR.



(Source: Authors)

Figure 5. Share of responses on the most preferred CCA (left) and DRR (right) definitions

Synergies in outcomes

The respondents were asked whether the CCA interventions, in general, can have DRR outcomes and vice versa (synergies). 67% of the respondents indicated that it is possible for CCA interventions to have DRR outcomes and DRR interventions to have CCA outcomes while 16% opined that such outcomes depend on the nature of the interventions and hence cannot be generalized. Fewer number of respondents (10.5%) thought CCA to have DRR outcomes than the other way (3.9%) (Figure 6).

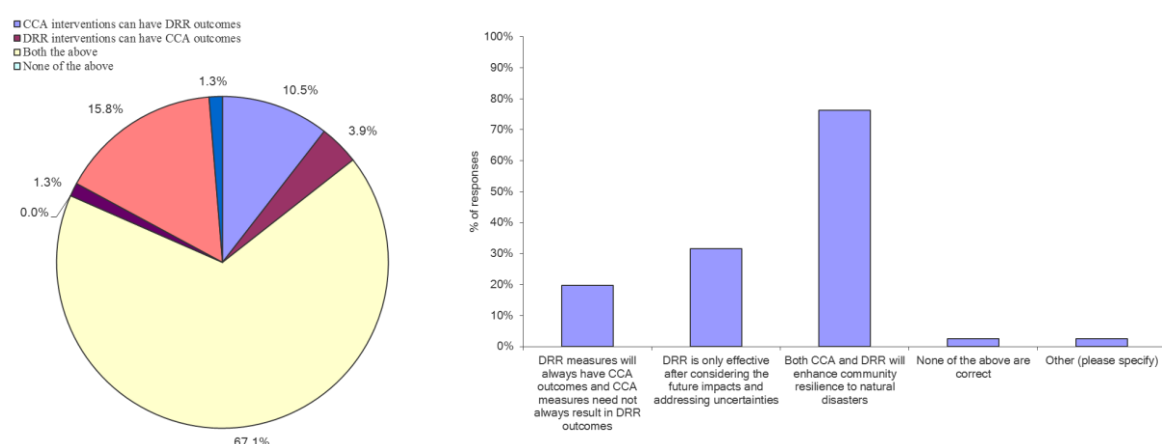
With regard to the extent of such synergistic outcomes, most respondents (76%) opined that the resilience is (or should be) the common outcome of both the interventions while others (32%) felt that DRR is effective in a changed climate only if DRR considers future climate change impacts in its planning and infusing redundancy to address uncertainties involved in

⁶ Available at http://ec.europa.eu/clima/policies/adaptation/index_en.htm

⁷ Available at <http://www.unisdr.org/2005/wcdr/intergover/drafting-committee/terminology.pdf>

⁸ Available at <http://www.unisdr.org/we/inform/terminology>

climate change projections. Few (20%) agreed that DRR measures will always have CCA outcomes. Some of the opinions expressed on the synergies between the CCA and DRR interventions could be seen in the Figure 6 according to which any CCA intervention is DRR intervention while DRR interventions include many interventions that may not be contributing to CCA. While it is evident from these observations that there are considerable synergies between CCA and DRR and that these synergies are widely acknowledged (65%), very limited efforts are being made to actively promote these synergies in various interventions being implemented on the ground (41%). One possible reason could be, at least by the opinions expressed by the survey respondents, that DRR tends to accept synergies while CCA tends to be ‘territorial’ and prefer ‘separation’.

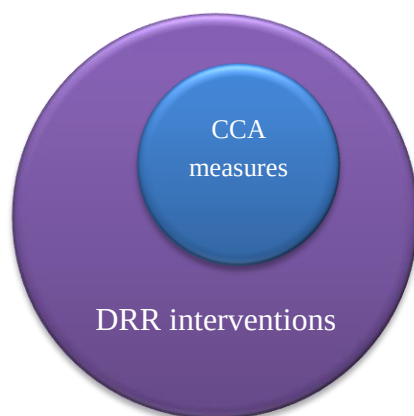


(Source: Authors)

Figure 6. CCA and DRR synergies of interventions (left) and extent of such synergies (right)

The extent of synergies may vary depending on the specific nature of the project and hence cannot be generalized (26%). However, irrespective of the nature of the intervention, the survey revealed, the DRR projects may have relatively higher CCA-synergistic outcomes (51%) than CCA projects having DRR-synergistic outcomes (48%) which corroborates well with the opinion expressed by the respondents and depicted in Figure 7. Not all sectors may have equal potential for CCA-DRR synergies. The survey revealed that the areas such as agriculture (54%), water resources (52%), urban planning (51%), natural resource management (49%), coastal zone management (48%), forestry (43%) and biodiversity and ecosystem services (42%) tend to have high potential for CCA-DRR synergies while areas such as transportation, animal husbandry and buildings can have medium potential to achieve CCA-DRR synergies. Relatively more respondents thought animal husbandry to have least potential among all the areas compared. Even among these areas, the potential for synergies vary depending on the nature of the project design. It was expressed that projects promoting community participation (52%), integrating both infrastructure and community participation measures (52%) and interventions with integrated approaches in general can have high potential to achieve CCA-DRR synergies compared to projects that promote only

infrastructure elements (36%). However, significant number of respondents (44%) also felt that all kinds of projects have equal potential to achieve the synergy and that interventions at macro scale tend to have medium potential (33%) to achieve synergy while the small scale local interventions (34%) will have high potential to achieve synergy.



(Source: Authors)

Figure 7. CCA and DRR synergies of interventions

Bottlenecks limiting the synergies

The most important bottleneck limiting the realization of CCA and DRR synergies include lack of sufficient knowledge about the CCA among DRR community and about the DRR among the CCA communities (18%). Lack of knowledge in both CCA and DRR fields appear to hinder stakeholders in designing projects with maximum synergy. Equal proportion of respondents has indicated there is inadequate knowledge and examples that show the benefits of promoting synergies. The language used by these stakeholders appears to have contributed to the lack of communication among them. However, specialist nature of these subjects appears to be the least important issue among the issues discussed here and may have contributed only at the policy level. Few respondents felt that it is difficult to integrate both CCA and DRR elements into a single project; however, ranked it as least important bottleneck.

Indicators and practices for CCA-DRR synergies

The survey has elicited several indicators that reflect the CCA-DRR synergies of interventions (Table 2). The most common indicator at the individual level appears to be the level of awareness, knowledge, attitude and individual resilience gained by the interventions which are also the factors that shape the actions and influence the uptake rate of the practices. Some indicators can be found common between individual and community levels which include resilience, knowledge, awareness levels and nature of livelihoods. In addition, collective wellbeing of communities, readiness of community for participatory decision making, initiating cooperative interventions and presence of infrastructure that provide collective benefits to communities reflect the synergies at the community level.

At the institutional level, the presence of programmatic and project linkages (between CCA and DRR projects and programs) within the institution, communication and collaboration among the institutions and presence of capacity building initiatives could lead to greater synergies between CCA and DRR (Table 2). At the regional level, elements such as coordination and networking, presence of CCA and DRR goals and mission, synergies between different levels of plans (e.g. provincial and national) and presence of integrated land use plans could facilitate greater CCA and DRR synergies. Policies are known to promote CCA-DRR synergy when policies are need-based, emphasize evidence for synergistic policy outcomes and emphasize standards for CCA and DRR including requirements for mainstreaming CCA and DRR into institutional and policy processes.

Table 2. Indicators reflecting the CCA-DRR synergies

Individual	Community	Institution	Regional	Policy
• Knowledge • Awareness/sensitization • Resilience • Education • Capacity built • Change in attitude • Individual savings • Livelihoods	• Resilience • Wellbeing • Infrastructure • Secure livelihoods • Level of participation and cooperation • Knowledge sharing and awareness	• Programmatic and project linkages • Communication and collaboration among institutions • Capacity building initiatives	• Coordination and networking • Regional goals and mission • Synergy between levels of plans • Integrated land use planning	• Need-based policies that integrate CCA and DRR concerns • Emphasis on evidence for synergistic policy outcomes • Promotion of standards for CCA and DRR including for mainstreaming

(Source: Authors)

When asked about suitable approaches for creating enabling environment that could enhance the CCA and DRR synergies of interventions, the responses showed considerable similarity between the indicators and practices proposed. The list of practices proposed to promote synergies is presented in Table 3. The way to understand this is to look at the above presented indicators as reflection of effectiveness of the practices/enabling environment presented in Table 3. It is evident from Table 3 that most measures are either related to resilience building or related to capacity and knowledge generation activities. Hence, it could be concluded that projects that address resilience and impart additional capacities could be successful in achieving maximum CCA-DRR synergies.

There is a wide-spread notion that achieving multiple synergies is financially demanding on the part of the project designers, in addition being knowledge and skill intensive. On the contrary, the survey has indicated that it would be cost effective to promote CCA and DRR synergies in a single intervention than trying to maximize the single outcome in two separate interventions (64%). 17% of the respondents were either not sure about such cost-effectiveness and 15% felt that there is no sufficient evidence for such cost-effectiveness.

However, it was revealed that the extent of cost-effectiveness depends on individual cases and contexts under which interventions are designed and implemented.

Table 3. Interventions for overcoming bottlenecks and for maximizing CCA-DRR synergies

Level	Interventions
Individual	• Considering cumulative risk factors • Enhancing knowledge through education, awareness and sensitization • Resilience building measures • Capacity building measures • Measures that target change in attitude
Community	• Collective resilience building measures • Participatory processes for collective decision making • Knowledge sharing and awareness generation • Implementing integrated planning processes
Institution	• Implementing capacity building initiatives • Promoting programmatic and project linkages • Communication and collaboration among institutions • Preparing and implementing strategic institution policies • Close collaboration between CCA and DRR experts
National and sub-national level	• Sharing experiences through networking, coordination and collaboration • Integrating socio-economic and biophysical measures • Establishing taskforces comprising of CCA and DRR experts for integrated decision making • Policies and guidelines to promote mainstreaming of CCA and DRR • Introducing scenario based policy measures to develop robust measures across scenarios • Making sure that the monitoring and evaluation considers CCA, DRR and SD outcomes of policies and programs combined with effective administrative, financial and regulatory checks • Measures for greater inter-ministerial coordination and collaboration

(Source: Authors)

Conflicts between CCA and DRR outcomes

While the survey has indicated the possibility of high CCA and DRR synergies in interventions, the survey has also delved into the possibilities for the presence of conflicts between CCA and DRR outcomes and conditions under which such conflicts may occur, leading to reduced overall project impact. 46% of the respondents felt that there is a possibility for such a conflict while 21% opined for lack of such possibility and the rest were unsure about the possibility for such conflicts. Among those who opined the presence of conflicts, majority (31%) thought that aspects such as down-stream and up-stream linkages, issues with cross-border implications, projects that give high emphasis on short-term gains, undue emphasis on infrastructure interventions and projects that neglect indigenous knowledge and experiences tend to result in such conflicts. 23% of those who expressed the

possibility of conflicts among CCA-DRR outcomes were not very sure under what circumstances such conflicts may occur. In terms of tendency for the interventions to fail, majority of respondents (33%) expressed that both CCA and DRR projects have equal chances to fail while 23% said it is more likely for DRR outcomes to fail than CCA outcomes. Success of outcomes depend on how projects are designed, implemented and followed up and the failure of outcomes is often context dependent. There is not much evidence for such failures as they tend to surface several years after the project cycle, often not reported and hence are often not captured by stakeholders. The survey has revealed the following factors that may contribute to the failure of CCA and DRR outcomes:

- Short-term nature of DRR interventions compared to CCA interventions
- Possibility of interventions being mal-adaptation or mal-DRR practices
- Large infrastructure projects without acknowledging social participation (unlikely in CCA)
- Erroneous design and implementation of projects
- Awareness levels among stakeholders
- Level of participation of critical stakeholders that are required to participate in the project
- Not taking into consideration the uncertainty factors associated with climate change impacts and other information used in decision making
- Robustness of factors taken into consideration while designing the interventions. For example, it was opined that DRR takes into consideration various factors other than climate change.

2.6 Conclusions

The online survey was participated by 151 respondents from India, Nepal and Ghana. Most had professional training in environmental sciences, social sciences and urban development. 23% claimed expertise in DRR and only 13% in CCA. Most worked with NGOs, governments and are largely researchers or practitioners. Most evaluated themselves having intermediate level of expertise on CCA and DRR and relatively equal numbers claimed expert levels.

The study has clearly indicated the presence of widespread consensus for the CCA and DRR synergies of interventions. While synergies are understandable and there is a high possibility to obtain synergies, the survey also indicated that these synergies need not be ‘automatic’, may not result equally in all the fields, can vary depending on the type of the intervention and how the interventions are designed, implemented and followed up. In addition, the survey has also indicated the need for providing enabling environment to facilitating and maximizing the synergies. Such enabling conditions could be provided through interventions such as capacity building and awareness generation at the individual and community levels while networking, dovetailing, mainstreaming activities will result synergies at the higher scales such as

communities, institutions and policy levels. There may be possibilities for the antagonistic CCA and DRR outcomes. However, we do not have clear evidence for such conflicts nor are clearly highlighted in the current discourse. The survey also revealed that there is a high potential for NGOs, researchers and UN agencies to play a vital role in promoting synergistic approaches at all the levels. There is a significant role for governments to promote synergies through instituting policy and regulatory regimes. At the international level, there is a need to coordinate CCA and DRR activities as in the case of initiatives under UNFCCC and HFA and it can be achieved only through setting up mechanisms such as joint sessions especially in areas of addressing loss and damage under UNFCCC. These initiatives could also consider coming up with joint goals and statements bolstering the DRR-CCA community to work together.

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3. Synergies of Interventions in Ghana

3.1 Introduction

The link between climate change adaptation (CCA) and disaster risk reduction (DRR) is increasingly growing in importance in different domains and levels of human development in relation to policy, planning, research and practice. It has become crucial in national development strategies and plans particularly for developing countries. This is because CCA and DRR initiatives require significant human and resource capacity to implement and monitor successfully. Hence synergistic linkages between CCA and DRR and the resultant outcomes during and after implementation would contribute to sustainable development.

Ghana is one of the developing countries of West Africa, South of the Sahara, with a population of 26 million; a fragile economy that is sensitive to climate variability and change and prone to disasters. Ghanaian economy is largely agrarian and relies on erratic rainfall patterns. A large percentage of the population works in sectors of agriculture, forestry, fisheries and tourism. Although agriculture remains the greatest contributor to the GDP, this has steadily and significantly reduced over the last decade. There is considerable evidence suggesting rising temperatures in all ecological zones with corresponding decrease in rainfall whose pattern is increasingly becoming erratic. The rural poor are the most impacted due to changing climate and declining share of agriculture in the overall GDP.

Ghana ranks high among African countries that are most exposed to risks emanating from multiple hazards related to the weather (GFDRR, 2011). Some of the major hazards that Ghana is facing include floods and droughts, particularly in the Northern Savannah belt. Six major floods occurred between 1991 and 2008 with two million people affected. The 1991 flood was the most devastating in that period. In 2007, more than 325 000 people were affected by devastating floods and close to 100 000 people required some form of assistance to restore their livelihoods (GFDRR, 2011). There are chronic coastal erosion rates as high as 1 m/yr along the coast particularly to the east around the Volta delta covering Keta and Ada Foah. Storms and storm surges exist and these result in risks of coastal hazards and landslides as well as urban hazards. Man-made and natural wildfires occur all through the nation and periods of drought occur particularly in the north suggesting a high variability in climate and hydrological flows in the country. In 2007, a period of drought that damaged the initial maize harvest was followed by floods (GFDRR, 2014).

The economic and social impacts on Ghanaian lives and property due to the effects of climate change and weather related disasters are significant even though the social cost is usually hardly accounted for. In 2009, for example, property lost from floods in the Southern part of Ghana in June and July alone was worth about 5.8 million US dollars with 23 deaths. After the massive devastation of the Northern Region of Ghana by floods in 2007, the government of Ghana distributed over US\$7.8 million for reconstruction. Direct emergency funding for the devastation in the three Northern Regions was about US\$ 25.1 million (GFDRR, 2011). Man-made activities that have aggravated the impacts of climate change include the destruction of forests and mangroves, sand mining on the coasts and improper planning of communities leading to a haphazard construction of houses. The capacity of communities to deal with climate related hazards is very low in the country. During disasters in Ghana, whether natural or man-made, the poor, women, children, the elderly and disabled as well as small businesses are often the most vulnerable and therefore are the worst affected. The poor are often forced to live in marginal and disaster-prone locations. For example, out of the 18 per cent of the total population of Ghana that lives in extreme poverty, more than half (about 54 per cent) live in Northern Ghana where climate related disasters like floods and droughts are very frequent.

Failure to give due attention to the complex interaction/linkages between climate variability, change and disaster risks and the negative impacts on the economy and the population might exacerbate the current situation. The result will be rise death toll and poverty levels in many regions and communities in Ghana, resulting in great loss of income, lives, livelihoods and property. Attempts by different stakeholders to introduce interventions addressing climate change and associated disaster risks with the objective of building resilience of societies and ecosystems have been made.

Keeping the above background in view, the purpose of this study was to investigate CCA and DRR synergies that is grounded in evidence using actual projects and the possible benefits (intended and otherwise) accrued from the projects to the local communities where the projects were implemented. This was done by identifying CCA and DRR interventions in some vulnerable communities in Ghana and evaluating how these interventions resulted in CCA and DRR synergies. This study on Ghana is one of three cases identified for this research. The remaining cases are India and Nepal which are presented in separate chapters in this report. The assessment was mostly done in the agricultural communities as their livelihood is one of the most sensitive to climate change and disaster risks in Ghana.

3.2 CCA and DRR initiatives in Ghana

The future of Ghana's economy will be bleak if governments fails to put in place appropriate measures to address the worsening impact of climate change. Against the backdrop that agriculture is the biggest contributor of the Ghanaian GDP – although this contribution has

declined throughout the years from over 51% to 36% of GDP, it is still the employer of more than 60% of the active population who are mostly small scale rural farmers. The result of climate change impacts will be unsustainable livelihoods with negative consequences for food security, household income, health, education, gender equality and the environment. A wake-up call for a more proactive risk reduction measures and increase in resilience rather than a reactive response to disasters occurred during the 2007-2008 floods, particularly in the Northern region. The nation realized the need to confront the persistent recurrence of drought and flooding cycles and other natural hazards. Consequently, the government is tackling these problems at policy, planning and practice levels through formulation of strategies to strengthen both CCA and DRR capacity with support from various donor agencies and countries.

At the international level, Ghana is signatory to several global climate change and disasters interventions and policy processes and hence is required to meet certain conditions under those agreements. For example, under the United Nations Convention on Climate Change (UNFCCC), national governments are expected to incorporate climate change issues into national development plans and processes. Similarly, the Hyogo Framework of Action (HFA) 2005-2015 also expects such integration in addition to aiming at substantially reducing casualties as well as socio-economic and environmental losses caused by disasters. At the national level the mandates to address climate change and disasters rest in different institutions. The Ministry of Environment, Science, Technology and Innovation (MESTI) is the centre for coordinating all environment related policies including climate change whilst the National Disaster Management Organization (NADMO) is responsible for disaster management in the country. Due to the cross-sectoral and cross-cutting nature of CCA and DRR, a number of other institutions also play an important role in CCA and DRR issues with differing mandates, particularly in the areas including meteorology, energy, water, agriculture, infrastructure and gender.

Some of the important climate change related activities, programs and strategies the country has undertaken in the past decade include: 1) the reconstitution of MESTI and granting it the coordinating responsibility for climate change related activities across ministries, departments and agencies (MDAs), 2) giving the Ministry of Finance and Economic Planning oversight of climate related financing, 3) rolling out several important climate change related projects such as the “Africa Adaptation Program, the Natural Resources and Environmental Governance Program (NREG),” and 4) developing a National Climate Change Policy Framework (NCCPF) that pooled together all or most of the activities related to climate change in Ghana after mapping the past and present projects to contribute to “mainstreaming climate change into key planning processes on the national, regional and local level” (Wurtenberger et al., 2011).

Although there is no national climate change legislative mandate, several documents on CCA policy, strategies, etc. exist. One such document is the National Climate Change Adaptation Strategy (NCCAS) which informs government commitments to both the UNFCCC and HFA 2005-2015. It is among others to “1) engender a targeted simultaneous increase in climate resilience and decrease in vulnerability in a comprehensive and consistent manner; 2) enhance the capacity of especially policy makers about the crucial role adaptation in national development ...” (NCCAS, 2010).

Ghana’s National Disaster Management Organization (NADMO) is mandated by the 1996 NADMO Act 517 to primarily manage disasters across the country in coordination with other relevant agencies and institutions. A new, more effective and comprehensive NADMO Bill is currently under deliberation to replace NADMO Act 517. With a National Secretariat, ten Regional Secretariats and several zonal offices (UNDP, 2010), NADMO is currently established within the Ministry of the Interior and functions under the National Security Council with the President of the Republic of Ghana as its chairperson. The administrative body of NADMO is the National Disaster Management Committee (NDMC), with the Minister of Interior as its chairperson. NDMC reports to the National Security Council, which is NADMO’s Governing Council. Seven hazard-specific technical committees of governmental and non-governmental experts advise the NDMC” (UNDP, 2010:1). The DRR capacities within government are limited. However, in the 2009-2011 National Progress Report on the Implementation of the Hyogo Framework for Action, some progress have been made in reducing disaster risks although lack of finance and institutions with inadequate capacity less commitment affected this effort.

