Chapter 3
The Role of Community Social Protection in Natural Disaster Risk Management in Cambodia

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1 Introduction

The pattern of risks faced by poor and vulnerable people in rural areas, particularly those involved in agriculture and other ecosystem-dependent livelihoods, serves as a major cause of chronic poverty. Dependency on subsistence agriculture, in particular for the rural poor in Cambodia, magnifies the impact of stresses and shocks (such as droughts or floods). This has profound implications for livelihood security and for welfare. Such stresses and shocks, on the other hand, will not necessarily always lead to negative impacts, as risks and uncertainties that are often associated with seasonality are embedded in the practice of agriculture. Further, people have considerable experience with coping and risk management strategies in this sector. However, in the face of climate change, the magnitude and frequency of stresses and shocks are changing and approaches such as social protection, disaster risk management and climate change adaptation will be needed to bolster local resilience and supplement people's experience.

The most common nature disaster impacts in Cambodia are relatively moderate flood and drought events combined with a high level of vulnerability. Additionally, rural people face major limitations in their ability to cope with the impact of these events on their livelihoods. Cambodia does not face flood risks of the magnitude and intensity of Bangladesh, nor does it face droughts of the magnitude and intensity of countries in the African Sahel. Yet the more moderate droughts and floods in Cambodia threaten livelihoods and cause widespread suffering among rural people. As natural disasters have a huge impact on social and economic

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welfare, policies to manage them need to be integrated and well-grounded to the specificities of natural hazards as well as local capacities in terms of fiscal, administrative and economic capabilities.

In Cambodia as well as in many other countries, social protection responses to natural disaster have been ad-hoc mechanisms. As discussed elsewhere in this volume (Aldrich Chap. 2), social cohesion and community connections provide informal insurance against hazards for members. However, social protection, including support payments and insurance against risk, does not reduce disaster risk in itself. Nor does social cohesion serve as an alternative to development investments in public infrastructure and services. There are compelling reasons why social protection should be part of strategic disaster risk management. This chapter, therefore, understands shocks as endogenous and seeks to integrate natural hazards into the design and implementation process of social protection as an ex-ante intervention.

This chapter makes the case for social protection being an important tool for managing the risk of natural hazards. Social safety nets and other components of community-level social protection prevent and mitigate the impact of natural disaster ex-ante and allow residents to cope with the impacts of natural shocks ex-post. We present a case study of the impact of the 2011 flood on Cambodia's rural poor, who require this comprehensive linkage between social protection and disaster management. This chapter conducts ex-post and ex-ante analysis of the past and potential socioeconomic impacts of disasters on the livelihoods of the rural poor in Cambodia, assesses risk-coping strategies of households, and highlights disaster management system.

The rest of the chapter is organized as follows. Section 2 briefly presents definitions of disasters and our research methodologies. Sections following deal with climate-related vulnerability in Cambodia, particularly the series of floods and droughts resulting from the unique hydrologic regime and agrarian system, and their impacts on people's livelihoods. Subsequently, the chapter presents the role of social protection for natural disaster management along with mechanisms to address the entitlement failures resulting from the impact of flood and drought, before concluding the chapter.

2 Research Methodologies

2.1 Definition of Disasters and Disaster Risk Management

Following Sawada (2007), we classify disasters into three major groups. The first type is the natural disaster, which includes hydrological disaster (flood), a meteorological disaster (storm or typhoon), a climatologically disaster (drought), a geophysical disaster (earthquake, tsunami and volcanic eruptions), or biological disaster (epidemic and insect infestation). The second type of disaster comprises

technological disasters, i.e., industrial accidents (chemical spills, collapses of industrial infrastructures) and transport accidents (by air, rail, road or water). The final group of disasters is manmade, and includes economic crises (hyperinflation, banking or currency crisis) and violence (terrorism, civil strife, riots, and war).