Although in the past the agencies like NADMO responsible for DRR and MESTI’s Environmental Protection Agency (EPA) responsible for the implementation of CCA have been working individually, attempts are now being made to bring their activities closer. With regard to international collaboration, the Government of Ghana with support from the UN in the country and other international donor agencies is shifting towards focusing on integrating CCA and DRR in programs supported by donors to strengthen institutional capacities. This is underpinned by the country’s ‘new’ development agenda for CCA and DRR at the district, regional and national levels. The UNDP is providing policy support to strengthen national systems linked to important sectors including the environment, climate, agriculture and water through institutional capacity development for CCA and DRR across levels in policy, planning and practice. Specific areas of support include capacity building of the National Climate Change Committee (NCCC); Integration of adaptation and mitigation strategies into policies, plans and programs; Capacity building to enhance access to climate change; Operationalization of national policies and strategies in disaster risk reduction in disaster-prone districts; Raising public awareness on disaster risk reduction institutional capacities of NADMO and other MDAs reinforced (UNDP- Ghana, 2015).

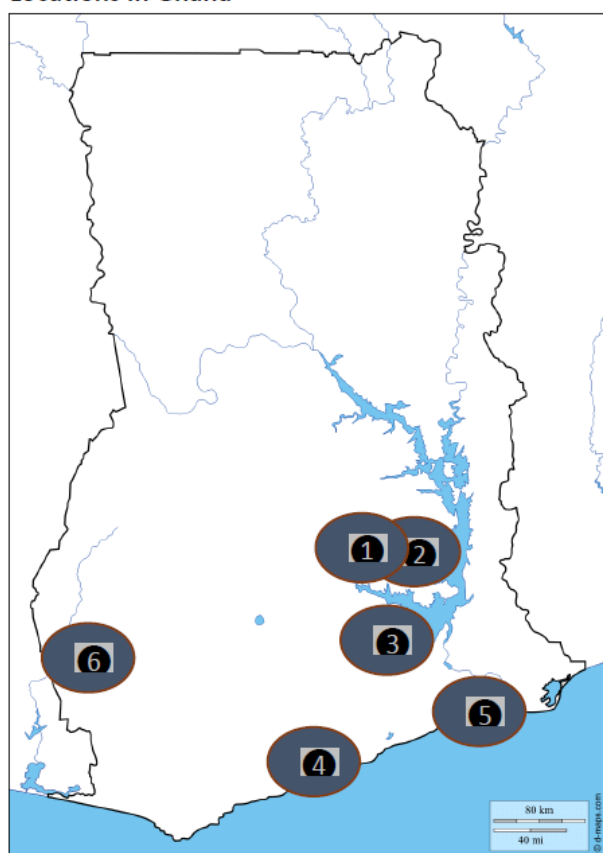
At the national level, disaster preparedness and response programs and actions, especially with regard to climate change has been looked at from a mainstreaming perspective with the objective of integrating CCA and DRR issues into the nation's policy planning and budgeting processes. The establishment of the National Platform for Disaster Risk Reduction and Climate Change aim to bring together CCA and DRR actors and stakeholders and their various related activities. The initiative aims to “1. create greater awareness among platform members about the Ghana Plan for Action for CCA and DRR (2011-2015) and the specific activities within their areas, 2. discuss/comment on various activities especially with respect to the status of each of them and the corresponding budget allocated, and 3. recommend measures/strategies to adopt to facilitate effective implementation and monitoring of these activities (National Platform, 2013).” In addition, new projects such as the Africa Adaptation Program were implemented taking into consideration the close relationship between CCA and DRR and hence the scope of implementation with regard to the component activities and stakeholder participation was comprehensive.

Public consultation is necessary to at least facilitate the understanding, awareness and successful implementation of CC/DRR programs and activities into nation's development plans. At the planning level, workshops, meetings and seminars on the impacts of CCA and DRR on district, regional and ultimately national development have been organized periodically for various stakeholders for effective mainstreaming into different levels of development in the country. The stakeholders include members of the regional and district Executive and the Legislature, community based organizations (CBOs), NGOs, civil society organizations (CSOs), faith based organizations, organized professional bodies, traditional authorities, trade unions etc.

With regard to community based (CCA/DRR) projects and pilot projects at the local level, risk reduction and adaptation strategies, including on-farm and off-farm long term and short term strategies, which benefit farmers directly or indirectly have been considered (Antwi-Agyei et al., 2013). However, these projects have largely been implemented in isolation with little thought given to the possible synergies between CCA and DRR.

3.3 Methodology

The CCA-DRR Synergies of Interventions Project



1 = Xedzodzoekope (Afram Plains); 2=Odomasi (Afram Plains);
3 = Kankama (Fanteakwa); 4 = Apam (Gomoa West);
5 = Suipe & Agorvinor (Keta); 6 = Enchi (Aowin-Suaman).

Figure 8. Study locations in Ghana

Gomoa West District; and Suipe/Agorvinu in Keta, Volta region both coastal communities and lastly, Enchi in the Aowin Suaman District in the Western region, which is located in the forest belt. In addition to farming and fisheries, some members of the communities were also engaged in activities like trading.

Participants for the focused group discussions (FGDs) were mainly the direct beneficiaries of the projects under study. The groups composed of women, men and youth. The composition of participants for the FGDs varied and was dependent on the communities' willingness to join the discussions (Please see Table 4 for number of participants in FGDs). For each pilot project, a meeting was set with at least one lead member during the implementation of the project to obtain information on project duration, objective, components, expected outcomes, intended benefits (for each component/intervention) etc. The process for conducting the FGD include 1) discussion about the historical hazards and impacts in the project location, 2) asking beneficiaries about their familiarity with the project and the component activities and

This section describes the methods employed to conduct the research and a summary of the background to the projects. The methods for gathering data were a) review of projects documents including reports, b) interviews with lead persons in the implementation of identified projects, and c) conduction of (FGDs) with direct beneficiaries of the identified projects. The selection of the study sites was informed by the objective of the study including the need for increased geographical and project (type) variation. The project locations selected for this study in Ghana were all farming and fisheries communities (see Figure 8 for project locations). The study sites were Xedzodzoekope and Odomasi in the Donkorkrom District of the Afram Plains (both of savannah transitional zone and savannah woodland vegetation type); Kankama near Begoro in the Fanteakwa District (of wet-semi

deciduous rain forest and the savanna scrub vegetation type); Apam in the

refreshing them when necessary, and 3) listing the project activities and mapping out all the benefits of the projects. Please see Annexure I for more information on the process followed for conducting FGD.

Table 4. Number of participant in the FGDs in the project locations

Project Location and District	Total number of participants in the FGD
Xedzozdoekope, Kwahu North	30
Odomasi, Kwahu North	34
Kankama, Fanteakwa	11
Apam, Gomoe West	10
Suipe and Agorvinu, Keta	13
Enchi, Aowin Suaman	39

(Source: Authors)

4.3.1 Background of projects

Here, an effort was made to provide a brief background of projects included in the study. The Table 5 compares the project objectives and intended outcomes.

- **Project 1 [CCA] (2009-2012):** *Food security and adaptation to climate change in the Afram Plains of Ghana* at Xedzozdoekope (composed of mainly grassland to semi-wooded vegetation) in Kwahu North District in the Afram Plains and located close to the Afram River. It was one of the pilot projects of the Anticipatory Learning for Climate Change Adaptation and Resilience (ALCCAR). The ALCCAR project encompassed research, outreach and education with funding from the National Science Foundation of the United States. The overall objective was to strengthen the capacity of four rural communities in Ghana to use community-based CCA approaches to build resilience (Tschakert et al., 2012). In addition, the project was to serve as platform for collective learning of participants to have a better understanding of climatic variations and change in relation to food security and well-being of rural communities. The learners comprised mainly farmers including herders, fishermen, policy makers and researchers (Codjoe et al., 2012). In the project location is characterized by poverty, intense rainfall in a short period followed by prolonged drought, bush fires, clashes among the Fulani cattle herders and land tenure related issues.
- **Project 2 [CCA] (2009-2012):** This pilot project was also conducted in Odomasi under the ALCCAR project previously described but whose vegetation ranged from wooded to semi-wooded village was more wooded hence quite different from that of the previous project location. Historical problems in this site are similar to that in Xedzozdoekope except clashes with the Fulani herders who do not operate in this project site and drought that led to water-borne disease in drinking water.
- **Project 3 [CCA-DRR] (2010-2013):** *Water management along the Osubin River* in Kankama, near Begoro in the Fanteakwa District of the Eastern Region. Past problems faced by the community in this project location include poverty and flooding worsened

by land degradation around River Osubin. It was one of the numerous pilot projects of the Africa Adaptation Program (AAP) in Ghana that was implemented in 2010-2013 with the objective to build/enhance the resilience of the vulnerable local communities through restoration of water resources. The broad objective of the Africa Adaptation Program was to “ensure that Ghana has broadened and improved institutional capacity and financing mechanisms for addressing climate risks and has demonstrated positive impacts in linking DRR and climate change through the implementation of early warning systems” (AAP, 2013: 10). The project was implemented by the Fanteakwa District Assembly with financial support from the Government of Japan and technical support from the Environmental Protection Agency (EPA), Ghana and the United Nations Development Program (UNDP). It is noteworthy that the AAP is considered as a ‘comprehensive program’ of several CCA- and DRR-related projects that sought to address challenges at policy (national), planning (regional/district) and practice (community) levels.

- **Project 4 [DRR] (2011-2013):** *Construction of footbridges in Keta* was a DRR pilot project under AAP implemented in 2011-2013 in the Keta District where a large lagoon and a number of creeks pose threats to movement of people, goods and services with high risk of flooding during the rainy season. Poverty, sea erosion and diseases are some of the reported problems in the community. The footbridge was to ease access to farms schools and markets for over 1500 inhabitants of the Suipe and Agorvinu communities. The Keta Municipal Assembly received financial support from the Government of Japan through the EPA Ghana and the UNDP in 2010 to undertake this intervention. Historical problem faced by the community include the inability to cross the river and adjoining creeks in high tides and frequent flooding.
- **Project 5 [DRR](2010-2012):** *Construction of sheds for artisans* was a pilot project also implemented under AAP in Enchi. The project was implemented by the Enchi District Assembly from 2010 to 2012. The source of funding and entities for its implementation are same as previously discussed projects implemented under the AAP. The communities in this region faced severe impacts of flooding, in terms of loss of livelihoods, destruction of socio-economic infrastructure and loss of lives and properties. Local capacity to deal with the situation was low hence the need to strengthen CCA and DRR capacity.
- **Project 6 [CCA] (2010-2013):** The pilot project on climate change and health management ‘Integrating climate change into the management of priority health risks in Ghana’ project with Global Environment Facility (GEF) funding was implemented from 2010 to 2013. Poverty, flooding and diseases especially malaria due to stagnant flood water are among the problems faced by the communities in the project location. Due to the prevalence of certain tropical diseases, some of which are climate (temperature) dependent such as malaria, and against the backdrop of poor health infrastructure and resource capacity, this project on CCA in the health sector was executed by the Ministry of Health, Ghana with technical support from UNDP. The aim of the project was to

“develop systems and response mechanisms to strengthen the integration of climate change risks into the health sector” (GEF-UNDP, 2010).

Table 5. Project's activities, expected outcomes/intended benefits

Project Title, Location [Project Type]	Project Components/Activities	Expected Outcomes/ Intended Benefits
Food security and adaptation to climate change in the Afram Plains of Ghana, Xedzodoko (Mainly grassland to semi-wooded), [CCA] ALCCCAR (2009-2012)	Learning through meeting with experts: • Ways to reduce soil dryness on farms (mulching) • Planting and harvesting at the right time	• Increased food and livelihood security and resilience through a better understanding of possible CCA strategies to climatic and other stressors • Stronger voice for local people to make their hazards more visible to policy makers (ALCCCAR, 2012)
Food security and adaptation to climate change in the Afram Plains of Ghana, Odomasi (Mainly wooded to semi-wooded), [CCA], ALCCCAR, (2009-2012)	Workshop/training in • Ways to curb soil erosion • Planting trees • Better farming methods to increase yield/unit space • Weather forecasting • Flooding and measurement of health-related issues • Proper ways of marketing	
Water Management Along the Osubin River, Kankama, Fanteakwa District, [CCA-DRR], AAP (2010-2012)	• Growing of trees (mahogany, teak and raffia seedlings) at the banks and watershed of the Osubin river • Poultry and livestock production (to a much lesser extent)	• The establishment of community volunteer group to manage trees • Demonstration 50-meter buffer zone established through planting of trees on the banks of river Osubin • Creation of community awareness on climate change
Construction of foot bridge Suipe and Agorvinu communities, Keta, [DRR], AAP (2011-2013)	• Construction of two footbridges in Suipe and Agorvinu in Keta • Training and capacity building on CC for public sector workers • Awareness creation on CC mainly using the broadcast (radio) media	• Accessibility of goods and services within the project area • Reduction in climate related disaster risks among project beneficiary communities • Reduction of time in doing business in the community
Construction of Sheds for the relocation of artisans in Enchi, [DRR], AAP (2010-2012)	• Awareness raising of Enchi residents on recurrent flooding (CCA and DRR) • Capacity building of stakeholders, particularly local government staff, on CCA and DRR • Mainstreaming CCA and DRR issues into district's medium term development plan	• Improved institutional capacities to implement, monitor and enforce climate change risk reduction policies and plans • Increased resilience of livelihoods and assets of people in Enchi township and other surrounding communities to flooding • Improved knowledge in CCA through resettlement programs
Climate change and health management pilot project, Apam, [CCA], (GEF-	• Creating awareness on CC and health through durbars and tree planting exercises	• By 2010, the population of the people of Ghana, particularly those living in the most deprived

Project Title, Location [Project Type]	Project Components/Activities	Expected Outcomes/ Intended Benefits
UNDP), (2010-2013)	Organize periodic cleaning/sanitation exercises	- districts whose right to health is fulfilled is increased - Develop institutional architecture and capacity for enhancing Ghana's management of priority climate change-health issues and to bolster the effectiveness of enhanced disease monitoring (GEF-UNDP, 2010)

(Source: Communication with implementing agencies)

3.4 Results

Table 6 shows the summary of results of the project evaluated using focus FGDs. Six pilot projects were evaluated in this study: three CCA projects, two DRR projects and one project which that includes both CCA and DRR activities. The CCA pilot projects implemented in Xedzozdoekope were located in grassland to semi-wooded areas and Odomasi is located mainly a semi-wooded to wooded area in Afram Plains.

The projects implemented in the Afram Plains (Xedzozdoekope and Odomasi), Kankama, Apam, Keta and Enchi were all different in nature with different component activities. However, it could be seen that the accrued project benefits were similar. Economic benefits (such as increased income) were reported in five communities and hence forms one of the important benefits observed among the projects. Knowledge acquired to address the challenges facing the communities and sharing this knowledge with the future generation was also reported in five communities. Social benefits namely strengthened social cohesion and increased resilience/adaptive capacity were reported in four and five communities respectively, respectively. In the two Afram Plains projects, different benefits to meet different needs (i.e., erosion control of the slopes through tree planting for short-term flooding in Odomasi and mulching for soil dryness in Xedzozdoekope) were realised in addition to the common benefits realised in both communities. Since a significant number of similar benefits were realised from different projects, it can be stated that both the CCA and DRR projects have synergies. In general, irrespective of the objectives/outcomes spelt out by the implementing/donor agencies and whether the project falls under CCA or DRR or both, the common benefits covering economic well-being, social development, improved health, increased mobility etc. were identified in these initiatives.

With regard to the content of the project documents (Table 5) and what was actually implemented on the ground (Table 6), the framing of the intended benefits/outcomes were rather broad and general and in some cases vague as seen in especially projects 1, 2 and 6 compared to more specific benefits accrued to the participants. In some cases the project key informants helped make the intended outcome clearer (e.g. in projects 3, 4 and 5).

One common cost that was identified by most of the FGD participants was the time sacrificed to participate in the projects activities, something they found difficult at the beginning but changed over time with increase in interest in the project. Poverty was the common denominator during the discussion and possible alleviation through participation in the project was one major reason if not the main one. There was also a nuanced power relations issue regarding land ownership and tenancy that impacted the social resilience of farmers due to limited control over the land they cultivate and the fact that their job security, and hence the future of their families, was not fully assured. It became clear that lack of land tenure further affect the sustainable management of the land.

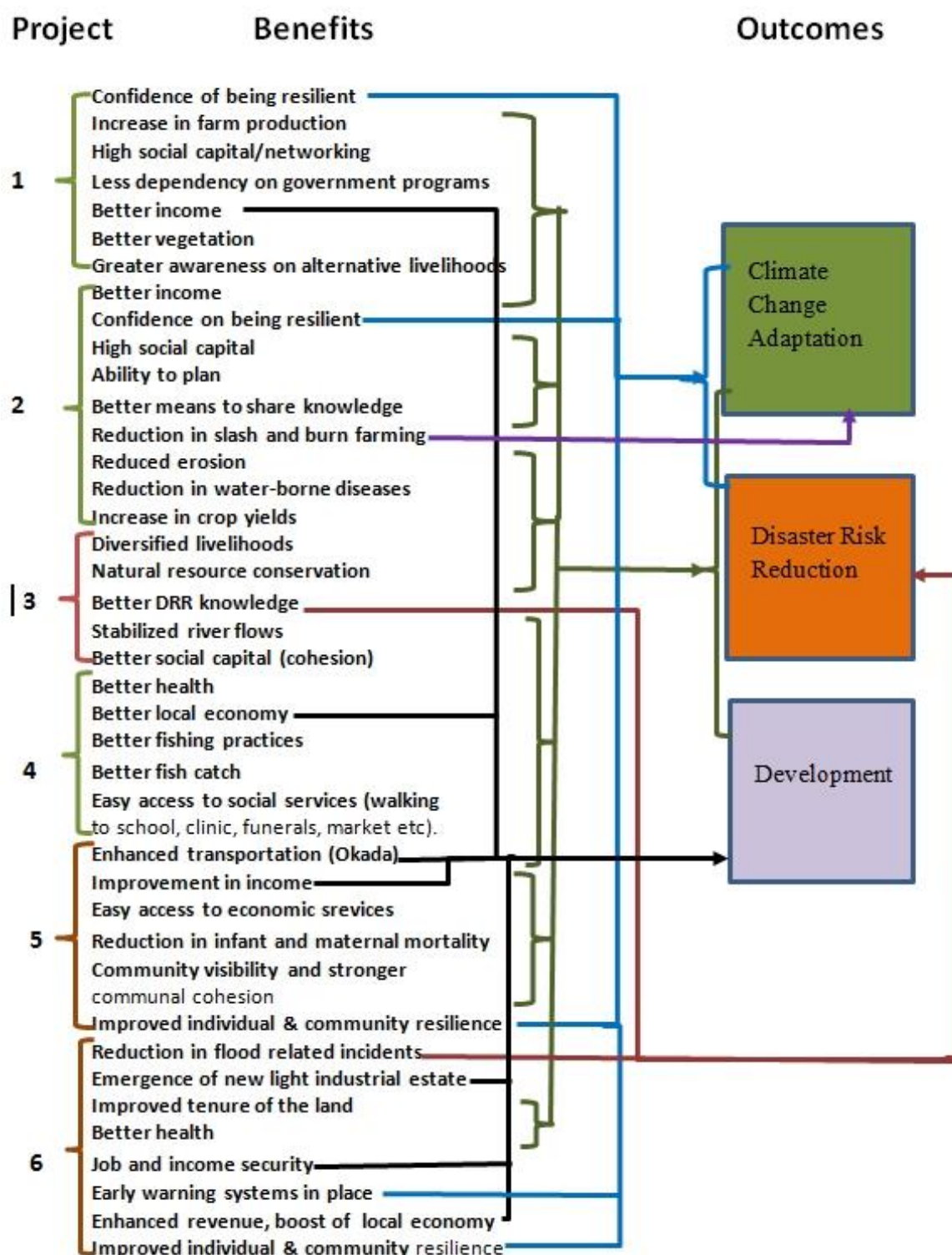
To support the validity of the results presented in Table 6, an attempt was made to track CCA and DRR outcomes of these projects. Figure 9 shows the identified benefits grouped under the respective pilot projects numbered 1-6. It also shows tracking of the accrued benefits for outcomes namely CCA, DRR and development. There were two benefits ('better DRR knowledge' and 'reduction in flood related incidents' (dark brown lines in Figure 9)) that were exclusive for DRR outcome and one ('reduction in slash and burn farming' (purple line)) for CCA outcome. 'Individual or community resilience' benefit from both project types and 'early warning systems' benefit from a DRR project (blue lines) were tracked for both CCA and DRR outcomes. A greater number of benefits (green lines) were tracked for all three outcomes especially for CCA and DRR. Several economic benefits that were identified with both CCA and DRR projects (black lines) could have developmental outcomes. This is because the majority of the communities studied cited poverty as their priority challenge and some beneficiaries have participated specifically for the economic benefits of these projects. This indicates that the ability to achieve economic wellbeing in CCA and DRR projects could attract more participants. The use of common outcomes (green lines) in this context was a bit vague because several of the benefits could also be categorized under outcomes such as health improvement, social development, agricultural improvements etc. In practice, however, many of the benefits, particularly the green lines are related and cannot be clearly separated from each other. The fact that they commonly trace to all three outcomes also suggests the CCA, DRR and development synergies of interventions.

Table 6. Summary of activities and benefits accrued from CCA and DRR pilot projects in Ghana

Pilot Project title and type	Activities implemented	Benefits accrued
Project 1: Food security and adaptation to climate change in the Afram Plains of Ghana	• Learning during workshops/ meetings with experts on: ○ Ways to reduce soil dryness on farms (through mulching) and other farming methods to increase yield ○ Planting and harvesting on time ○ Marketing of farm produce ○ Data collection and management (for weather forecasting)	• Increased knowledge and skills • Increase in farm produce due to timeliness in planting and harvesting • Stronger social bonds though increase in cooperative activities among villagers • Independency from local government programs • Better income from produce • Encouragement to plant local woody species • Increased knowledge on methods of improved livelihood
Project 2: Food security and adaptation to climate change in the Afram Plains of Ghana	• Learning during workshops/ meetings with experts • Ways to curb soil erosion • Afforestation • Efficient farming methods to yield increased yield per/unit area • Data collection and management (for weather forecasting) • Flood control and measurement of health-related issues • Marketing farm produce • Improving the quality of water during drought	• Increased knowledge on methods of improved livelihood to share with children • Increase in income/ “we are able to take care of our families better” • Increase in self-confidence (resilience) • Increase in social cohesiveness/more cooperative activities • Ability to “use our time better for other things” by drawing ‘action plan’ for farming • Better ways of sharing knowledge/information on improved methods of livelihood • Reduction in slash and burn farming • Reduction in erosion of slopes • Reduction in crop diseases • Increase in crop yield
Project 3: AAP: Fanteakwa District Pilot Project	• Growing of trees on the banks and in the watershed of the Osubin River, (i.e., mahogany, teak and raffia seedlings) • Poultry and livestock production (to a much lesser extent)	• Source of livelihood and improved economic well-being • Knowledge on the role of trees in improving the river basin • Extreme variation of river levels has reduced • Project encouraged tree planting in farmers’ own farms, “the joy” of seeing trees grow • Increase in social cohesion as members worked together • Clean water
Project 4:	• Construction of two footbridges in Suipe	• Easy access to social services (health facilities, schools, festivals, funerals, etc.)

Pilot Project title and type	Activities implemented	Benefits accrued
AAP Construction of foot bridge in Keta's Suipe and Agorvinu Communities	and Agorvinu in Keta	• Easy and regular access to market by women • Reduction in infant and maternal mortality • Improvement in income due to enhanced marketing • Enhanced transportation facilities (Okada) • Strong communal cohesion • Improved individual and community resilience
Project 5: Construction of Sheds for the Relocation of Artisans in Enchi	• Construction of sheds for relocation of artisans	• Reduction in flood related incidents • Emergence of a new light industrial estate • Improved tenure of the land • Improved income security and employment • Improved individual and community resilience • Development of a new small industrial estate • Early warning systems in place • Enhanced revenue benefiting the local economy
Project 6: Integrating Climate change into the management of priority health risks in Ghana	• Durbar to create awareness on CC and related health issues • Tree planting exercises • Monthly sanitation exercises	• Decrease in disease prevalence and improvement in health • Increase in hygiene ("more beautiful surroundings") • Increased business and better local economy • Knowledge gained through awareness led to improved fishing practices • Better fish catch due to improved fishing methods • Improved individual and community resilience to CC and disasters

(Source: Authors)



(Source: Authors)

Figure 9. Tracking of CCA benefits for DRR outcomes and vice versa

Note: Project locations are numbered: 1= Xedzodzoekope (CCA); 2 = Odomasi (CCA); 3= Kankama (CCA/DRR); 4 = Apam (CCA); 5 = Suipe and Agorvinu (DRR); and 6 = Enchi (DRR).

3.5 Conclusions

Ghana's economy is sensitive to climate change and variability and a large percentage of its people in both rural and urban settings are vulnerable. The government has begun addressing the challenges by placing high emphasis on CCA and DRR. However a lot is still not known about CCA and DRR linkages and possible synergies when addressed together. This study makes a contribution to this knowledge by showing the presence of common outcomes associated with project benefits irrespective of their type and by proving that CCA and DRR project activities and outcomes complement each other in a synergistic manner.

This study is significant for a couple of reasons:

- It makes a case for CCA and DRR policy makers, experts and practitioners to consider working more closely together due to significant synergies of their interventions.
- It opens the discussion on the need for institutional and systemic changes in project design at the policy, planning and implementation levels so as to streamline CCA and DRR implementation processes which should include better monitoring and ex-post evaluation of projects to ensure effectiveness.

Successful implementation of CCA and DRR projects require a systematic capacity building of all stakeholders. The success of implementing these projects and the ability to scale them up and embed in the community of practice will require upgrading the limited understanding on the CCA, DRR and SD concepts among the related professionals and practitioners especially the project implementers. Performing stakeholder analysis and capacity needs assessment (CAN) will be appropriate. Strengthening the appropriate learning approaches (e.g. anticipatory learning), processes and content would be key. The issue of poverty and the need to know that climate change and disasters could exacerbate it should be grounded in the basic knowledge of the rural communities especially farmers with realistic assumptions about how development can progress in their situation.

A discussion with representatives from UNDP and EPA for an overview of work they are involved revealed lack of proper coordination between stakeholders engaged in CCA and DRR projects. The government can play a significant role in setting up a coordination mechanism by setting up an inter-agency system that would 1) liaise between implementing and donor agencies to streamline their project implementation both in content and process and 2) act as a clearing house and information portal for appraisal of incoming projects against completed ones for sustainability and efficiency thus eventually enhancing the impact of such projects. A mechanism needs to be put in place to capture the benefits that are accrued from projects for further upscaling. Such a mechanism can help decide if the ongoing and proposed CCA and DRR projects are to be implemented separately but with an interagency coordination or to be merged for achieving maximum CCA and DRR outcomes. This study indicate that the idea of implementing projects (such as the African Adaptation

Program) that are more comprehensive and systematic in terms of scope and depth of coverage should be encouraged.

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4. Synergies of Insurance Interventions in India

4.1 Introduction

Farmers in India face a plethora of problems including extreme weather events, pests, disease and volatile market conditions. Farmers in India are particularly vulnerable to the impacts of climatic irregularities as institutional systems are not adequately developed to ensure resilience and adaptive capacity. The regular crop loss often reinforces and traps farmers in poverty. Coping mechanisms such as selling of assets and migration are predominant in most of the disaster prone areas in the country. In the light of this, effective policy strategies are essential to build sustainable agrarian livelihood systems.

Crop insurance is a risk management tool, which has been gaining popularity for the past decade. It is increasingly becoming a common policy tool in developed countries and more so in India. However an evidence for its effectiveness as an efficient risk management tool is yet to be brought out. The government of India has started offering crop insurance as early as 1985. The first insurance scheme offered was the Comprehensive Crop Insurance Scheme (CCIS), which was largely seen as a failure. The CCIS was subsequently replaced by the National Agricultural Insurance Scheme (NAIS). However, its effectiveness has also come into question. Since 2010, the government has begun to expand the index insurance scheme. In many parts of India, crop insurance has become a mandatory prerequisite to obtain crop loans.

The value of crop insurance, both private and subsidized, is much debated among academicians and policy makers alike. Evidence based studies quantifying the effectiveness of agricultural insurance to manage disaster risks, especially in the context of developing countries, is not abundant. Similarly most of the literature available on the contribution of agricultural insurance to long-term CCA is theoretical and is often a speculation. In light of this, it is necessary to conduct field-based studies to empirically study the ground realities of the effectiveness of insurance.

In order to study the effectiveness of agricultural insurance products in terms of CCA and DRR outcomes, a survey-based study was conducted among small farmers in the Andhra Pradesh state of India. The study included a questionnaire-based survey using indicators identified from relevant CCA and DRR literature and focus group discussions (FGDs) with the community members in villages where agriculture insurance has been implemented. The indicators were used to assess the impacts that the agricultural insurance (in this case both

government and private) had upon household capacity to cope with disasters and adapt to climate change.

4.2 Reported benefits of insurance

Disasters and climate change pose threat to development and poverty reduction (IPCC, 2001). In many developing and least developed countries, extreme events severely hamper the ability of communities to adapt and manage long term impacts. Traditionally, available resources are often channeled towards disaster relief and rebuilding (Schipper and Pelling, 2006). However, these efforts have seldom contributed to effective DRR. Studies have shown that climate change will increase the frequency and severity of disasters; implying that climate change will multiply existing disaster risks (IPCC, 2014). Natural resource dependent livelihoods are particularly vulnerable. Agrarian based livelihoods within developing countries are generally most severely impacted by changes in climatic systems (Parry et al., 1990). This is particularly true in areas of rain fed agriculture where weather is a major determinant of agricultural production. Unmanaged weather risks contribute to poverty and marginalization in these areas (Collier, 2009). Weather events not only destroy current sources of farm income but also effect household assets such as livestock that are important sources of income and nutrition. As a result, households often slip into situation called as a “poverty trap” where they do not have necessary assets to bring themselves out of poverty (Sen, 1981). Distress sale of assets below market prices can further contribute to household losses and perpetuation of poverty.

Insurance can be a useful tool in preventing the distress sale of productive assets (Aggarwal, 2010). Post loss liquidity is essential in coping with disaster impacts and preventing unsustainable coping strategies and insurance can help smooth post loss liquidity issues by providing liquidity following crop losses (Murdoch, 2006). Insurance can help in conservation and building of assets, this frees up assets for investment in adaptive capacity (Davies et al., 2009). Households often recognize the risks they face from weather related disasters. In order to cope with these losses, they engage in low risk strategies such as income diversification and migration. Although this may serve to minimize losses, it could result in reduced profits further depreciating the economic situation of the household (Anderson 2002, Deron, 2004). Insurance could lend itself as a useful safety net that will allow people to make productive yet high-risk livelihood choices (Bliss and Stern, 1982; Cole et al., 2012). Increased capital allows farmers to invest in better management techniques, such as irrigation technologies and soil conservation technologies, within their agricultural practices. The availability of liquid capital also allows farmers to invest in other livelihood options such as aquaculture, animal husbandry, small scale agriculture industries etc. This reduces dependence upon agriculture and can augment existing livelihoods.

Livelihood diversification reduces the vulnerability of farmers to agricultural losses and provides an opportunity for economic growth. Income generation is supported and consistent income allows farmers to save surplus income which allows for returns through interest. Insurance can help build social capital, improve self confidence and empower the rural poor. It can improve the availability, flow and dissemination of information regarding weather risk and variability (Patoja, 2002). Availability of weather information can contribute to building of disaster management plans and create awareness among farmers regarding climate trends. This can help farmers to prepare long term CCA strategies (Davies et al., 2009). Agricultural insurance has been shown to increase the uptake of formal credit by farmers supporting agricultural operations often leading to profits. By providing consistent and secured income, insurance could lead to better farm investments leading to improved farm management and profits (Davies et al., 2009; Kalavakonda and Mahul, 2003).

In addition to its contributions on the farm front, insurance can also help address the underlying vulnerabilities that render communities susceptible to impacts of climatic disasters. Addressing the vulnerabilities and increasing resilience of a system serves a dual purpose: addressing immediate disaster impacts and preparing the systems for long term effects of climate change (Robot, 1996; Schipper and Pelling, 2006). It appears that the effect of insurance on vulnerability reduction is mainly through its impact on the income smoothing and better farm management which could be significant enough to decide if a farmer is trapped in perpetual vulnerability.

4.3 Methodology

4.3.1 Socio-economic characteristics

The survey was carried out in the Bonthiralla village, in the Dhone Mandal of Kurnool District, Andhra Pradesh. The village is situated in hot and arid region and is demarcated as rainfall deficit area in the state. The average annual rainfall is 760mm and hence frequent droughts are prevalent in the region.⁹

The Bonthiralla village has 153 households and all the households are classified as poor as per the poverty classification of Government of India. The village has a Panchayat office but all other amenities such as schools and primary health centers are located in Dhone Mandal, which is 12km away. There is no public transport to the village and the village is connected to the main highway through a mud road. The primary occupation of the village is agriculture which is mainly rainfed with very few farmers having access to tube well irrigation. Crops grown include groundnut, castor, millets, field beans, horse gram and other cereals which are hardy and resistant to drought conditions. Farmers who have access to irrigation grow cash crops such as vegetables that fetch higher profits. Farmers in this area generally have small

⁹ Agricultural Contingency Plan, Kurnool district, Andhra Pradesh

land holdings of less than 2 acres. Productivity of agriculture in the area is low. Farmers reported frequent losses due to rainfall deficits. Almost all households have livestock and small ruminants (sheep and goat). Livestock is used for farm work and dairy and serve as source of organic manure. Seasonal migration is common in the village, usually after the *rabi* harvest, where most of the villagers migrate to Guntur to work as farm labor.

4.3.2 Insurance characteristics

Currently two agricultural insurance products are being offered in the Bonthiralla i.e. government agricultural insurance and an index insurance product by the International Crop Research Institute for the Semi-Arid Tropics (ICRISAT). Government insurance was introduced in Bonthiralla village in 2002 with initial payouts decided by crop cutting experiments. The payouts were subsequently decided based on an index since 2010. 70 farmers in the village have government insurance. Farmers pay an annual premium of 250-300 Rs per acre. The insurance is triggered by a deficit rainfall. Farmers reported that insurance was triggered nearly every year for the last five years.

In addition to the above insurance scheme, the ICRISAT in collaboration with local NGO's has introduced a weather index insurance product on a trial basis as a part of a project for climate risk management in dryland areas. As a part of this project, 25 farmers were enrolled into insurance in 2014. The index was designed based on rainfall monitored by a weather station set up in the village. The insurance is targeted for fodder crops but it is also available for all crops in the village. The project holds regular capacity building workshops in the village to help farmers understand the insurance product and to help manage crops effectively. The sum insured is Rs. 5,000 per acre and the premium is Rs. 750 per acre.

4.3.3 Data collection

30 insured households were selected within the Bonthiralla village for the purpose of household surveys. Equal number of farmers with government insurance, farmers with private insurance offered under ICRISAT project and uninsured farmers were selected. Farmers were selected based on their availability and willingness to participate in the survey.

Survey questionnaires were developed based on a set of indicators identified that demonstrate the effectiveness of insurance (please refer to Table 7 for indicators and Annexure III and IV for insured and uninsured respectively). The survey questionnaire was designed to elicit responses from farmers regarding the degree of effectiveness of the insurance, in terms of short term DRR and long term CCA benefits and to identify important shortcomings in insurance products being offered in the village. The questionnaire included questions regarding the socio-economic characteristics of farmers and specifics of the insurance product they were enrolled in.

Table 7: Indicators to measure crop insurance effectiveness in CCA and DRR of farming households

Component	Sub component	Benefit indicator	Cost indicator
Livelihood	Livelihood strategies	• Agriculture expansion • Reduced migration • Usage of agricultural extension services • Taking microfinance and agricultural loans • Reduced informal borrowing	Livelihood diversification
	Income	• Increased overall income • Income stability during disasters	Opportunity cost
	Capital	• Capital available for investment	
	Assets and savings	• Increased savings • Increased livestock Improved livestock health • Increased major assets • Decreased distress sales of assets	
Farmer Behavior	Confidence	• Reduced anxiety	Moral hazard Risk under appreciation
	Strategic decision making	• High risk high yield crop choices	Reduced mitigation
	Knowledge and skills	• Improved knowledge regarding farming practices • Availability of weather information	
	Risk management	• Increased irrigation • Long term CCA Strategies in agriculture¹⁰	
Household well being	Nutrition	• Increased overall nutrition • Reduced nutrition deficit during disaster	
	Education	• Reduced school dropout rate during disaster	
	Economic status	• Improved economic status • Reduced post disaster recovery time	

(Source: Authors)

The survey questionnaire was divided into 5 sections: 1) Background of the respondent 2) Hazards and impacts 3) Insurance 4) Insurance effectiveness 5) Opinion on the insurance product. The questionnaire included questions on the effectiveness indicators, opinions on the insurance product and effectiveness of the insurance product.

In addition to household questionnaire survey, a focus group discussion (FGD) was conducted to build community profile. The FGD helped to understand the effectiveness of agricultural insurance at a community level. The participants of FGD include village heads, insured and uninsured farmers. Key aspects discussed during the FGD include: a) impact of

¹⁰ Crop management, water management and soil management techniques

insurance on social, economic and structural aspects of the community, b) impact of insurance on the overall wellbeing of the community, c) impact of insurance on access to and availability of infrastructure and livelihood facilities, d) impact of insurance on agricultural practices, e) impact of insurance on social capital in the village, f) current level of understanding on climate change in the community, g) CCA strategies in the village, and h) coping strategies of community members to natural disasters and the impact of insurance on these coping strategies.

4.4 Results

4.4.1 Household characteristics

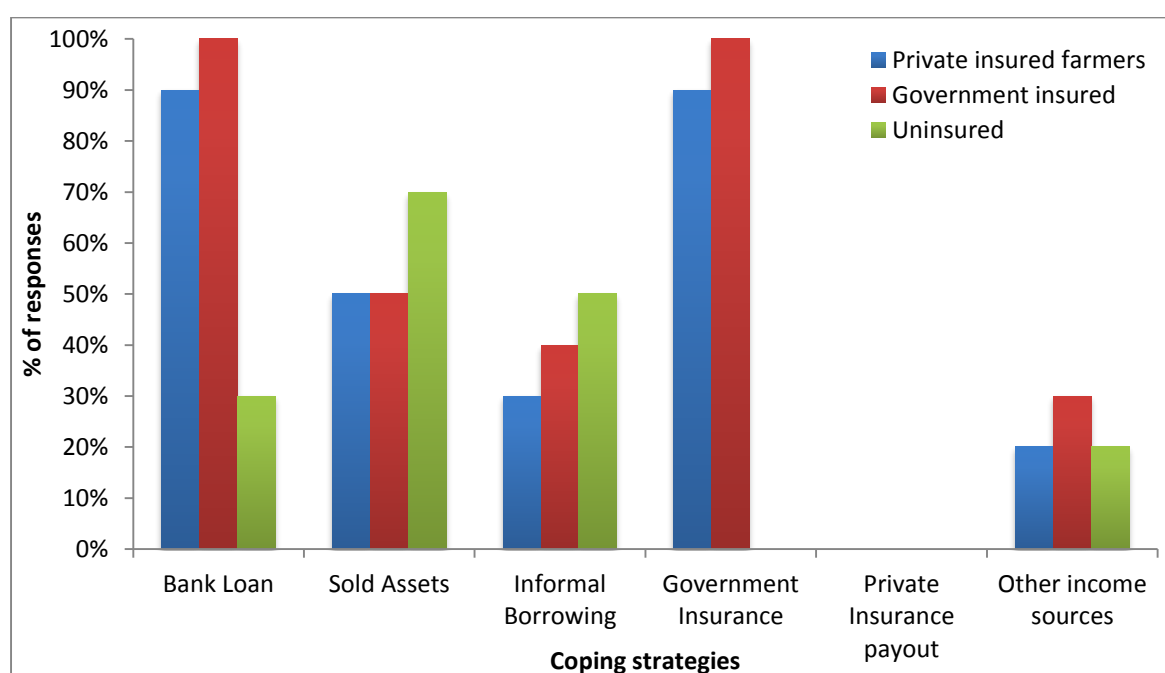
The primary source of livelihood for all the respondents in the survey was farming. 90% the respondents were small farmers with land holdings of less than 2 acres. All the respondents interviewed were male. 83% of respondents responded that decisions in the household were made by the eldest members of the house. Bonthiralla has a low levels of literacy, 70% of the respondents were illiterate and none of the respondents were graduates. Apart from farming, most households have secondary income from farm related labor work in the village (90%). 76% of households said that members of the family migrated to neighboring villages such as Guntur during the end of the Rabi season to work as farm labor. This migration played a vital role in reinforcing livelihood during lean summer months when no crops are cultivated. Majority of the households surveyed had cattle (ox and cows) or small ruminants (goats and chickens). Oxen provide animal power for farm operations and manure for fields while cows provide dairy products and nutrition. Main outputs during normal years are dairy and crops while during drought years some farmers sell their livestock. Farmers in this village took crop and other loans almost every year. These loans were taken for agricultural purposes such as buying of seeds and pesticide. Occasionally, loans were also taken for household purposes such as financing a marriage or medical expenses. 40% of farmers with insurance (both private and government) had health insurance from Life Insurance Cooperation of India (LIC). Delayed rainfall (100%) was the primary cause of crop failure followed by drought, pests and diseases. All farmers reported crop failures were frequent, one crop in every 2-3 years failed due to these factors.

4.4.2 Insurance effectiveness

Government insurance is prevalent in Bonthiralla. This is primarily due to the fact that farmers must have crop insurance in order to take crop loans. Farmers preferred to take agricultural loans from banks due to their lower interest rate (10-15%). However if the loan was not paid back within the stipulated time, farmers were not issued loans during the next season. As a reason, most farmers resorted to informal borrowing from friends and money lenders at interest rates as high as 30 %. The premium for government insurance is subsidized by 50% by the state for all the farmers. The rate of premium is uniform at Rs 250 per acre.

All farmers reported average crop losses between 50-70% due to disasters. 90% of the government insured farmers reported that insurance was triggered during losses. The private insurance has not yet triggered in the region since it was introduced recently. Farmers who enrolled into government insurance reported that they received payouts almost annually.