Disaster risk management (DRM) describes the sets of policies, strategies and practices that reduce vulnerabilities, hazards and unfolding disaster impacts throughout a society. Disasters can have a huge impact on livelihood opportunities and on people's ability to cope with further stresses. Impacts such as loss of assets can lead to increased vulnerability of poor people and a "downward spiral of deepening poverty and increasing risk" (Davies et al. 2008). DRM aims to make livelihoods more resilient to the impacts of disasters, hazards and shocks before the event. Programs include early warning systems, infrastructure investment, social protection measures, risk awareness and assessment, education and training, and environmental management.

In the Cambodian context, disaster risk management should emphasize social protection measures to help people cope with major sources of poverty and vulnerability and promote human development. DRM consists of a broad set of arrangements and instruments designed to protect individuals, households and communities against the financial, economic and social consequences of various risks, shocks and impoverishing situations, and to bring them out of poverty. Social protection interventions include, at a minimum, informal social insurance, labor market policies, social safety nets and social welfare services. Community ties, norms, and trust serve to reduce the vulnerability of members to shocks such as droughts and natural disasters.

2.2 Methodologies and Data Sources

The chapter utilizes existing socioeconomic survey data from 2004 to 2009 and a unique questionnaire survey in 2012 for empirical analyses. The field research, carried out during February to April 2012, took place in 7 provinces (22 communes of 15 districts) which were selected to represent the major and sub-components of Cambodia's agrarian landscape. These 7 provinces were later categorized into 5 clusters of research areas based on an agro-ecological typology.

Cluster 1: Areas with inundated plains, prone to secondary river flooding and prolonged drought (Preah Net Preah and Serei Sophorn District of Banteay Meanchey Province and Banteay Srey District of Siem Reap Province). The majority of crops are large scale cash crops (cassava and maize).

Cluster 2: Areas with undulated plains, prone to flooding from Great Lake during the rainy season (Tonle Sap) but reliant on the delayed recession of floodwater during the dry season (Siem Reap and Chikreng District of Siem Reap Province and Kampong Svay and Baray District of Kampong Thom Province). Receding rice and occasionally floating rice are the major crops.

Cluster 3: Areas of riverbank, prone to Upper Mekong flooding during the rainy season but reliant on the fast recession of floodwater during the dry season (Cheung Prey and Batheay District of Kampong Cham Province). Diversified vegetables and cash crops can be found.

Cluster 4: Areas with extreme undulated plains, prone to Lower Mekong flooding and vulnerable to the speed of flooding and prolonged drought (Prey Veng and Svay Antor District of Prey Veng Province). The area is used mainly for rain-fed rice production.

Cluster 5: Areas of riverbank with secondary swamp lakes, prone to Lower Mekong flooding during the rainy season but reliant on the fast recession of floodwater during the dry season (Muk Kampoul and Khsach Kandal District of Kandal Province and Russey Keo District of Phnom Penh). The area is used mainly for vegetable production.

In total, we interviewed 239 households randomly selected with the help of Village Chiefs. Based on the proxy mean test procedure of the ID-Poor Database[1] (MoP (Ministry of Planning) 2011) including characteristics of housing, household properties, land sizes etc. interviewed households were divided into three categories, namely the poor, near-poor, and non-poor. We use these five clusters to identify areas and locations of household in the sample of the Cambodian Socio-Economic Survey in 2004 and 2009[2] to analyze the impact of droughts and floods on household welfare. Households were also categorized based the size of land ownership into small (0–0.5 ha), medium (0.5–3 ha), and large (more than 3 ha).

3 Vulnerability to Climate in Cambodia

Cambodia's unique hydrological regime and low coverage of water control infrastructure makes it vulnerable to climatic and natural disasters (Fig. 3.1). Most rural households rely heavily on subsistence agriculture for their livelihoods, especially rice cultivation, which accounts for 90 % of the country's total cultivated area and 80 % of agricultural labor input (World Bank 2006a). Agricultural production (and thus households' food security) is heavily dependent on weather conditions and can fluctuate significantly from year to year.

Accordingly, the growth rate of the crop sub-sector varies widely, reflecting high reliance on adequate rainfall and susceptibility to the weather (CDRI (Cambodia Development Resource Institute) 2008). Livelihoods and sources of income for the

[1] ID-Poor Database, an almost nationwide database of the "Identification of Poor Household Program" which divided the livelihood of people into three categories (very poor or ID-Poor I, poor or ID-Poor II, and non-poor) based on a set of proxy mean tests of household properties.