The primary means to cope with disaster losses within the village in the order of preference are: bank loans, informal borrowing, selling of assets and insurance payouts (please refer to Figure 10). None of the respondents reported receiving government compensation, as a part of disaster relief efforts, on crop losses. All the farmers (insured and uninsured) reported taking loans from various sources at least once a year. It was observed that a large percentage (80% of government insured and 70% of private insured) of farmers resorted to obtaining bank loans compared to only 30% of uninsured farmers in 2014. This can be attributed to the fact that government crop loans are not available to uninsured farmers. Uninsured farmers can take government loans other than crop loans.



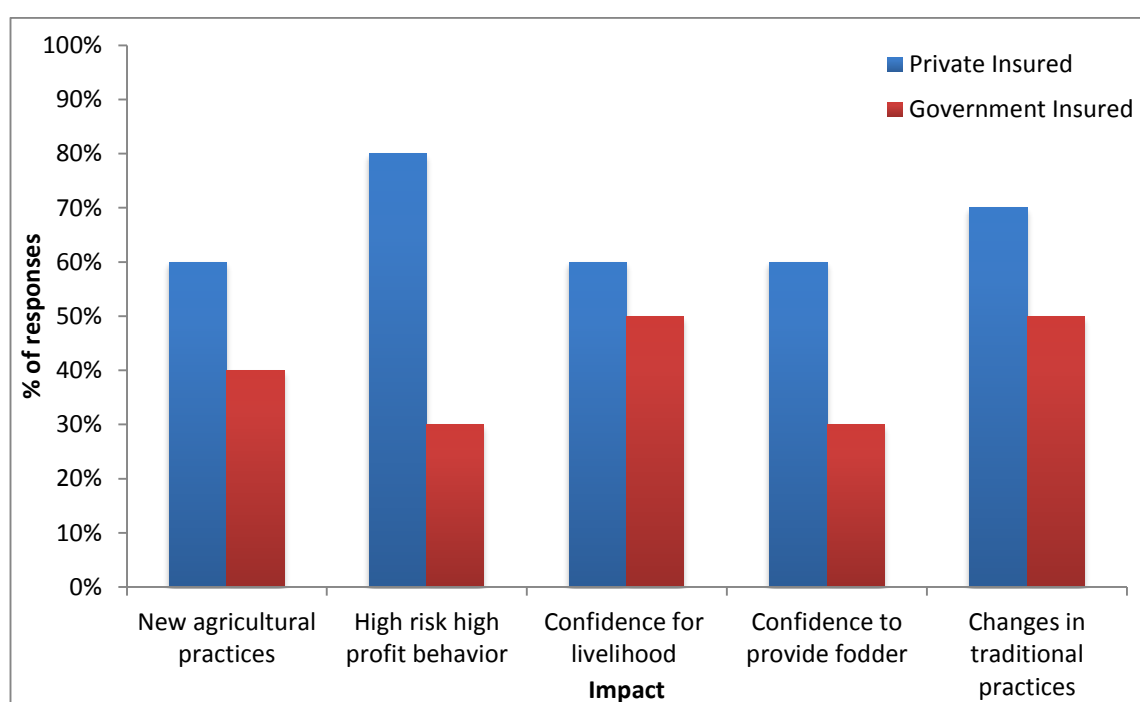
(Source: Authors)

Note: The private insurance has not yet triggered in this region

Figure 10. Strategies to come out of disaster loss

90% of government insured farmers reported that the payout received was sufficient to cover less than 50 % of the disaster losses. All government insured farmers reported that insurance payments were made 4 months after the report of crop loss was filed. The same number also reported that the payouts were delayed making them ineffective to help in immediate coping. To deal with this, both insured (50% private insured and 60% government insured) and uninsured farmers (60%) sold their livestock at 30-40% below market prices. 40% of government insured farmers and 30% of private insured farmers took informal loans from moneylenders, neighbors and family as banks take long time to process loan applications.

70% of privately insured farmers and 50% of government insured farmers reported to have introduced new agricultural practices for reducing the impacts of extreme weather events such as droughts (Figure 11). Examining the CCA methods adopted by the survey respondents, it was seen that farmers who have taken private insurance are highly likely to take up number of better crop management practices compared to government insured and uninsured farmers. The primary reason for this could be due to the technical knowledge support that the private insurance holders receive. The respondents hoped that these better management practices will contribute towards building resilience of farmers. 90% of respondents reported cost as a major constraint for adopting better management practices followed by lack of labor (50%) and lack of technical support (36%). Currently, the premium on insurance is not calculated based on management practice followed by farmers and they don't require farmers to adopt better crop management practices. 40% of the private insured farmers and 10% of the government insured farmers opined that the crop management practices should be taken into consideration while fixing premiums so that it acts as incentive for farmers to follow best management practices leading to reduced crop losses. 80% of farmers with insurance (government as well as private) said that they have increased the number of crops they grew after taking crop insurance.

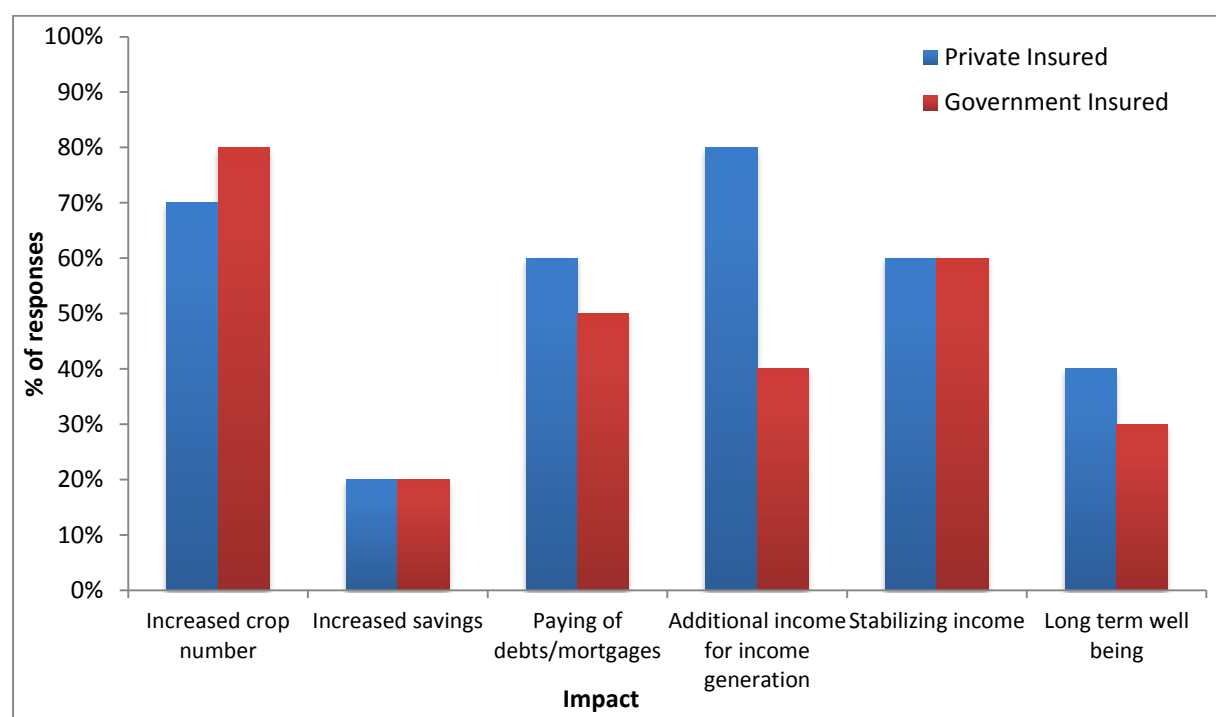


(Source: Authors)

Figure 11. Long term behavioral effectiveness

60% of the private insured farmers reported that insurance had helped to pay off debts (Figure 12). Responses from government (80%) and private (80%) insured farmers indicated that the insurance did not had a significant impact on their savings; however, 40% of the government insured farmers reported that the number of their livestock increased after enrolling into insurance indicating the positive impact of insurance on asset creation. 30% of

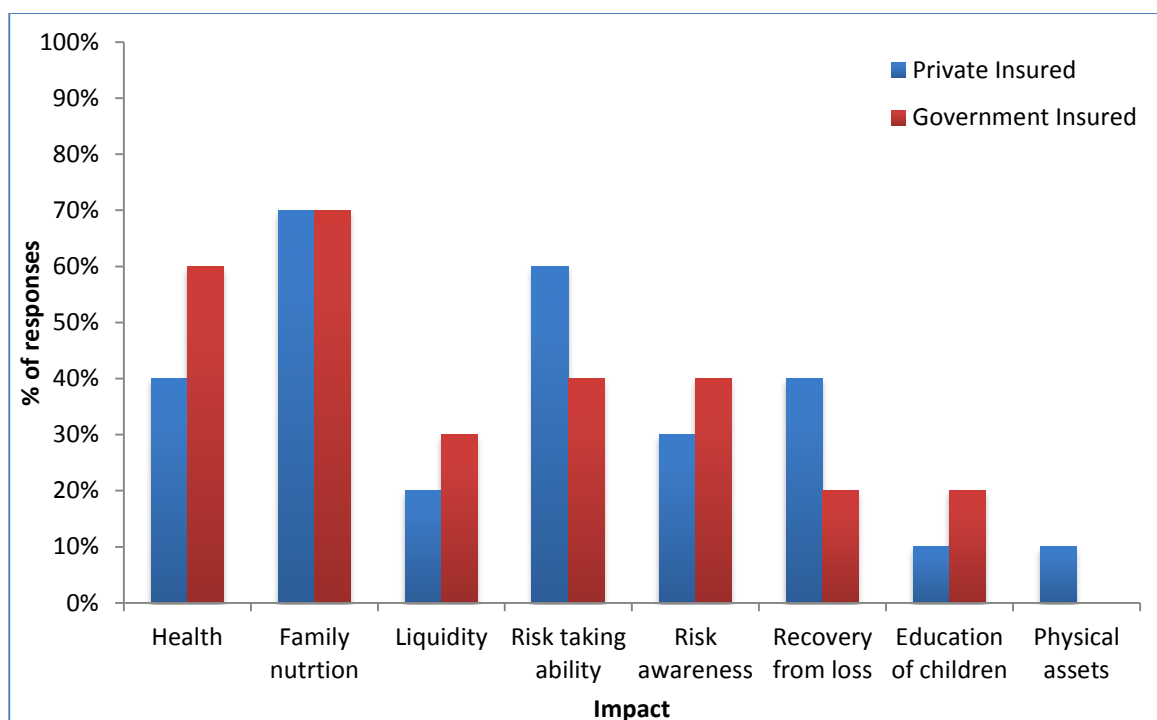
the insured farmers also reported that the presence of insurance has prompted them to increase the amount of land that they leased for farming. Only 10% of insured farmers (private and government) thought the amount paid for insurance premium has opportunity cost. 90% of the government insured farmers and all of the private insured farmers reported that they would continue taking insurance. Many of the government insured farmers felt that insurance did have a positive impact on their household in terms of nutrition (70%), health (60%) and risk taking with gainful returns (60%). This was also true in the case of farmers who enrolled private insurance where 90% of farmers felt that insurance had a positive impact on health (Please refer Figure 13).



(Source: Authors)

Figure 12. Long term livelihood effectiveness

Regarding the opinion of government insured farmers about the insurance, 70% of farmers rated the payment received as very low, 80% of farmers felt that the time taken for payment was very long and 80% rated the amount of payout received as good. The biggest improvement that farmers would like to see in the insurance product is a full subsidization of premiums. 40% of the uninsured farmers stated that the main reason for not enrolling in insurance was the lack of knowledge regarding the insurance product. 60% of uninsured farmers would be open to enrolling if changes such as coverage of more perils (30%) and increase in subsidy (50%) are made.



(Source: Authors)

Figure 13. Opinion of farmers on positive impact of insurance

4.5 Conclusion

This study aimed to understand DRR and CCA impacts of insurance on individual farmers as well as the community. The results showed that the insurance was only marginally effective in helping the community cope with the immediate impacts of disasters. This was primarily due to the fact that the farmers received insurance payments only after four months of reporting their losses. To offset immediate losses, farmers still had to take formal and informal loans as well as resort to distress sale of their livestock which is prevalent even among the uninsured farmers but at higher proportions. In addition, farmers also reported that the payout covered less than 50% of their losses which was not helpful in reducing the financial instability caused by the crop loss. Many farmers reported that the insurance payout was primarily used to meet basic household necessities and hence the investment of payouts in long-term risk reduction is questionable.

Though some farmers did reported increase in the number of cattle after enrolling into insurance; the insurance payouts were not sufficient enough to significantly increase savings or to build gainful income generating assets that are necessary to build long term resilience. Although the insurance has not significantly increased the physical capital required for CCA and DRR, insurance has played an important role in building farmers confidence. Many farmers in this area are now aware about new CCA methods. This is primarily because of the presence of private insurance providers in the area who have been proactively engaging farmers in agricultural capacity building programs.

The main constraint for farmers taking up new crop management technologies in their farming was found to be additional financial costs. In order for agricultural insurance to help farmers adapt towards long term climate change impacts, it is imperative that the payout should cover at least 70% of their losses. From the FGD, it was observed that, although farmers would like more subsidies, farmers do not mind paying slightly more insurance premium if payout commiserates to that of the actual loss. Knowledge building programs especially about the government insurance programs is essential for farmers to understand the product and increase its uptake. It was premature to evaluate the impact of the private insurance as it was introduced very recently and has not triggered yet. However, offering training and capacity building along with insurance appears to be an effective strategy to improve farmers resilience to climate change. Many the farmers reported that insurance has made a small but positive impact on their socio-economic status and scaling up of these products are important to make significant impacts on households and communities towards more effective CCA and DRR.

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5. Synergies of Interventions in Nepal

5.1 Introduction

Climate change is impacting in every aspect of natural and human life in Nepal. Nepal is highly vulnerable to climate change impacts due to exposure to climatic vagaries, high dependence on nature-based livelihood and economic activities, steep topography, fragile geology and poor economy. Glaciers and water resources, agriculture, biodiversity and natural resources and water-induced disasters are some of the most impacted areas to climate change.

Nepal is warming at a significantly higher rate compared to the global average as reported in several studies (e.g. HMGN, 2004; IPCC, 2007; Shrestha et al., 1999). Both days and nights are becoming warmer, while cool days and nights are becoming less frequent (Baidhya et al., 2008). Though no distinct trend in precipitation changes in Nepal have been observed, regional and seasonal variations in precipitations have been noted. High rainfall regions and seasons are experiencing increases in precipitation and becoming wetter whereas low rainfall regions and seasons are recording decreases in precipitation and becoming drier (HMGN 2004). Precipitation extremes have been observed in recent years with increasing trend in intense precipitation events at most of the stations in Nepal (Baidhya et al., 2008). The change in intensity and amount of monsoon rains positively correlate with the increase in water-induced disasters like floods and landslides in Nepal (DWIDP, 2006).

Impact of climate change at any given locality is a product of several factors including the intensity of change, geological conditions, geographic location, socio-political and economic factors. Due to the location specific and multi-sectoral nature of climate change impacts, the adaptation strategies to climate change, therefore, demand location-specific and integrated approaches. Integrated approaches are required that take into consideration all possible interactions within and between the natural ecosystem and the socioeconomic systems (Gurung and Bhandari, 2009). In addition, climate change adaptation (CCA) projects should take into account both structural and non-structural approaches. The strategies could include, but not limited to, livelihood diversification, promotion of less water-intensive crops, behavioral changes, awareness generation, education and institutionalizing CCA at various levels. It is well understood that communities that are well aware about their vulnerabilities and disaster risks tend to prepare well and implement risk reduction measures. Since climate change will have implications for the hazard profile of a region and on the underlying

vulnerabilities, there has been significant discussion among the stakeholders engaged in development on the need to understand the synergies between DRR and CCA so that appropriate interventions can be designed with maximum efficacy. In this context, this study is conducted to identify synergistic impacts of four CCA and DRR projects implemented in Nepal.

5.2 CCA–DRR initiatives in Nepal

Nepal has taken several CCA and DRR measures to deal with climate related hazards that put over one million people at risk every year (MOE 2010). DRR is often highlighted as one of the CCAs in climate change policies, CCA plans and action programs. Nepal Climate Change Policy 2011 has recognized the close relationship between CCA and DRR. The policy asks for identification and implementation of medium and long term CCA actions in vulnerable regions, communities and people. The policy also mentions about forecasting water-induced disasters, early warning, preparedness and implementation of preventive measures.

Nepal has developed National Adaptation Programs of Action (NAPA) and Local Adaptation Plan of Action (LAPA) to climate change. The thematic working group (TWG) of NAPA has listed reduction of climate-induced disasters as one of the priority adaptation actions (MOE, 2010). Strengthening resilience, diversifying livelihoods, providing insurance and development of early warning system were considered relevant for CCA. The NAPA also prioritizes community based disaster management for CCA as a combined approach to build capacity to enhance local community adaptation to climate hazards, develop water retaining infrastructures, conserve and rehabilitate water sources and to reduce climate induced disaster risks at the community level. Another combined action prioritized by NAPA is GLOF (Glacial Lake Outburst Flooding) monitoring and DRR which also mentions about the need to link climate change with DRR.

In order to implement the NAPA at local level, the Government of Nepal has developed National Framework on LAPA (GoN, 2012). CCA and DRR synergies were also highlighted in the LAPA document. LAPA underscores the need for making local specific adaptation plans to deal with climate induced disasters and building community resilience. LAPA stressed the formation of District Disaster Risk Reduction Committees to enhance knowledge and skills on CCA and to implement CCA actions at village and district levels.

Nepal has also prepared Strategic Program for Climate Resilience (SPCR) to respond priority climate risk as a part of global Pilot Program for Climate Resilience (PPCR) financed by the Climate Investment Fund (GoN, 2012). SPCR mainly focuses on longer term interventions to enhance climate resilience and aims to address high priority risks. Building Resilience to Climate-Related Hazards is one of the priority components of the SPCR that is also related with DRR. The component aims to strengthen weather and flood forecasting system,

establish early warning and improve access to financial instruments that reduce the adverse impacts of climate induced shocks. The government has launched Nepal Risk Reduction Consortium in 2009 which has prioritized flood risk management and community based disaster management as two important flagship programs out of five (NRRC, 2011).

DRR and CCA interventions can have different level of DRR and CCA synergies since the scope of DRR covers climate and non-climatic hazards while CCA measures often are limited to climate-induced disasters. Both also differ in terms of their sectoral scope. CCA measures are much more wide-spread in terms of their sectoral focus than DRR measures. DRR has longer history than CCA. For example, Nepal has introduced its first Natural Disaster Relief Act in 1989 while CCA was not a priority issue for the government until recently and hence is not well developed in policy processes. Due to these differences and commonalities, it is often difficult for stakeholders to effectively integrate these two aspects into policies, projects and programs. As an example, the recently introduced National Strategy for Disaster Risk Management (NSDRM) reveals the issue of CCA and DRR being not well understood and incorporated in the national policies, plans and action (NSET 2008). Although NSDRM does acknowledge the need to link CCA and DRR, this need is not well highlighted in its Priority Actions and Strategic Activities.

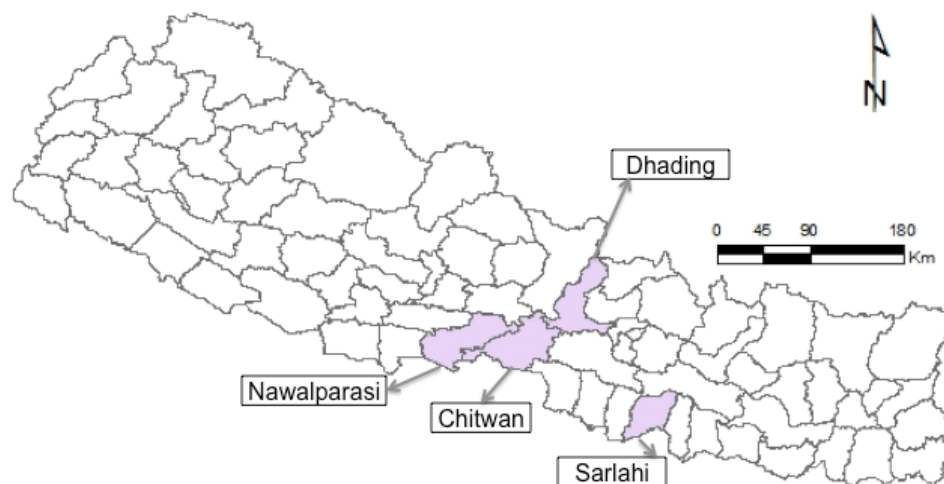
5.3 Methodology

This study was carried out to analyze DRR and CCA synergies obtained from DRR and CCA projects implemented at rural community level in Nepal. Different CCA and DRR projects implemented since 2000 were reviewed. Four projects were selected for further analysis based on the physical access, coverage of CCA and DRR issues and the year of completion. Attention was given to geographical diversity of projects covering different districts in Nepal under varying socio-economic, climatic and environmental conditions and implemented by different agencies. Since the study relied on direct contact with the project implementing agencies (PIAs) for the purpose of obtaining project documentation and accessing the project beneficiaries, only those projects were selected for which PIAs could be contacted and consent was obtained. Out of four projects selected, two projects were focused on CCA and two on DRR. The selected project districts are shown in Figure 14. The overall methodology consisted of following three steps.

Step I Study of the project documentation: project duration, activities and expected outputs of the selected projects were obtained from project reports collected from the PIAs. Intended benefits and negative externalities (if any) were extracted from those documents.

Step II Selection of study site: One village per project was selected for assessing the CCA and DRR impacts of projects. Beneficiaries were identified in consultation with PIAs.

Step III Focus Group Discussions (FGD): FGDs were organized with project beneficiaries in order to understand the impacts of selected projects (please refer to Annexure I for the steps involved in conducting FGDs). Gender and socio-economic balance was ensured among the FGD participants through stratified random sampling.



(Source: Authors)

Figure 14. FGD project districts in Nepal

FGDs were started with a brief objective of this study. The project activities were recalled to refresh the participants about the project. Historical hazards in the area and their impacts in the project location were discussed and the impacts of major hazards were listed. Benefits (primary, secondary and tertiary) of the project activities, without distinguishing if they are DRR or CCA benefits, were listed and quantified. Finally, the FGD participants were asked about how the listed benefits helped (or did not help) them in addressing disaster risks and in adapting to climate change. Table 8 provides a brief overview of the FGD sites, structure of FGDs and the participants. Names of FGD participants are presented in Annexure V and pictures of FGDs and project activities are shown in Annexure VI.

5.3.1 Background of the projects

- Project 1: Mainstreaming livelihood centered approaches to DRR [DRR]** The project was implemented in three VDCs (Pragatinagar, Devchuli and Divyapuri) of Nawalparasi district and two VDCs (Megghauli and Patihani) of Chitwan districts (Practical Action Nepal, 2010). The overall objective of the project was to reduce poverty through DRR. The project focused on three specific goals: disaster preparedness, disaster mitigation and resilience building of local the communities. The activities consisted of a set of local level interventions (construction and improvement of irrigation canals, introduction of cropping systems, enhancing community awareness and strengthening local institutional capacity to deal with disasters) and national level activities related to exposure, advocacy and capacity building.

Table 8. Projects, FGD sites and number of participants

Project ID and title	FGD site	FGD participants
P-1: Mainstreaming livelihood centered approaches to DRR Focus: DRR (Duration: 2007-2010)	Kirtipur, Devchuli VDC – 3, Nawalparashi district	11 persons (Male = 7, Female = 4)
P-2: DRR and Humanitarian Program (DRR and HP) Focus: DRR (Duration: 2011-continuing)	Karinjor VDC-8, Sarlahi district	11 persons (Male = 2, Female = 9)
P-3: Increasing the resilience of poor communities to climate change impacts Focus: CCA (Duration: 2005-2007)	Kabilash VDC-1, Chitwan district	11 persons (Male = 4, Female = 7)
P-4: Climate change adaptation for livestock smallholders in Gandaki River Basin, Nepal Focus: CCA (Duration: 2012-2015)	Bhaltar, Baireni VDC-8, Dhading district	10 persons (Male = 7, Female = 3)

(Source: Authors)

Notes: FGD = Focal Group Discussion; VDC = Village Development Committee

- Project 2: DRR and Humanitarian Program [DRR]** The project was implemented in several VDCs of four *Terai* (plain) districts of Nawalparasi, Saptari, Sarlahi and Rautahad in southern Nepal (Oxfam Nepal, personal communication). Started in 2011, the project has been implemented with an overarching aim of reducing suffering of women, children and socially excluded families living in floods and droughts prone areas. It aims to improve wellbeing of communities through mainstreaming DRR into development planning processes at the local level, provide disaster resilient livelihood options and do advocacy for strengthening DRR institutionalization. Recurrent flooding and drought are common hazard events in the project districts. People lives, livelihoods and properties are lost and communities become vulnerable due to low adaptive capacity and fewer livelihood options. The project implemented disaster preparedness planning, improve livelihoods and conduct policy advocacy to institutionalize DRR.
- Project 3: Increasing the resilience of poor communities to climate change impacts in Nepal [CCA]** The project is located in Chitwan district in the Central Nepal (Practical Action Nepal, 2009). Estimated direct beneficiaries of the project were about 190 households. Agriculture and livestock rearing was the mainstay of the communities here. The site is known for flash floods, erosions and landslides. The project was started in aftermath of the severe flooding in 2003 that resulted in loss of 18 lives and significant loss of properties. The community agreed to resettle at the same place as a result of the reconstruction efforts of the project. The project has adopted a watershed approach in Jugedi Khola watershed by introducing diversified agriculture practices, natural resources management and conservation, rehabilitation of local infrastructure, capacity building and awareness raising campaign. The project aimed to strengthen the long-term coping capacity to natural disasters, better preparedness to disasters, increased production and income diversification, rehabilitation of degraded environment to conserve water

resources and to control erosion and institutional strengthening for community based CCA.

- **Project 4: Climate change adaptation for livestock smallholders in Gandaki River Basin, Nepal [CCA]** The project was implemented in three districts (Dhading, Syangja and Kapilvastu) of the Gandaki River Basin in the central Nepal (Small Earth Nepal, 2014). Landslides and soil erosion on slopes are key problems here, which are triggered by high intensity rainfall events. Majority of people here rely on livestock rearing for their livelihoods. The project activities were prioritized to improve the resilience of livestock production systems as a strategy to strengthen the nutritional and economic base of livelihoods and adaptation to climate change. The key activities included demonstration of village based nutritional fodder production and water management practices such as water saving techniques, distribution of nutritious and drought resistant fodder seeds, fodder cultivation on slopes to control soil erosion and kitchen gardening. The project also undertook capacity development by conducting training on forage conservation, animal health and gender sensitization. Networking and engagement with university, government and I/NGOs were also an integral part of the capacity building.

5.4 DRR and CCA synergies

The CCA and DRR synergies obtained in four projects implemented in Nepal are analyzed and discussed based on the FGDs conducted in the project sites. Based on the review of the project activities and responses from the project beneficiaries, the CCA and DRR synergies are analyzed by looking into 1) project design and implementation, 2) impacts/benefits perceived by the communities, and 3) mapping community perceived project benefits with DRR, CCA and developmental outcomes.

5.4.1 Project design and implementation

The assessed projects shared similarities and differences in the way they set their objectives and the way they executed them. Table 9 presents key similarities and differences that are observed in the reviewed projects.

Table 9. Similarities and differences between the CCA and DRR projects

Project features	DRR	CCA
Objectives and scope	Broad (locally based action to influence national level policy and decision process)	Broad (locally based action to influence national level policy and decision process)
Key activities	• Strengthening physical structures and facilities • Increasing livelihood wellbeing and stabilizing income • Enhancing capacity on DRR preparedness, response and planning • Institutionalizing DRR local level	• Strengthening physical structures and facilities • Increasing livelihood wellbeing and stabilizing income • Enhancing capacity on understanding CCA needs and adoption of climate resilient systems/technologies

Project features		DRR	CCA
			• Institutionalizing CCA local level
Process/ approach		Priority was on capacity building of communities. Building livelihood resilience was embedded as a part of DRR strategy. Advocacy and networking were key strategies to raise awareness on DRR at district and national levels	Priorities were detecting signals and assessing vulnerability. Activities were designed to build livelihood resilience and improving coping capacity of households. Advocacy and networking were key strategies to raise awareness on CCA needs of the community at the district and national level
Expected results/ outcomes		• Improvement in local DRR preparedness and planning at the community was the main intended outcome of DRR projects • Improving livelihood wellbeing and resilience building were considered as an integral part of DRR • Institutionalization of DRR at local, district and national level was viewed as an ultimate outcome	• Reducing climate vulnerability through capacity building (for detecting climate signals, using appropriate technology) and improving resilience of community livelihoods (on-farm and off-farm income generation) were the main intended outcomes of CCA interventions • Institutionalization of CCA (and DRR indirectly) at local, district and national level was viewed as an ultimate outcome
Viewpoint on DRR and CCA		Disasters such as floods, landslides, droughts are linked with climate change but DRR project activities were not found to explicitly acknowledge CCA	Climate change is mainly responsible for increased floods, landslides and droughts. DRR was explicitly embedded in the CCA related activities

(Source: Authors)

All analyzed projects had broad objectives to ensure long term impacts and contribute to DRR and CCA at the national level. However, activities were focused on the local level (i.e. village). Networking and advocacy were widely promoted to disseminate lessons and findings to district and national level stakeholders. Irrespective of the project design and goal setting, the main activities of these projects were essentially similar on the ground, which can be categorized into: a) strengthening physical structures and facilities, b) increasing livelihood wellbeing and stabilizing income, and c) enhancing capacity to adapt and institutionalizing DRR and CCA at local level. However, the approach and sequence of implementing these activities varied to suit to local context and to accomplish set targets. For instance, DRR projects aimed at enhancing the community capacity to prepare against natural disasters and to make plans. On-farm and off-farm activities were embedded as a part of DRR strategy to improve livelihood wellbeing and stabilizing income to build the community resilience. Activities such as construction and rehabilitation of irrigation facilities, improved cropping systems and livestock rearing, off-farm income, savings and training programs were introduced. CCA projects involved the detection of climate signal and vulnerability assessment of communities to climate change impacts. Based on the vulnerability assessments, CCA projects also introduced similar activities to improve livelihood wellbeing and income stabilization. Both CCA and DRR projects widely used training and capacity

development programs to improve the disaster preparedness and response capacity of communities. In particular, strengthening of local institutions and networking among stakeholders were promoted as means to streamline the implementation, give formal recognition of the introduced practices and ensure continuity of the introduced measures.

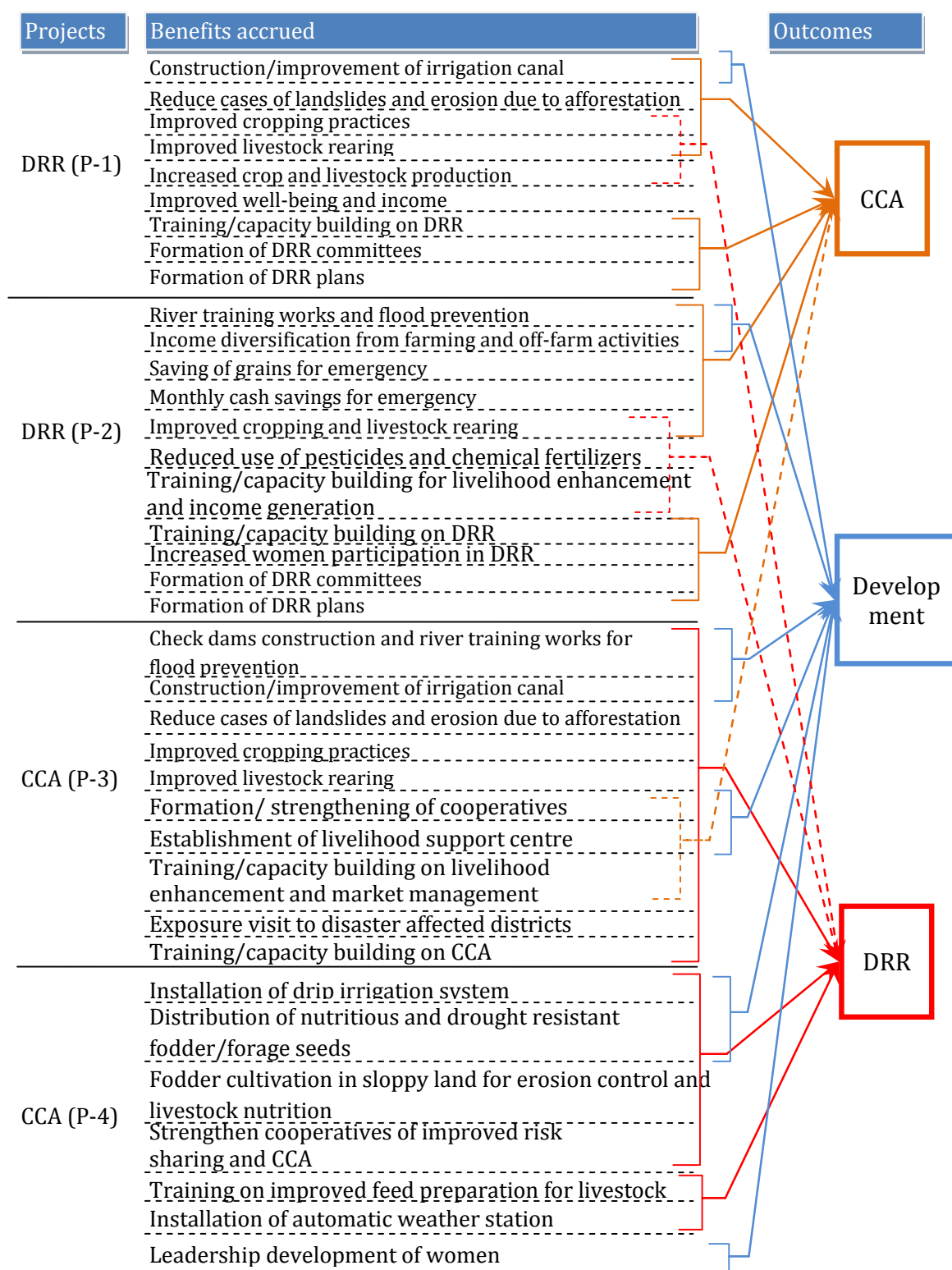
5.4.2 Community level impacts and benefits

FGD participants reported that they are increasingly experiencing changes in the local climate in terms of erratic rainfall, floods, droughts, landslides and outbreak of diseases and pests. They were unable to cope with those changes on their own and needed support. The participants appreciated the new interventions introduced by the projects which have helped them to cope with the adverse impacts and to improve their livelihoods. Acceptance and continuity of activities by the communities further validates the positive impacts of the project on these communities. While communities could not differentiate project benefits into DRR and CCA categories, they were able to identify benefits accrued from the projects (Table 10). Communities admitted that their awareness and knowledge levels on climate change was enhanced by all the projects. They mentioned that climate change is a common topic for discussion whenever new interventions are introduced, either in the name of development, DRR or CCA. Despite the appreciation of project interventions by communities, establishing a direct link between perceived benefits and overall project objectives was not easy. Agencies implementing the projects were found to link the small scale local level outcomes with its broader objective by advocacy, networking and communication with district or national level stakeholders through various means.

A shortcoming in all the projects, as per responses from the FGD participants, was the designing of project activities without prior consultation with the beneficiaries. Although the project did adopt a participatory and inclusive approach of problem solving, the project lacked flexibility in the design and implementation and hence consultations didn't make any difference in the way the projects were implemented. The discussants suggested that more focused and high-impact activities could be designed if beneficiaries knew the pros and cons of the planned activities. However they also admitted that the level of flexibility and the degree of success depends on the knowledge and capabilities of the project officers to elaborate project objectives, to mobilize community, ensure maximum participation and implement the project within allocated resources and time line.

5.4.3 DRR, CCA and development outcomes

The Figure 15 shows the CCA and DRR synergies of project benefits perceived by the community members in FGDs. Only cross linkages are shown. However, DRR and CCA project benefits are linked to their expected DRR and CCA outcomes through a dotted line if they are indirectly linked. The solid line indicates a direct DRR, CCA and development synergy.



(Source: Authors)

Note: Solid line is for most direct linkage and dash line for indirect linkage

Figure 15. Comparison of CCA, DRR and development synergies among projects

Three important lessons can be drawn from these observed synergies. Firstly, certain CCA and DRR benefits, especially those related to improvement of well-being and resilience of livelihoods, can be considered relevant to DRR, CCA and development. Different approaches can deliver these synergies irrespective of under what theme (i.e. CCA, DRR and development) they are implemented. For instance, improved cropping practices and livestock rearing introduced either under CCA or DRR projects can lead to a same extent of vulnerability reduction.

Secondly, some of the benefits could be specific to the intended objectives of a project but can occur in other project types as well. CCA projects can have DRR benefits such as flooding and landslide risk reduction; however, though complementary but may not be adequate enough for effective DRR suggesting the presence of possible threshold levels to which such synergies can occur.

Many benefits accrued from DRR projects were specific to DRR such as training and capacity building for DRR and formation of DRR committee or plans. Benefits from DRR approaches are robust and can lead to CCA benefits.

The CCA benefits accrued from projects such as improved cropping practices, livestock rearing, better use of fertilizers and pesticides, training/capacity building for livelihood improvement and income generation may have DRR benefits. In these cases, DRR benefits tend to be distantly connected in the sense that there could be some time lag between the occurrence of event such as ‘adoption of improved livestock rearing’ to the occurrence of DRR benefits. In this case, translation into DRR benefits may need certain enabling conditions such as presence of DRR plans and policies.

5.5 Conclusions

Study of the project activities and assessment at the project site through FGDs was used to understand potential CCA and DRR synergies of interventions in Nepal. All investigated projects were designed with a broad scope that included a range of structural (hard) and non-structural (soft) measures at the local level. All the projects were implemented with a vision to contribute in the national level CCA and DRR planning. However, it was observed that the issues such as shorter time scales and budgets may have hindered some of the projects to achieve their ambitious goals.

From the FGDs it is concluded that the projects had positive impact on several aspects of CCA and DRR. Only broad observations on the possibility of obtaining CCA and DRR synergies could be made since the magnitude of benefits varied from project to project depending on the way the PIAs allocated resources across project components and hence it was difficult to compare the magnitude of CCA and DRR synergies across projects.

Table 10. Comparison of project benefits reported by the communities

Activities	Kirtipur, Devchuli VDC-3, Nawalparashi (P-1) (DRR)	Karinjor VDC-8, Sarlahi (P-2) (DRR)	Project site	
			Jugedi Khola, Kabilash VDC-1, Chitwan (P-3) (CCA)	Bhaltar, Baireni VDC-8, Dhading (P-4) (CCA)
			Benefits accrued	
1) Construction and rehabilitation of physical structures/facilities (including bioengineering)	- Irrigation canal improvement → About 30% HH increased food security to entire year - Afforestation → reduction in landslides from zero to none	Construction of river training works (more than 10 spurs) → 1/3rd reduction in losses due to flooding	- Construction of 30 check dams and several river training works → protection against river bed erosion and flood control; complete reduction of flood events - Construction and rehabilitation of six irrigation facilities with a total length of 1km → benefited over 30 ha of land and increased yield by 30%; number of crops per year in the areas has increased from 1 to 3 - Afforestation → reduced cases of forest fire as well as soil erosion and subsequently flooding events in recent years	Drip irrigation system was introduced to 20 HHs → irrigation quantity and time was significantly reduced
2) Increasing and stabilizing income through livelihood support activities and formation of cooperatives	- Improved farming practices → Vegetable farming group were formed and household savings increased to 0.18 million rupees in the village - Improved cattle sheds and livestock growing practices → Healthy livestock with better dairy production	- Group farming by forming vegetable farming group (e.g. mushroom, cash crops, etc.) “Storing a handful rice grain in a day” program launched → the saved grains were used during emergencies - Monthly savings through formation of cooperatives (2 in Phase-I; 3 in Phase-II; and 6 in Phase-III) → saving habits have been developed - Improved “he-goat” for mating → Better goat rearing and increase in goat population	- Improvement in agriculture practices → increase in high value crop production amounting to NRs. 7-8 million/year; off-season vegetable farming started - Modernized farming with high quality seeds, innovative techniques → increased production by up to 50% - Improved livestock practices → 24 seed goats provided to encourage goat-raising activities and community livestock insurance scheme established; encouraged to sell surplus milk to market - Formation and strengthening of cooperatives → two cooperatives were formed - Service center was established → villagers received regular services in various livelihood areas	- Nutritious and drought resistance forage and forage seeds were distributed to HHs → 20% more milk production was achieved - Fodder cultivation on slopes → soil erosion was controlled and livestock nutrition maintained - Community cooperatives → the project has strengthened existing cooperatives in terms of cooperative mechanisms in “risk sharing” and adapting to climate change

Activities	Project site			
	Kirtipur, Devchuli VDC-3, Nawalparashi (P-1) (DRR)	Karinjor VDC-8, Sarlahi (P-2) (DRR)	Jugedi Khola, Kabilash VDC-1, Chitwan (P-3) (CCA)	Bhaltar, Baireni VDC-8, Dhading (P-4) (CCA)
3) Enhancing capacity of local stakeholders through training, awareness, exposure visits, etc.	• More than 70 people were trained on livelihood support activities • Leadership skills of “group savings” participants were enhanced • DRR resources (e.g. booklets, leaflets posters, etc.) were produced and disseminated → awareness on DRR was enhanced	• 70 farmers were trained on better livelihood activities • Reduced pesticide and chemical fertilizer use due to better awareness on their impact on health and livelihoods • School-based DRR program in 2 schools → enhanced understanding of DRR and CCA of parents through students • Increased women participation in DRR activities	• More than 100 people received training on livelihood enhancement and income generation (e.g. training for candle making, sauce making, pickle making) • More than 120 people were trained on market management • Five days exposure visit to disaster affected districts → strengthened hope on reconstruction and changed the attitudes to move the village to another location • Seminars and workshops → Better understanding on CCA • Children were educated in CCA → in 3 schools; meteorological stations were established • Information materials (e.g. booklets, posters on CCA and their global and local impacts, etc.) were disseminated	• 15 people were trained on nutritious forage and their conservation; 10 were trained on animal health and 7 on gender sensitization training → significant improvement in livestock management leading to better productivity • Automatic weather stations to observe real time micro-climate of the area (Temperature, Precipitation and Relative Humidity) were established → better awareness on climate change and need for adaptation
4) Institutionalizing DRR and CCA at local levels	• Formed VDPRP and DRR committee at village level	• Formed VDPRP and DRR committee at village level • Emergency fund (NRs. 4,000/cooperatives and NRs. 50,000 in VDC) was prepared → risk sharing, there were two cases of using these funds during disasters	• CCIDMG registered with DAO as an institution to deal with CCA in the area and the executive members were trained in administrative and financial management, activity planning, implementation and reporting	• No specific institutional measures were implemented

(Source: Authors)

Note: VDPRP: Village (VDC) Disaster Preparedness and Response Plan; CCIDMG: Climate Change Impacts and Disaster Management Group; DAO: District Administration Office

The following key observations emerge from the study:

- CCA and DRR projects can have complementary synergies. It is more relevant for CCA project to use established DRR intervention methods and tools when dealing with climate change induced future disasters. DRR projects can enhance the adaptive capacity of the community.
- This finding provides a strong message about designing of CCA, DRR or developmental intervention. Considering increasing incidences of climate change impacts, future interventions should put people at the centre and give due attention to building livelihood resilience and reduction of climatic risks.
- Clearly stated project objectives are important to understand the characteristics of synergies between CCA and DRR. Without such clarity, it can become conceptually difficult to evaluate comparative strengths and weakness of CCA and DRR approaches.
- Flexible project design can encourage the enhanced participation and can enable experimentation and learning during project implementation.