[2] CSES (Cambodian Socio-Economic Survey), last conducted in 2009, is a nationwide representative sample of 12,000 households focusing on livelihood and socio-economic characteristic at household level.

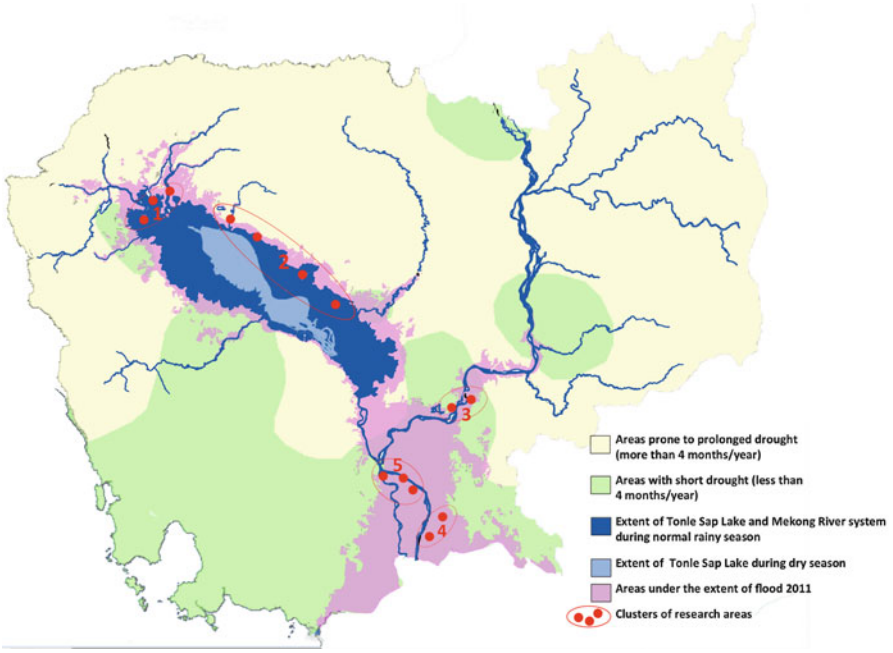

Fig. 3.1 Detailed extension of actual size of great lake (during dry season), expanded size (during rainy season), and the areas flooded in 2011

rural population may therefore be compromised, leaving them reliant on social protection from the state and development partners—in particular in the case of natural disasters.

Poor households also rely on natural resources such as water and forests to generate income. Access to common property provides an important safety net for the rural poor in bad harvest years. The 2006 Poverty Assessment found that one-quarter of the poor depended only on fishery and forest products for over half their income in 2004 and, on average, fishery and forest products accounted for 25 % of household income among the poor (World Bank 2006b). However, access to this common property is becoming increasingly limited. As captured in the qualitative Participatory Poverty Assessment (Ballard et al. 2007), many of the extractive activities in the forest do not comply with rules and regulations. Rising population numbers have also contributed to overexploitation and a decline in resource availability. In addition, leasing of water bodies to business interests and increasing restrictions on free access to fisheries are already evident in places where the poorest depend on hunting and gathering for their livelihoods.

Rural households' vulnerability to climate and economic shocks is exacerbated by the low productivity and low diversification of their income-generating activities. Most rural households rely heavily on subsistence agriculture for their livelihoods: an estimated 72 % of Cambodians are dependent on fishing and agriculture (CNCDM (Cambodia National Committee for Disaster Management) 2010).

In addition, household-level agricultural productivity remains low: rice yields, for instance, remain among the lowest in the region, owing to limited and poor use of improved seed, fertilizer, tillage and water management (CARD (Council for Agricultural and Rural Development) et al. 2009).

Interviewees were asked to range the severity of flood and drought from "no-impact at all =0" to "significant damage to harvest, livelihood and income = 10" in 2009, 2010, and 2011. In total, drought periods were more prolonged than floods especially in Area Cluster 1 (lands used for cash crops) and 4 (lands used for rain-fed rice). The total duration of flood and drought accounted for one third of the last 3 years. The damage caused by flood and drought was comparable overall, even though the 2011 flood was the most damaging event.