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6. Conclusions

The study has provided useful insights into CCA and DRR synergies of projects implemented on the ground. The study consisted of a set of country-specific case studies and online surveys to seek evidence of CCA and DRR synergies, using an inductive approach, and elicit opinions from various stakeholders engaged in CCA and DRR. The following salient points emerge from the study.

1. There is an agreement on CCA and DRR synergies: Throughout the study, it became clear that both CCA and DRR interventions can have DRR and CCA synergies respectively though the exact nature and degree of synergies can vary from project to project. The opinions elicited from various stakeholders engaged in CCA and DRR corroborated these findings.

2. Nature of synergies vary by project interventions: Though CCA and DRR projects can have DRR and CCA synergies, the extent of these synergies can differ by specific project interventions being promoted. For example, CCA synergies were high when skill development and livelihood development activities were implemented in DRR projects. Similarly, DRR synergies were high when CCA projects used vulnerability assessments and planning based approaches. However, the DRR synergies of CCA projects were least, at least in the immediate aftermath of completion of these projects, when these projects focused only on natural resource management aspects.

3. Synergies are often co-benefits: From the study, especially from projects that focused only either on CCA or DRR, it became clear that most CCA synergies of DRR projects and DRR synergies of CCA projects were co-benefits (i.e. unintended benefits outside the intended project objectives and outcomes) rather than by design. This further strengthens the evidence for the possible synergies, even without conscious efforts to obtain them, in outcomes of CCA and DRR projects. However, the synergies could be higher if PIAs make conscious efforts in the design and implementation aspects of projects.

4. Both CCA and DRR projects have developmental impacts: It was also evident from the country cases that both CCA and DRR projects have significant amount of development impacts which are largely co-benefits rather than by design. Projects have often failed to quantify these developmental benefits and hence may have under reported the overall impacts of projects. This could largely be due to the time gap for these developmental impacts to occur after the completion of the project. This is contrary to the belief that CCA benefits often take longer time to realize.

5. Broad based interventions may have high synergies: Synergies were higher when projects were designed with broader scope. However, these are also the projects that have likely suffered to obtain the intended outcomes reported in the original project proposals. This could largely be attributed to thinning of resources over several unrelated project activities that may have generated some positive results on the ground but may have missed on the front of the intended outcomes. There is a hazard that these projects may get more attention for being better candidates for greater synergies which should to be avoided since synergies were not by design but at the cost of the actual intended outcomes. On the other hand, projects that had focused approach were the least to report synergies but still synergies were apparent.

6. Insurance did not provide sufficient condition for CCA and DRR: It has been argued that insurance can provide both CCA and DRR benefits. However, findings from this study indicate that such conclusions could be far fetching if we consider only the income stabilization potential of insurance approaches. However, insurance can be a very good vehicle to realize CCA and DRR outcomes if insurance providers build capacities of farmers in promoting better agriculture practices, in ensuring that the areas with insurance have good CCA and DRR plans etc. Hence, it can be concluded that insurance itself may not provide a necessary and sufficient condition for resulting in CCA and DRR outcomes but rather there is a need for the presence of enabling environment.

7. Substitution may not lead to cost effectiveness: One of the important questions that emerged during the study was the possible substitution of certain CCA components with DRR components, and vice versa, to obtain a particular outcome at a lower cost. However, from the study, it could be noted that such substitution of approaches may not be possible. For example, CCA planning can cover large proportion of DRR needs if CCA planning is made more comprehensive to cover traditional DRR areas. However, DRR planning may not cover most CCA planning elements since DRR is often focused to certain sectors as opposed to broader sectoral scope of CCA planning. From the surveys, it was evident that maximizing CCA synergies of a DRR project, and vice versa, may have additional cost implications. Such cost implications were also alluded to by various stakeholders who participated in the online survey. However, no evidence could be obtained for additional costs in the case studies conducted.

8. Quantifying synergies is not obvious: Synergies will become evident if they could be quantified. In absence of quantifications, it was difficult to clearly differentiate which projects and approaches can provide better synergies. However, quantifying these synergies require greater access to project locations, stronger collaboration with the PIAs and additional resources that could not be possible in this study. Because of these reasons, synergies were assessed only qualitatively.

9. Seeking synergies is not common: Despite the significant possibility of obtaining CCA and DRR synergies in project interventions, the project implementing agencies (PIAs) have mostly refrained from focusing on maximizing these synergies. This could be due to the objectives set by the project at their inception and lack of proper incentives to obtain additional benefit from such synergies. In most cases, projects are considered successful as long as they achieved their set objective even though there is much room to achieve by consciously seeking synergies.

10. Collaboration can enhance synergies: There is a very limited evidence on the extent the CCA and DRR stakeholders have worked together to obtain maximum out of the interventions. This provides an evidence to the possible barriers, including the technical ones, discussed in the second chapter of this report.

11. Capacity building is the key: The lack of conscious efforts to maximize CCA and DRR synergies of interventions indicate lack of appropriate capacity, largely technical, among the stakeholders implementing these interventions. It is evident that projects that collaborate with knowledge partners such as universities and research institutions were better placed to achieve these synergies than other interventions. This signifies the importance of networks to work with stakeholders on the ground. However, most networks fail to reach out to the actual implementing agencies as they tend to operate at much higher level limiting passing of information to a trickle.

This study has certain limitations and keeping in view these limitations is important while understanding and applying the above results. These observations are based on a limited set of projects evaluated in each country which may not represent all possible conditions under which adaptation takes place. Secondly, as alluded above, the CCA and DRR synergies of interventions were qualitatively assessed and compared across the projects and conclusions are based on the overall picture emerging from the evidences presented and opinions of the researchers based on the field surveys and interaction with stakeholders which may limit the appearance of clear evidence for these conclusions in some cases. Nevertheless, this study reiterated the importance of conducting inductive based and evidence seeking exercises to distil CCA and DRR synergies, rather than trying to fit theory into real-world observations, though such exercise requires large number of samples to derive conclusions which could not be done. The future iterations of this study will try to take these lessons into consideration for bringing out even more robust evidences for synergies and enabling conditions that could help achieve these synergies.

ANNEXURE

Annexure I: FGD Template

Step I

Have a meeting with one of the project implementers and obtain the following information. This has to be done both for CCA and DRR projects: Project duration, objective, components, expected outcomes, intended benefits (for each component/intervention), measured benefits (categorize as short, medium and long-term if possible) etc. It is very important that you clearly identify the intended benefits of the project and if any negative externalities were foreseen (costs)

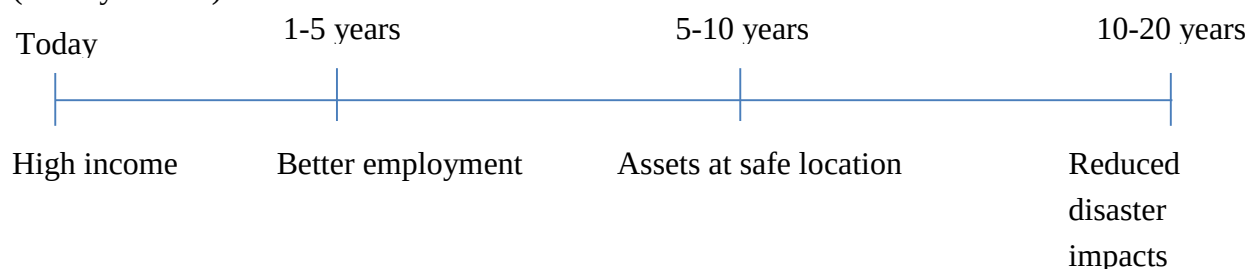
Step II

Identify a village for conducting FGD, the FGD participants would essentially have to be the direct beneficiaries of the project. They could consist of beneficiaries of capacity building programs, physical assets and any other interventions including benefiting or contributing to micro-finance pools etc. The FGD could be attended by a representative sample of women and men and if possible from all major economic classes targeted by the project.

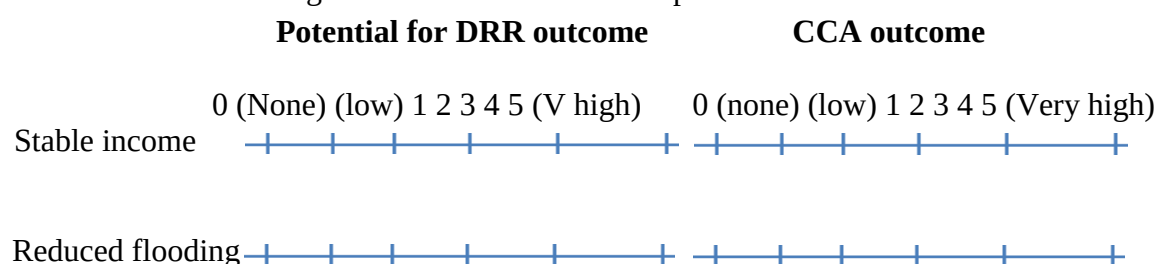
Step III: Conduct the FGD

1. Discuss about the historical hazards and impacts in the project location. List and rank the historical impacts of a major hazard in the location. Conduct the problem tree analysis to identify the root causes and effects of the problems
2. Ask if all beneficiaries know the project, refresh them the project activities etc. (but not intended benefits), ask the reason why they participated in the project (what was the incentive for them)
3. List the project activities and map out all the primary, secondary and tertiary benefits of the project (without distinguishing if they are DRR or CCA benefits). Specific emphasis has to be given to quantify benefits (e.g. amount or % of income increased/stabilized, migration avoided, number of school children those didn't drop out of the school etc. All these indicators will emerge as you discuss with the participants different benefits and costs. You could map out which of these benefits are short term, medium term and long term. A scale can be drawn on the chart and benefits could be written on the scale as written below.

Primary benefit (stable income from drought tolerant varieties) > Children going to school
(secondary benefit) > literacy / better health due to school mid-day meal program etc.
(tertiary benefit)



4. Similar to above, map out all the costs (of engaging in the project or negative externalities that project may have caused; classified into primary, secondary and tertiary)
5. This is the stage where you could ask them about their opinion on how these benefits helped or didn't help them in reducing disaster risks and adapting to climate change outcomes. Which of the benefits have high potential to reduce disaster risks and which for adapting to climate change? You could use a 5-point scale and ask them which one will give what level of related impact.



6. The entire above analysis could be done by each component or by combining for all the components of the project (e.g. check dam, training, agro-forestry, legume cultivation etc. as components of a project).

Annexure II: CCA-DRR online survey

Understanding the climate change adaptation (CCA) and disaster risk reduction (DRR) synergies of CCA and DRR interventions

Dear Respondent, this collaborative survey by Asia Pacific Adaptation Network (APAN) and the Institute for Global Environmental Strategies (IGES) is being carried out to understand the perspectives of practitioners, policy makers and researchers on the synergies between climate change adaptation (CCA)¹ and disaster risk reduction (DRR) interventions. The objective is not only to gauge the stakeholder perceptions but also to identify the means to maximize the synergies leading to greater impact and efficiency of interventions. While it is desirable that this survey be filled based on your experience of working with CCA DRR projects and programs, respondents can also rely upon their knowledge and related experiences and learnings.

All the opinions expressed in this survey will be used for the research purposes and every effort will be made to protect the privacy of the respondents.

I. Your Background

1. Please provide your email ID (Optional):
2. What is your highest level of education (please select only one option):
☐ 10+2 and below, ☐ Diploma Course, ☐ Graduation, ☐ Post-Graduation without technical degree, ☐ Post-graduation in technical fields (medical, engineering, agriculture, etc.)
☐ Doctoral degree, ☐ Others, Specify
3. Which of the following best describes your major field of expertise (please select only one option):
☐ Climate change adaptation;
☐ Climate change adaptation-Mitigation linkages; ☐ Natural resources management,
☐ Forestry and biodiversity, ☐ Climate change mitigation; ☐ Disaster risk reduction; ☐ Environmental management; ☐ Public policy and planning; ☐ Risk management,
☐ Others (Specify):
4. Number of years of experience in the above field (please type number):
5. You have largely worked with (please select only one option): ☐ Non-governmental organization (NGO), ☐ United Nations, ☐ Government, ☐ Bi-lateral organizations, ☐ Multi-lateral organizations, ☐ Donor, ☐ Private sector, ☐ Consultancy services, ☐ Research institution, ☐ University, ☐ Other (Specify) :
6. You are primarily a (please select only one option) ☐ Practitioner, ☐ Researcher, ☐ Manager, ☐ Administrator,
☐ Others (Specify)
7. The dominant nature of your projects (you can select multiple options)
☐ Research projects (assessments, tools development),
☐ Action research and piloting (projects that involve individual/communities during in the research or to test a proposed solution),

¹ For the purpose of this survey, the definition of climate change adaptation is defined as “The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate harm or exploit beneficial opportunities. In natural systems, human intervention may facilitate adjustment to expected climate and its effects (IPCC, 2014)” and disaster risk reduction as “measures employed for anticipating future disaster risk; reducing existing exposure, hazard, or vulnerability; and improving resilience.”

- ☐ Implementation projects (projects that implement a set of CCA/DRR actions at individual, community, district or national level),
- ☐ Research and development projects, ☐ Planning (activities in the planning processes),
- ☐ Others (please specify):
8. **Your work is mainly concerned with (can select multiple options)** ☐ Projects at the individual/household level, ☐ Projects at village/community level, ☐ Projects at district level, ☐ Projects at the national level, ☐ Projects at the planning level, ☐ Others (Please specify):
9. **How do you rate your overall expertise in the field of Climate Change Adaptation (please select only one option)**
- ☐ No knowledge, ☐ Fundamental awareness (basic knowledge), ☐ Novice (Limited experience), ☐ Intermediate (Practical application), ☐ Advanced (Applied theory), ☐ Expert (Recognized authority)
10. **How do you rate your overall expertise in the field of disaster risk reduction (please select only one option)**
- ☐ No knowledge, ☐ Fundamental awareness (basic knowledge), ☐ Novice (Limited experience), ☐ Intermediate (Practical application), ☐ Advanced (Applied theory), ☐ Expert (Recognized authority)

II. DRR-CCA synergies

11. **Which of the following definitions of climate change adaptation (CCA) you agree the most? (please select only one option)**
- ☐ Adjustments in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impacts.
- ☐ Anticipating the adverse effects of climate change and taking appropriate action to prevent or minimize the damage they can cause, or taking advantage of opportunities that may arise.
- ☐ Lower the risks posed by the consequences of climatic changes.
- ☐ Process by which strategies to moderate, cope with and take advantage of the consequences of climatic events are enhanced, developed, and implemented
- ☐ Process or outcome of a process that leads to a reduction in harm or risk of harm, or realization of benefits associated with climate variability and climate change
- ☐ Taking deliberate and considered actions to avoid, manage or reduce the consequences of a hotter, drier and more extreme climate and to take advantage of the opportunities that such changes may generate
- ☐ I agree with all the above, ☐ Not completely sure, ☐ None of the above
12. **Which of the following definitions of disaster risk reduction (DRR) you agree the most? (please select only one option)**
- ☐ The concept and practice of reducing disaster risks through systematic efforts to analyse and reduce the causal factors of disasters.
- ☐ The conceptual framework of elements considered with the possibilities to minimize vulnerabilities and disaster risks throughout a society, to avoid (prevention) or to limit (mitigation and preparedness) the adverse impacts of hazards, within the broad context of sustainable development.
- ☐ The systematic process of using administrative directives, organizations, and operational skills

and capacities to implement strategies, policies and improved coping capacities in order to lessen the adverse impacts of hazards and the possibility of disaster.

☐ I agree with all the above, ☐ Not completely sure, ☐ None of the above

13. Do you agree that CCA interventions can have DRR outcomes and DRR interventions can have CCA outcomes? (please select only one option)

☐ It is possible for CCA interventions to have DRR outcomes, ☐ It is possible for DRR interventions to have CCA outcomes, ☐ Both the above are possible (i.e. both interventions can have both outcomes), ☐ None of the above, ☐ Not sure, ☐ Depends on the nature of the specific intervention and hence cannot be generalized, ☐ Other (please specify):

14. Which one of the following statements do you agree with (please tick multiple if needed)?

☐ Introducing DRR measures (mitigation, prevention and preparedness) will always have CCA outcomes; however, CCA measures need not always result in DRR outcomes.

☐ In the context of climate change, DRR is only effective if CCA is mainstreamed into DRR by considering the future climate change impacts and infusing redundancy to address uncertainties

☐ Both CCA and DRR will enhance community resilience to natural disasters

☐ None of the above is correct

☐ Other (add your comment):

15. How acknowledged are the synergies between CCA and DRR (please select only one)?

☐ Widely acknowledged across the board,

☐ Not acknowledged across the board,

☐ Only acknowledged among few experts,

☐ Widely acknowledged but not actively promoted,

☐ Other:

16. If you agree about the possible synergies, rate the maximum possible synergy between CCA and DRR outcomes from your experience or knowledge (please answer at least one column below)

	DRR synergies in CCA projects	CCA synergies in DRR projects
Synergistic outcomes as % of total outcomes	☐ 0%	☐ 0%
	☐ 20%	☐ 20%
	☐ 40%	☐ 40%
	☐ 60%	☐ 60%
	☐ 80%	☐ 80%
	☐ 100%	☐ 100%
	☐ Cant be generalized	☐ Cant be generalized
	☐ None of the above	☐ None of the above

17. Please rate the following areas in the order of potential for achieving high synergy between CCA

and DRR?

Field	High potential	Medium potential	Low potential
Agriculture	☐	☐	☐
Urban planning	☐	☐	☐
water resources	☐	☐	☐
Biodiversity and ecosystem services	☐	☐	☐
Natural resource management	☐	☐	☐
Forestry	☐	☐	☐
Transportation	☐	☐	☐
Buildings	☐	☐	☐
Education	☐	☐	☐
Health	☐	☐	☐
Coastal zone management	☐	☐	☐
Animal husbandry	☐	☐	☐
Capacity building	☐	☐	☐
All areas have equal potential for achieving synergies	☐	☐	☐
None of the above	☐		
DRR-CCA synergies are not bound upon the nature of areas	☐		

18. Please rate the following kinds of interventions to achieve CCA and DRR synergies

Kind of project	High potential	Medium potential	Low potential
Projects that have hardware components such as infrastructure	☐	☐	☐
Projects that have software components such as community participation	☐	☐	☐
Projects that combine software and hardware	☐	☐	☐
Projects that focus on integrated planning	☐	☐	☐
Projects that are implemented at macro level	☐	☐	☐
Projects that are implemented at the small scale	☐	☐	☐
All of the above	☐		
None of the above	☐		
DRR-CCA Synergies are not bound upon the nature of project	☐		

19. Please write indicators (at least two indicators for two levels) that measure/reflect the CCA-DRR synergies of an intervention.

These indicators can correspond to your primary area of discipline you identified in Question 3 under your background. For e.g. if you are from the background of biodiversity and ecosystems, please provide related indicators below.

Level	Indicators
Individual level	
Community level	
Institutional level	
Regional level	
Policy level	

20. Please rank the following five bottlenecks that are limiting the full realization of CCA-DRR synergies (1 is highly important and 5 is least important)

Bottleneck	Rank
Lack of sufficient knowledge about the other field (e.g. knowledge on DRR for a CCA person),	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
Inadequate knowledge/examples that promoting synergies is beneficial,	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
Confusion over the language used by DRR and CCA communities,	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
High specialist nature of these fields limit interaction among these communities,	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
Integrating CCA and DRR elements into the same intervention is difficult due to all the above reasons	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

21. Please write at least one measure/preconditions that will help in overcoming the bottlenecks and realizing and or maximizing the DRR-CCA synergies of outcomes?

Level	Measure/s
Individual level	
Community level	
Institutional level	
Regional level	
Policy level	

22. Do you think maximizing CCA-DRR synergies in a single intervention would cost less than when aimed at single outcome (e.g. either CCA or DRR outcome but not both)?

☐ Yes, ☐ No, ☐ Not sure, ☐ There is no evidence to conclude, ☐ Other (Please specify):

23. Are there any conflicts between DRR and CCA outcomes of interventions?

☐ Yes, ☐ No, ☐ Not sure

Note: If the answer is 'No', please proceed to fill Question NO 27 and skip the rest in between.

24. If the answer to Q 23 is Yes, identify under what circumstances the conflict between CCA and DRR outcomes could manifest (i.e. implementing a project on CCA could negatively impact the DRR outcomes in the project location)

- ☐ Projects implemented in upstream without considering the impacts on the downstream
- ☐ Projects addressing issues that permeates across the borders but address only one side of the border
- ☐ Projects that give high emphasis on short-term gains (e.g. 5-10 years) as against long-term gains (e.g. 20-50 year)
- ☐ Projects with high emphasis on infrastructure elements as against projects that combine with social participatory elements
- ☐ Projects that do not take into consideration the local indigenous/historical knowledge/experiences
- ☐ All of the above
- ☐ None of the above
- ☐ Not sure

☐ Others:

25. Which among the following is true in a CCA and or DRR projects (considering that a CCA or DRR project will have synergistic DRR or CCA outcomes respectively)

- ☐ It is more easy for CCA outcomes to fail than DRR outcomes
- ☐ It is more easy for DRR outcomes to fail than CCA outcome
- ☐ Projects have equal chances of failing to deliver both outcomes
- ☐ None of the above (please add your comment in the Other field)
- ☐ Do not know

☐ Other (please specify)

26. If your answer to the above question is top three options, please clarify the reason why it could

happen:

27. Which of the following organizations do you think tend to give more emphasis on promoting/ensuring DRR-CCA synergies

- ☐ Research organizations, ☐ NGOs, ☐ UN agencies, ☐ Donor agencies, ☐ Consultancy firms,
- ☐ Financial firms, ☐ Universities, ☐ All the above, ☐ None of the above

28. Are stakeholders engaged in United Nations Framework Convention on Climate Change (UNFCCC) well-versed with the disaster risk reduction: ☐ Yes, ☐ No, ☐ Not sure

29. Are stakeholders engaged in Hyogo Framework of Action (HFA) and its successor version well-versed with climate change adaptation: ☐ Yes, ☐ No, ☐ Not sure

30. Processes under both UNFCCC and HFA are (Select multiple if required): ☐ Well-coordinated, ☐ Somewhat coordinated, ☐ Not at all coordinated, ☐ No need to coordinate, ☐ There is much deserve to be coordinated, ☐ Not sure,

☐ Others (Specify):

31. If you think the UNFCCC and HFA need to be coordinated, please describe in short how it can be

achieved

32. Please provide a web-link or title of any project that you know has achieved maximum CCA-DRR synergies. Our team will visit this webpage or report (optional)

33. Please add a comment you wish to convey to the survey team that could help with the study

III. More information about yourself

34. What is your gender? ☐ Female, ☐ Male

35. What is your age? ☐ 18 to 24, ☐ 25 to 34, ☐ 35 to 44, ☐ 45 to 54, ☐ 55 to 64, ☐ 65 to 74, ☐ 75 or older

36. In what country do you currently reside?

37. In which field have you obtained your highest degree? ☐ Agriculture, ☐ Rural development,

☐ Urban development, ☐ Energy, ☐ Water, ☐ Biodiversity and ecosystem services,

☐ Social sciences, ☐ Economics, ☐ Environmental sciences, ☐ Management sciences,

☐ Political sciences, ☐ Earth sciences,

☐ Others:

38. Number of years of experience in the above field (please type number):

39. In which country you have maximum experience?

Please return this by Email to nre-info@iges.or.jp or prabhakar@iges.or.jp with subject 'DRR-CCA Survey'

Annexure III: Insured Survey

Assessing the Disaster Risk Reduction and Climate Change Adaptation Benefits and Costs of Risk Insurance

Thank you very much for your acceptance to participate in this survey organized by IGES in collaboration with eeMausam. Your participation will help us get insight into risk insurance experiences and be able to provide better policy suggestions to relevant agencies involved in climate risk reduction.

1. Background of the respondent

1.1 Gender: Male ☐ Female ☐

1.2 Occupation of the respondent: ☐ Farmer, ☐ Merchant, ☐ Rural artisan, ☐ Farm laborer, ☐ Rural entrepreneur, ☐ Others

1.3 What is the highest level of education that you have completed?
Illiterate ☐, Pre-Primary School (1-5) ☐, Upper primary (6-8) ☐, High School (9-10) ☐, PUC ☐, Diploma Course ☐, Graduation ☐, Post-Graduation and above ☐, Technical Degree (medical, engineering, agriculture, etc.) ☐, Others ☐ Specify _____

1.4 Total number of family members _____ and number of earning members _____

1.5 What type of housing do you currently occupy?
Katcha-Thatched roof ☐, Katcha -Tiled roof ☐, Semi pucca ☐, Pucca (Through housing scheme) ☐, Pucca ☐

1.6 Area of land owned (ha)?
☐ 0 ☐ 0.25-0.5, ☐ 0.5-1.0, ☐ 1-1.5, ☐ 1.5-2.0, ☐ 2.0-2.5, ☐ >2.5

1.7 Do you lease land and how much?
Yes ☐, No ☐
Area of land taken on lease _____ (ha)

1.8 % of land (ha) under arable cropping (paddy etc.): ☐ <10, ☐ 20-40, ☐ 40-60, ☐ 60-80, ☐ 80-100

1.9 Livestock owned (type and number)
Pig ☐ _____ Cow ☐ _____ Chicken ☐ _____ Goat ☐ _____ Others ☐: _____

1.10 Do you have savings?
Yes ☐, No ☐

1.11 If 'Yes', in what form?
Bank savings ☐, Assets ☐

1.12 Sources of household income

Source of Income	Tick appropriate box		% of annual income
	Primary	Secondary	
A. Agriculture	☐	☐	
B. Livestock	☐	☐	
C. Forest produce	☐	☐	
D. Manual labor in the village	☐	☐	
E. Seasonal migration to nearby city (Name the city: _____)	☐	☐	
F. Business (Specify: _____)	☐	☐	
G. Regular job (Specify: _____)	☐	☐	
Others	☐	☐	

1.13 What kind of agricultural products you have been producing (crops, animals or aquatic products) in the normal year and deficit rainfall year?

	Arable crop	Diary products	Meat	Aquatic	Others (mention)
A. Normal year	☐	☐	☐	☐	☐ _____
B. Deficit rainfall	☐	☐	☐	☐	☐ _____

1.14 How many different crops do you grow during a particular season?

Year	Rabi	Kharif	Other
A. Normal	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 & above ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 & above ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 & above ☐
B. Deficit rainfall	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 & above ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 & above ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 & above ☐

1.15 Loans taken in the last five years:

	Year	Sources of Loan ¹	Loan as % of total annual income	Purpose	% Repaid
A					
B					
C					
D					
E					

¹ a) Bank, b) Money lender, c) friend, d) family member, e) neighbor, f) others

1.16 Who makes farming investment decisions in your household? Elder male member ☐, all male members ☐, elder female member ☐, all female members ☐, all adults in the family ☐

1.17 Composition of meals usually consumed per day:

A. Normal year _____
B. Rainfall deficit year _____

1.18 Months most difficult to provide adequate food for HH _____
Why?: _____

1.19 How many times in a month does your family borrowed food grains?

- A. Normal year: Once ☐, twice ☐, thrice and above (number of times _____) ☐, Never ☐
- B. Drought/flood year: Once ☐, twice ☐, thrice and above (number of times _____) ☐, Never ☐

2. Hazards and Impacts

2.1 Rank the leading causes of the crop loss:

Peril	Rank
A. Drought	
B. Flood	
C. Delayed rainfall	
D. Pests and diseases (Specify: _____)	
E. Others: _____	

2.2 Frequency of crop loss:

	Every year	Once in 2 Yr	Once in 3 yr	Once in 4 yr	Once in 5 yr	Once in 6 & above
A. Before insurance	☐	☐	☐	☐	☐	☐
B. After insurance	☐	☐	☐	☐	☐	☐

2.3 What was the average crop loss over the past five years?

Complete crop loss ☐, 90-80% loss ☐, 70-60% loss ☐, 40-50% loss ☐, 20-30% loss ☐, No loss ☐, Didn't measure ☐

2.4 When were the most recent crop failures due to natural calamity? Specify the calamity? Never ☐

Year	Calamity (specify)	Total loss (INR) ¹	Crop loss (% of total loss) ²	Insurance triggered?
A				Yes ☐ No ☐ Not insured ☐
B				Yes ☐ No ☐ Not insured ☐
C				Yes ☐ No ☐ Not insured ☐

¹ Total of all losses including crop and other income sources if any

2.5 How did you come out of loss from the most recent disaster (Year from above table: _____)? (Tick multiple if needed)

Took bank loan ☐, specify as % of total loss _____

Bank loan waived off ☐, specify as % of total loss _____

Government paid the compensation ☐, specify as % of total loss _____

Sold assets ☐, specify as % of total loss _____

Informal Borrowing ☐, specify as % of total loss _____

Other income sources ☐ Specify source: _____

Couldn't come out, I am still at loss ☐

Government Insurance payout ☐: specify as % of total loss _____

Non Government Insurance payout _____

Others: _____

2.7 Was government compensation timely?

Yes ☐, No ☐

2.8 Was the government compensation sufficient to come out of loss?

Yes ☐, No ☐, Partially ☐ Specify how much % it could cover the loss (%): _____

2.9 What asset did you sell/mortgage? (Tick multiple if applicable)

Livestock ☐, Land ☐, buildings ☐, Farm implements ☐, jewelry ☐, Others (specify): _____

2.10 Specify the type and number of livestock sold

Pig ☐ _____ Cow ☐ _____ Chicken ☐ _____ Goat ☐ _____ Others ☐: _____

2.11 If you borrowed informally whom did you borrow from?

Family ☐, Friends/Neighbors ☐, Village money lender, Others(specify): _____

2.12 If you borrowed from bank, what was the interest rate you had to pay on this loan?

No interest ☐, Up to 5% ☐, 5-10% ☐, 10-15% ☐, 15-20% ☐, >20% ☐

2.13 If you informally borrowed, what was the interest rate you had to pay on this loan?

No interest ☐, Up to 5% ☐, 5-10% ☐, 10-15% ☐, 15-20% ☐, >20% ☐

2.14 Did you or any of your household members have to migrate (unseasonal) during the drought/flood to provide extra income?

Yes ☐, No ☐

2.15 Did you have to make household consumption adjustment during this period?

Yes ☐, No ☐

2.16 If 'Yes' how did you reduce expenditure?

Nutrition ☐, Health ☐, Education ☐, Social functions ☐, Leisure activities ☐, others ☐

2.17 Did you have any household food shortages during this period?

Yes ☐, No ☐

2.18 Did any of your livestock die due to the disaster related causes, specify type and number?

Pig ☐ _____ Cow ☐ _____ Chicken ☐ _____ Goat ☐ _____ Others ☐: _____

Did you have to sell the animals during the stress period? ☐Yes, ☐No

If yes, specify the % of number of cattle sold out of total (_____%), amount received (_____INR) and % loss in sale if the sale was below the market value of a normal period (_____% below the price during a normal period).

2.19 Did you grow sufficient fodder at this time to feed your cattle?

Yes ☐, No ☐

2.20 If 'No' where did you obtain fodder from?

Bought from market ☐

Informal borrowing ☐

Migrated to area with better pasturing ground ☐

2.21 Where did you obtain money to buy fodder from the market?

Government paid the compensation ☐,

Sold assets ☐

Informal Borrowing ☐,

Other income source ☐,
Insurance payout

2.22 How was the productivity of your livestock during the year of the disaster?
Less productive ☐, More productive, Same ☐

2.23 Did you provide any nutritional supplements to improve health of your cattle during this period?
Yes ☐, No ☐

2.24 If 'Yes' where did you obtain money to purchase the nutritional supplements?
Government paid the compensation ☐, Sold assets ☐, Informal Borrowing ☐, Other income source ☐, Insurance payout ☐

3. Insurance

3.1 What form of insurance do you have and for what amount (premium)

Health ☐ Premium (INR): _____
Property ☐ Premium (INR) _____
Livestock ☐ Premium (INR) _____
Crop ☐ Premium (INR) _____
Government Crop Insurance ☐ Premium (INR) _____
Others (Specify) ☐ Premium (INR) _____

3.2 When was the insurance taken: Less than a year ago ☐, 1-2 years ago ☐, 3-4 years ago ☐, 5 and more years ☐

3.3 Government subsidy received:
Completely subsidized ☐, 80-90% subsidized ☐, 75 % ☐, 50% ☐, Not subsidized ☐

3.4 What support do you receive from the insurance provider?

A. Service	Response		
B. Weather related information	Yes ☐	No ☐	☐ Not expected
C. Best agriculture practices to mitigate hazard impacts	Yes ☐	No ☐	☐ Not expected
D. Tips on farm financial management	Yes ☐	No ☐	☐ Not expected
E. Tips on risk management	Yes ☐	No ☐	☐ Not expected
F. Conducted capacity building programs on any of the above-mentioned subjects.	Yes ☐	No ☐	☐ Not expected

3.5 Were you involved in designing the insurance product?
Yes ☐, No ☐, Others in our village were involved ☐, Not required ☐, Cant say ☐

3.6 Why did you enroll for insurance (Expected benefits)? (Check multiple if required)
Stabilizes agriculture income ☐, Reduces dependency on loans ☐, Enables in making risky investments in agriculture ☐, Others (specify) _____

3.7 How did you enroll into insurance (Tick multiple if necessary)? By coercion of insurance agency ☐, Voluntary decision due to perceived benefits ☐

4. Insurance effectiveness

4.1 What was the insurance payout you received from the last crop loss due to disaster (refer to same year as in previous section on year of last crop loss due to disaster)? (INR) _____

4.2 How much of the loss did the payout cover?
Covered complete loss (100%) ☐, Covered 75% ☐, Covered 50% ☐, Covered >50 % ☐

4.3 Total time taken to receive your insurance payout after the crop loss was identified:
<1 month ☐, 2 months ☐, 3 months ☐, 4 months ☐, >4 months ☐

4.4 Was the payout disbursement 'timely' for you to get back to your normal life?
Yes ☐, No ☐

4.4 Of your recovery from disaster, how much of it do you attribute to the insurance payout?
Completely attribute to payout money ☐, Partially attribute to the payout money ☐, Do not attribute to payout money ☐

4.5 Where you able to purchase any assets during that year after receiving the payment?
Major assets ☐ Specify _____, Minor assets ☐, None ☐

4.6 Could you payback some loans/mortgages in the year you received the insurance payout?
Yes ☐, No ☐

4.7 Did you change the area of irrigated land in the disaster year compared to a normal year?
☐ Decreased ☐ Increased ☐ No change

4.8 Could you provide better quality fodder and supplements to your livestock after receiving insurance payout?
Yes ☐, No ☐

4.9 Did you increase the coverage of your insurance after this experience?
Yes ☐, No ☐, Decreased it ☐, Stopped taking insurance ☐

5. Opinion on the Insurance Product

5.1 Rate the insurance program on 1-5 scale on the following indicators. 1 is very good and 5 is very bad

Quantum of sum assured: ☐1 ☐2 ☐3 ☐4 ☐5
Number of risks covered: ☐1 ☐2 ☐3 ☐4 ☐5
Period of risk coverage: ☐1 ☐2 ☐3 ☐4 ☐5
Convenience in enrolment: ☐1 ☐2 ☐3 ☐4 ☐5
Basis for making insurance payment: ☐1 ☐2 ☐3 ☐4 ☐5
Mechanism of grievance redress: ☐1 ☐2 ☐3 ☐4 ☐5
Time taken for claim settlement: ☐1 ☐2 ☐3 ☐4 ☐5

5.2 Do you want to continue subscribing insurance? Yes ☐, No ☐, Only if insurance is subsidized ☐, Can't say ☐

5.3 What improvements would you like to see in the insurance product to make it more effective? [Tick multiple if needed]

Full loss coverage ☐, more perils covered ☐, only specific peril covered ☐, full subsidization ☐, no-subsidy ☐, more knowledge to farmers on insurance ☐, more knowledge to farmers on risk reduction measures ☐, make insurance compulsory to all farmers ☐, make insurance compulsory only to borrowing farmers ☐, make it compulsory only to certain income level farmers ☐ (specify the income nature i.e. poor, rich etc.): _____

6. Long-term DRR and CCA impacts of insurance

6.1 Did crop insurance motivate you to adopt new agriculture practices with less likelihood to crop failure? Yes ☐, No ☐, Can't say ☐, Not required by the insurance ☐, No incentive for taking up better crop practices ☐, Others ☐ _____

6.2 Does the presence of insurance make you feel that you can engage in more risky farming (high risk high profit crops) activities?
Yes ☐, No ☐, Maybe /can't say ☐

6.3 Have you adopted any of the following practices in your regular agriculture practices (select multiple boxes if required)

	Adopted after taking the insurance	Adopted before taking the insurance	Not yet adopted but considering for the future	Not adopted or Not considered
A. Crop management-				
New drought/pest resilient varieties				
Change sowing dates				
Change in cropping system redesign ¹				
B. Water management-				
New management strategies using less water ²				
Water conservation during summer				
More effective uses of irrigation				
Change of irrigation systems/new technology				
C. Soil management				
Soil micronutrient management				
Soil erosion prevention methods				
Methods to conserve soil				
D. Livestock				
Shift to indigenous breeds of cattle				

¹ Crop rotation, intercropping, multi-storey cropping, inclusion of perennial water source in dry lands

² Amount and timing of irrigation

Invest in multiple livestock species				
Shift to drought tolerant species				
Better feed practices (Specify _____)				
Immunization ☐ and/or insemination ☐				
Others (Specify: _____)				

6.4 What are the constraints you have faced in adopting any of the previously mentioned adaptations in your agricultural practice?

Cost ☐, Lack of financial support (banks loans, government subsidies etc.) ☐, Lack of technical support ☐, Lack of labor ☐, Others ☐ specify _____

6.5 Have these measures resulted in reduced premium price?

Yes ☐, No ☐, Not sure ☐

6.6 Do you think the insurance premium price should be different for farmers who adopt disaster risk reduction measures compared to those who have not adopted them?

Yes ☐, No ☐, Not sure ☐, It is already that way ☐

6.7 Has your expenditure in agricultural inputs changed after taking the insurance?

Agricultural input	Increased	Decreased	Stayed the same
A. Chemical fertilizers			
B. Pesticides			
C. Hybrid seeds			

6.8 Are your crop/animal choices influenced by availability of insurance for a particular crop/animal breed?

Yes ☐, No ☐, Can't say ☐

6.9 Have you changed the number of crops/animals that you grow in the year after taking insurance?

Yes ☐ No ☐

	Drought Year		Normal Year	
	Increased	Decreased	Increased	Decreased
A. Kharif	☐	☐	☐	☐
B. Rabi	☐	☐	☐	☐

6.10 Have you felt the need to make changes in your traditional practices in order to adjust to climatic changes after taking the insurance?

Yes ☐, No ☐

6.11 How has your savings changed after taking insurance?

Increased ☐, decreased ☐, No change ☐, Can't say ☐

6.12 If your savings have changed after insurance by what percentage have they changed?

☐ 10-20%, ☐ 20-30%, ☐ 30-50%, ☐ 50-75%, ☐ 100%

6.13 Have you been able to pay off debts/mortgages from previous years after taking insurance?

Yes ☐, No ☐, Did not have any debts ☐

6.14 How have your investments have changed after taking insurance?

Asset	No change	Increased	Decreased	% Change from before insurance
A. Livestock	☐	☐	☐	
B. Owned land	☐	☐	☐	
C. Leased land	☐	☐	☐	
D. Irrigation facilities (☐ ponds, ☐ canals, ☐ drip, ☐ sprinkler etc.)	☐	☐	☐	
E. Farm house	☐	☐	☐	
F. Others	☐	☐	☐	

6.15 Do you have additional income in your household to invest in further income generating activities (Value addition for agricultural products, etc.) after taking up insurance?

Yes ☐ No ☐

6.16 Do you have additional income in the house for non-essential activities (recreational etc.) after taking up insurance?

Yes ☐ No ☐ Same ☐

6.17 Do you feel more confident to invest to diversify your livelihood strategies after taking up insurance?

More ☐, Less ☐, Same ☐

6.18 Do you feel more confident to provide sufficient fodder and nutrition for livestock during disaster years after taking insurance?

Yes ☐, No ☐, Same ☐

6.19 Did you take microcredit before taking up the insurance?

Yes ☐, No ☐, No but was considering ☐

6.20 Does the insurance make you more confident to take up microcredit to invest in farming activities?

More ☐, Less ☐, Same ☐

6.21 Since taking up insurance have you taken any microcredit for increasing investment in your farming activities?

Yes ☐, No ☐

6.22 Have you seen any perceivable reduction in flood/drought impacts in your village that can be attributed to insurance after introduction of insurance?

Yes ☐, No ☐, Cant say ☐

6.23 Specify the reason for the above if any: _____

6.24 Has the crop insurance contributed to stabilizing agriculture income?

Yes ☐, No ☐, Cant say ☐, Insurance pay off has not yet happened ☐

6.25 Are you confident that insurance can lead to long-term wellbeing compared to without insurance?

Yes ☐, No ☐, Cant say ☐, Others: _____

6.26 If yes, how confident are you? Very high ☐, High ☐, Medium ☐, Low ☐, Very low ☐

6.27 Do you feel that you could have used the money invested in insurance premium for more gainful livelihood activities?

Yes ☐, No ☐, Cant say ☐

6.28 If yes, what are those better alternatives to invest? (Tick multiple if needed)

Income diversification options (Specify _____) ☐, invest in better farm infrastructure (Specify: _____) ☐, invest in better animal breeds ☐, invest in better crop varieties ☐, others: Specify _____

6.29 Do you think the insurance effectiveness will be different if the insurance pay out beneficiary is female member of the household rather than the male member? Yes ☐, No ☐, Cant say ☐, will not make a difference as the farming decisions are made collectively in the family ☐

6.30 Please rate the perceived impact of insurance on the following aspects in your household

	Very highly +ve	Highly +ve	+ve	No impact	-ve	Highly -ve	Very highly -ve
Health	☐	☐	☐	☐	☐	☐	☐
Family nutrition	☐	☐	☐	☐	☐	☐	☐
Liquidity	☐	☐	☐	☐	☐	☐	☐
Risk taking ability	☐	☐	☐	☐	☐	☐	☐
Risk awareness	☐	☐	☐	☐	☐	☐	☐
Recovery from loss	☐	☐	☐	☐	☐	☐	☐
Education of children	☐	☐	☐	☐	☐	☐	☐
Physical assets	☐	☐	☐	☐	☐	☐	☐

7. Insurance payout spending

How did you spend your last insurance pay out? Please explain

7.1 Did you spend your last insurance payout to enhance your livelihood?

Yes ☐ , No ☐

If yes, please explain:

7.2 Did you receive advice or guidance on how to spend the payout to enhance your livelihood? Yes ☐ , No ☐

If Yes, from whom _____

7.3 Do you feel that you could have spent the insurance payout more gainfully for livelihood enhancement if you had received advice Yes ☐ , No ☐

Annexure IV: Uninsured Survey

Assessing the Disaster Risk Reduction and Climate Change Adaptation Benefits and Costs of Risk Insurance

Thank you very much for your acceptance to participate in this survey organized by IGES in collaboration with eeMausam. Your participation will help us get insight into risk insurance experiences and be able to provide better policy suggestions to relevant agencies involved in climate risk reduction.

1. Background of the respondent

1.1 Gender: Male ☐ Female ☐

1.2 Occupation of the respondent: ☐ Farmer, ☐ Merchant, ☐ Rural artisan, ☐ Farm laborer, ☐ Rural entrepreneur, ☐ Others

1.3 What is the highest level of education that you have completed?
Illiterate ☐ , Pre-Primary School (1-5) ☐ , Upper primary (6-8) ☐ , High School (9-10) ☐ , PUC ☐ , Diploma Course ☐ , Graduation ☐ , Post-Graduation and above ☐ , Technical Degree (medical, engineering, agriculture, etc.) ☐ , Others ☐ Specify _____

1.4 A. Total number of family members _____

B. Number of earning members _____

1.5 What type of housing do you currently occupy?
Katcha-Thatched roof ☐ , Katcha -Tiled roof ☐ , Semi pucca ☐ , Pucca (Through housing scheme) ☐ , Pucca ☐

1.6 Area of land owned (ha)?
0 ☐ , 0.25-0.5 ☐ , 0.5-1.0 ☐ , 1-1.5 ☐ , 1.5-2.0 ☐ , 2.0-2.5 ☐ , >2.5 ☐

1.7 Do you lease land and how much?
Yes ☐ , No ☐
Area of land taken on lease _____ (ha)

1.8 % of land (ha) under arable cropping ☐ <10, ☐ 20-40 , ☐ 40-60, ☐ 60-80, ☐ 80-100

1.9 Livestock owned (type and number)
Pig ☐ _____ Cow ☐ _____ Chicken ☐ _____ Goat ☐ _____ Others ☐ : _____

1.10 Do you have bank savings?
Yes ☐ , No ☐

1.11 Sources of household income

Source of Income	Tick appropriate box		% of annual income
	Primary	Secondary	
A. Agriculture	☐	☐	
B. Livestock	☐	☐	
C. Forest produce	☐	☐	

D. Manual labor in the village	☐	☐	
E. Seasonal migration to nearby city (Name the city: _____)	☐	☐	
F. Business (Specify: _____)	☐	☐	
G. Regular job	☐	☐	
Others	☐	☐	

1.12 What kind of agricultural products you have been producing (crops, animals or aquatic products) in the normal year and deficit rainfall year?

	Arable crop	Diary products	Meat	Aquatic	Others (mention)
A. Normal year	☐	☐	☐	☐	☐ _____
B. Deficit rainfall	☐	☐	☐	☐	☐ _____

1.13 How many different crops do you grow during a particular season?

Year	Rabi	Kharif	Other
A. Normal	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 & above ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 & above ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 & above ☐
B. Deficit rainfall	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 & above ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 & above ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 & above ☐

1.14 Loans taken in the last five years:

	Year	Sources of Loan ¹	Loan as % of total annual income	Purpose	% Repaid
A					
B					
C					
D					
E					

¹ a) Bank, b) Money lender, c) friend, d) family member, e) neighbor, f) others

1.15 Who makes farming investment decisions in your household? Elder male member ☐, all male members ☐, elder female member ☐, all female members ☐, all adults in the family ☐

1.16 Months most difficult to provide adequate food for HH _____
Why?: _____

1.17 How many times in a month does your family borrowed food grains?

A. Normal year: Once ☐, twice ☐, thrice and above, number of Times _____ ☐, Never ☐

B. Drought/flood year: Once ☐, twice ☐, thrice and above, number of times ☐, Never ☐

2. Hazards and Impacts

2.1 Rank the leading causes of the crop loss:

Peril	Rank
A. Drought	
B. Flood	
C. Delayed rainfall	
D. Pests and diseases (Specify: _____)	
E. Others: _____	

2.2 Frequency of crop loss:

Every year	Once in 2 yr	Once in 3 yr	Once in 4 yr	Once in 5 yr	Once in 6 & above
A. ☐	☐	☐	☐	☐	☐

2.3 What was the average crop loss over the past five years?

Complete crop loss ☐, 90-80% loss ☐, 70-60% loss ☐, 40-50% loss ☐, 20-30% loss ☐, No loss ☐, Didn't measure ☐

2.4 When were the most recent crop failures due to natural calamity? Specify the calamity? Never ☐

Year	Calamity (specify)	Total loss (INR) ¹	Crop loss (% of total loss) ²
A			
B			
C			

¹ Total of all losses including crop and other income sources if any

2.5 How did you come out of loss from the most recent disaster (Year from above table: _____)? (Tick multiple if needed)

Bank loan waived off ☐, specify as % of total loss _____
 Bank loan ☐, specify as % of total loss _____ Interest rate _____
 Government paid the compensation ☐, specify as % of total loss _____
 Sold assets ☐, specify as % of total loss _____
 Informal Borrowing ☐, specify as % of total loss _____ Interest rate _____
 Other income sources ☐ Specify source: _____
 Couldn't come out, I am still at loss ☐
 Others: _____

2.6 Was government compensation timely?

Yes ☐, No ☐

2.7 Was the government compensation sufficient to come out of loss?

Yes ☐, No ☐, Partially ☐

2.8 If you sold assets, what asset did you sell/mortgage? (Tick multiple if applicable)

Livestock ☐, Land ☐, buildings ☐, Farm implements ☐, jewelry ☐, Others (specify): _____

2.9 If you borrowed informally whom did you borrow from?

Family ☐, Friends/Neighbors ☐, Village money lender, Others(specify): _____

2.10 Did you or any of your household members have to migrate (unseasonal) during the drought/flood to provide extra income?

Yes ☐, No ☐

2.11 Did you have to make household consumption adjustment during this period?

Yes ☐, No ☐

2.12 If 'Yes' how did you reduce expenditure?

Nutrition ☐, Health ☐, Education ☐, Social functions ☐, Leisure activities ☐, others ☐

2.13 Did you have any household food shortages during this period?

Yes ☐, No ☐

2.14 Did any of your livestock die due to the disaster related causes, specify type and number?

Pig ☐ _____ Cow ☐ _____ Chicken ☐ _____ Goat ☐ _____ Others ☐: _____

2.15 If you sold livestock, specify the type and number of livestock sold

Pig ☐ _____ Cow ☐ _____ Chicken ☐ _____ Goat ☐ _____ Others ☐: _____

2.16 If yes, amount that the livestock was sold for (_____ INR), what is the price of the cattle during normal periods (_____ INR)

2.17 Did you grow sufficient fodder at this time to feed your cattle?

Yes ☐, No ☐

2.18 If 'No' where did you obtain fodder from?

Bought from market ☐

Informal borrowing ☐

Migrated to area with better pasturing ground ☐

2.19 If you bought fodder, where did you obtain money to buy fodder from ?

Compensation paid by government ☐,

Sold assets ☐

Informal Borrowing ☐

Other income source ☐

2.20 How was the productivity (diary, farm work) of your livestock during the year of the disaster?

Less productive ☐, More productive ☐, Same ☐

2.21 Did you provide any nutritional supplements to improve health of your cattle during this period?

Yes ☐, No ☐

2.22 If 'Yes' where did you obtain money to purchase the nutritional supplements?

Compensation paid by government ☐, Sold assets ☐, Informal Borrowing ☐, Other income source ☐

3. DRR and CCA practices

3.1 Have you adopted any of the following practices in your regular agriculture practices over the last five years¹ (select multiple boxes if required)

	Adopted	Not yet adopted but considering for the future	Not adopted or Not considered
A. Crop management-			
New drought/pest resilient varieties			
Change sowing dates			
Change in cropping system redesign ²			
B. Water management-			
New management strategies using less water ³			
Water conservation during summer			
More effective uses of irrigation			
Change of irrigation systems/new technology			
C. Soil management			
Soil micronutrient management			
Soil erosion prevention methods			
Methods to conserve soil			
D. Livestock			
Shift to indigenous breeds of cattle			
Invest in multiple livestock species			
Shift to drought tolerant species			
Better feed practices (Specify _____)			
Immunization ☐ and/or insemination ☐			
Others (Specify: _____)			

3.2 Why have you not adopted any of the previously mentioned adaptations in your agricultural practice?

Cost ☐, Lack of financial support (banks loans, government subsidies etc.) ☐, Lack of technical support ☐, Lack of labor ☐, Others ☐ specify _____

3.3 Has your expenditure in agricultural inputs changed over the last five years?

Agricultural input	Increased	Decreased	Stayed the same
A. Chemical fertilizers			

¹ Five years is taken as the reference period for comparison with insured farmers.

² Crop rotation, intercropping, multi-storey cropping, inclusion of perennial water source in dry lands

³ Amount and timing of irrigation

Agricultural input	Increased	Decreased	Stayed the same
B. Pesticides			
C. Hybrid seeds			

3.4 What are the main factors that determine your crop choices?

Input costs ☐ , Availability of water ☐ , Weather conditions (rainfall etc.) ☐ , Others ☐
Specify _____

3.5 Have you changed the number of crops that you usually grow in the last five years.

Yes ☐ No ☐

	Drought Year		Normal Year	
	Increased	Decreased	Increased	Decreased
A. Kharif	☐	☐	☐	☐
B. Rabi	☐	☐	☐	☐

3.6 Have you felt the need to make changes in your traditional practices in order to adjust to climatic changes in the last five years?

Yes ☐ , No ☐

3.7 Are you usually able to pay of debts and mortgages completely?

Yes ☐ , No ☐ , Do not have any debts ☐ , Partially pay the debts ☐

3.8 How have your investments have changed within the last five years ?

Asset	No change	Increased	Decreased
A. Livestock	☐	☐	☐
B. Owned land	☐	☐	☐
C. Leased land	☐	☐	☐
D. Irrigation facilities (☐ ponds, ☐ canals, ☐ drip, ☐ sprinkler etc.)	☐	☐	☐
E. Farm house	☐	☐	☐
F. Others	☐	☐	☐

3.9 Do you have additional income in your household to invest in further income generating activities(During non disaster years) (Value addition for agricultural products, etc.)?

Yes ☐ No ☐

3.10 Do you have additional income in the house for non-essential activities(During non disaster years) (recreational etc.)?

Yes ☐ No ☐ Same ☐

3.11 Do you want to invest to diversify your livelihood strategies?

Want to but no resource's ☐ , Want to but do not have sufficient skills/expertise ☐ ,
Have already invested ☐

3.12 Do you feel that you can provide sufficient fodder and nutrition for livestock during disaster years?

Yes ☐ , No ☐.

3.13 Do you feel that frequent crop losses prevent you from coming out of poverty
Yes ☐, No ☐, Can't say ☐

3.14 Have you observed any changes in the village after introducing insurance in the village? Yes ☐, No ☐, Can't say ☐

3.15 If yes, what are they? Farmers have started taking risky agriculture production decisions ☐, Less and less of farmers are taking loans now ☐, more and more non-farm investments/activities ☐, more knowledge on better agriculture practices ☐, others:

3.16 Why have you not taken up crop insurance?

Lack of knowledge ☐, Non availability ☐, No funds to pay premium ☐, Don't feel the need for it ☐

3.17 What improvements would you like to see in the insurance product to make it more effective? [Tick multiple if needed]

Full loss coverage ☐, more perils covered ☐, only specific peril covered ☐, full subsidization ☐, no-subsidy ☐, more knowledge to farmers on insurance ☐, more knowledge to farmers on risk reduction measures ☐, make insurance compulsory to all farmers ☐, make insurance compulsory only to borrowing farmers ☐, make it compulsory only to certain income level farmers ☐ (specify the income nature i.e. poor, rich etc.); _____

3.18 Would you enroll for the insurance if the above changes were made? Yes ☐, No ☐, Cant say ☐ Specify if any other: _____

-----Thank you! -----

Annexure V: Focal group discussants in Nepal

SITE-1: Devchuli VDC, Kirtipur Village, Nawalparashi

- | | |
|------------------------|-----------------------|
| 1. Ambar Singh Sunari | 7. Meen Bahadur Soti |
| 2. Bom Bahadur Lungeli | 8. Naula Singh Sunar |
| 3. Chhali Maya Fewali | 9. Rim Kumari Sunari |
| 4. Jema Khadka | 10. Rina Kumari Baral |
| 5. Lal Bahadur Baral | |
| 6. Laxmi Thapa | |

SITE-2: Karinjor-8, Sarlahi

- | | |
|------------------------|----------------------|
| 1. Abadh Kishore Raya | 7. Laxmi Lungeli |
| 2. Anita Waiwa | 8. Naradevi Thapa |
| 3. Binda Lungeli Magar | 9. Parwati Adhikari |
| 4. Birendra Khadka | 10. Shanta Khadka |
| 5. Chanchala Karki | 11. Tulasha Adhikari |
| 6. Laxmi Khadka | |

SITE-3: Kabilash VDC -8, Jugedi Khola Watershed, Chitwan

- | | |
|--------------------------|--------------------------|
| 1. Bimala Dahal | 7. Shanta Maya Praja |
| 2. Buddhi Maya Tamang | 8. Sher Bahadur Tamang |
| 3. Chandra Bahadur Praja | 9. Tara Kumari Tamang |
| 4. Chiran Karki | 10. Teel Kumari Bhandari |
| 5. Kiru Maya Gurung | 11. Tek Maya Chepang |
| 6. Meena Gurung | |

SITE-4: Baireni VDC-8, Dhading

- | | |
|--------------------------|-----------------------|
| 1. Bisu Mijar | 6. Mahesh Adhikari |
| 2. Ganga Datta Adhikari | 7. Ram Bahadur Nepali |
| 3. Krishna Bahadur Mijar | 8. Shyam Khatiwada |
| 4. Lekhanath Koirala | 9. Sita Adhikar |
| 5. Madhav Prasad Rimal | 10. Tulasha Nepal |

Annexure VI: Photos from the field



Bird eye view of Kirtipur VDC



FGD in process



Improving water supply and sanitation



Irrigation canal constructed

P-1: A glimpse of FGD and project activities in Kirtipur, Devchuli VDC, Nawalparashi



FGD in progress



River training works and landscape of hills



Improved he-goat for mating

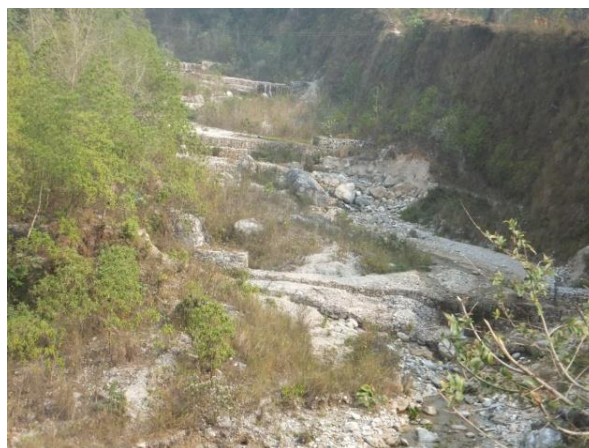


Mushroom farming

P-2: A glimpse of FGD and project activities in Karinjor VDC, Sarlahi



FGD in process



Check dams constructed



River bank erosion and sliding



Irrigation canal rehabilitated

P-3: A glimpse of FGD and project activities in Jugedi Khola Watershed, Chitwan



Bird eye view of the project area



FGD1 in progress

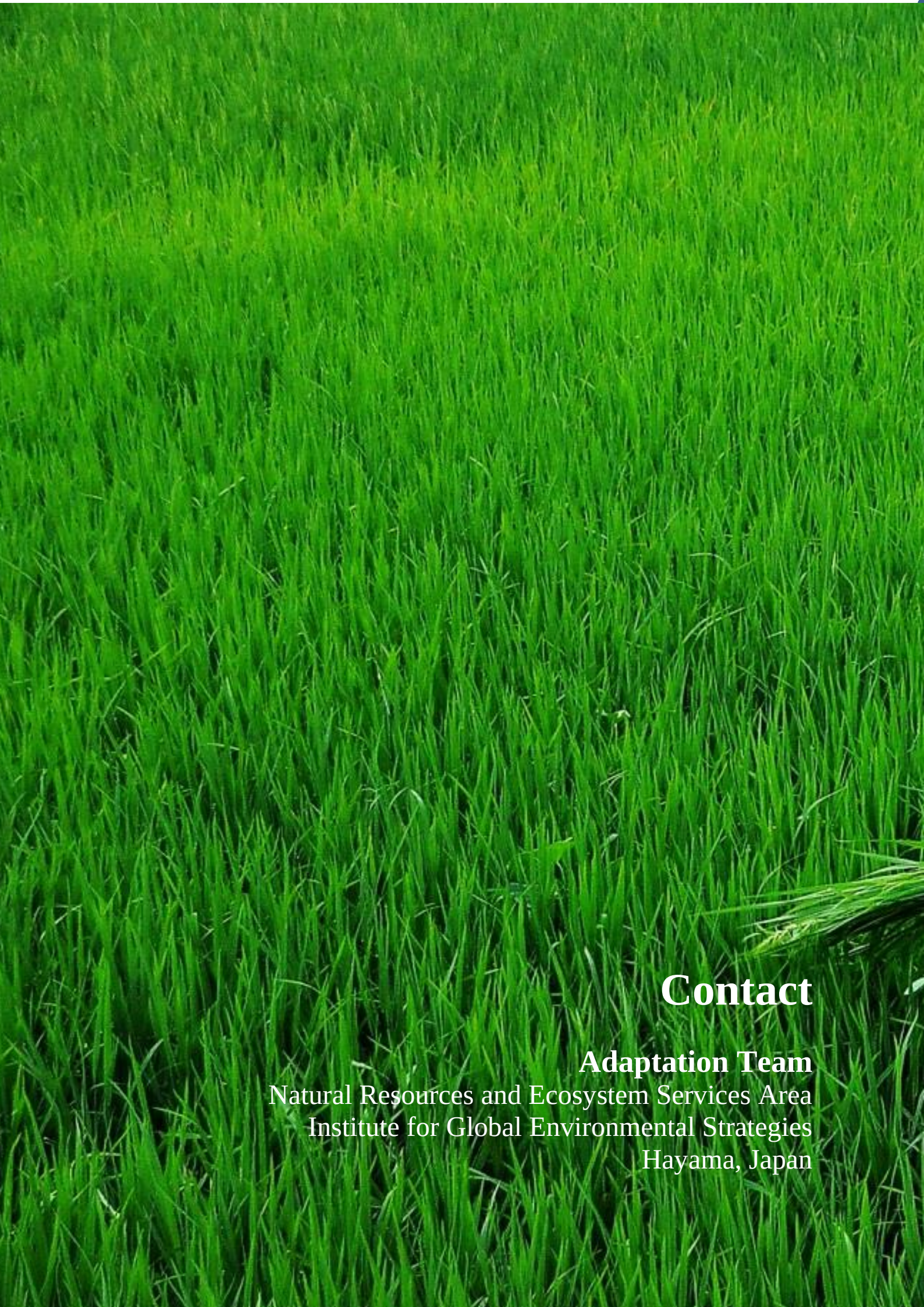


FGD2 in progress



Agriculture production using irrigation facility

P-4: A glimpse of FGD and project activities in Baireni VDC, Dhading



Contact

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