Households experienced different typologies of severity as a result of drought and flood among households with different poverty levels and land size. Table 3.1 below presents the total number of months in the last 3 years in which flood and drought were experienced, and the degree of severity, by different poverty levels and land sizes. Large-scale farmlands were mostly owned by non-poor in both figures. However, severe impacts from flood and drought were experienced extensively in large, medium and small-scale farmlands.

The severity of drought was quite diverse. Poor and small farm-land holders mostly faced lower levels of severity whereas as near-poor and medium farm-land holders were concentrated in the high severity zone, and the non-poor and large-scale holders experienced medium severity. In contrast to the degree of drought severity, the severity of flooding was more concentrated. Poor and small farmlands and near-poor and medium farmlands were located in the lower zone of severity whereas the non-poor and large farmlands were concentrated in the higher division of severity. The results presented in Table 3.1 indicated the extensive impact of drought on small and medium-scale farmlands and the high level of damage from flood (mostly sudden and prolonged) to the large-scale farmlands.

On the other hand, the non-diversification of household economies exacerbates the vulnerability of rural Cambodians. Most rural households rely heavily on subsistence agriculture for their livelihoods, with rice cultivation accounting for 90 % of total cultivated area and 80 % of agricultural labor input. Rice yields remain among the lowest in the region due to limited and poor use of improved seed, fertilizer, tillage, and water management. Because productive off-farm opportunities are limited, rural households lack alternatives that would allow them to maintain stable incomes or cope in times of poor harvest (CARD (Council for Agricultural and Rural Development) 2010).

Table 3.1 The total number of months in the last 3 years in which flood and drought were experienced, and the degree of severity by different poverty levels and land sizes

Poverty	Land size	Total number of months		Total level of severity		Flood 2011 severity
		Flood	Drought	Flood	Drought	
Poor	Small	5.28	6.6	13.28	8.8	7.44
	Medium	5.55	6.51	13.38	13.02	7.45
	Large	5.33	6.67	14.08	11.67	7.58
	Total	5.44	6.56	13.45	11.57	7.46
Near-poor	Small	5.93	6.62	14.89	12.82	7.71
	Medium	5.79	5.84	13.72	11.36	9.09
	Large	5.72	5.89	13.83	14.83	6.33
	Total	5.83	6.14	14.17	12.42	8.17
Non-poor	Small	5.5	7.75	18	12.75	8
	Medium	4.79	7.21	15.71	11.14	8.43
	Large	4.63	8	13.63	11.63	8.25
	Total	5	7.59	16.03	11.82	8.24
Total	Small	5.67	6.78	14.85	11.59	7.67
	Medium	5.58	6.27	13.82	11.99	8.36
	Large	5.37	6.58	13.87	13.16	7.13
	Total	5.58	6.49	14.18	12.04	7.93

Source: Authors' calculation from the surveyed data

4 The Impacts of Natural Disasters

4.1 The Socio-economic Impacts of Natural Disasters

In Cambodia, extreme floods and droughts are among the most damaging shocks afflicting rural households, and climate change will heighten their severity. In the past decade, unusual floods and droughts have severely affected large parts of the countryside, resulting in 3 years of negative agricultural growth. In 2009, for example, Typhoon Ketsana left 43 people dead and 67 severely injured and destroyed the homes and livelihoods of some 49,000 families or 180,000 people directly or indirectly (equivalent to 1.4 % of the population). Most of the affected districts were among the poorest in the country. The widespread damage to property and public infrastructure will have a long-term impact on these communities' livelihoods (CNCDM (Cambodia National Committee for Disaster Management) 2010). Looking ahead, although many regions in Cambodia are shielded geographically from climate hazards, almost all provinces are considered vulnerable to the impact of climate change, owing to their low adaptive capacity resulting from financial, technological, infrastructural and institutional constraints (UNDP (United Nations Development Program) 2009).

Poor households are less able to cope than the non-poor, even though empirical studies showed that households are partially able to smooth consumption after a

natural disaster (Vakis et al. 2004). The poor are more vulnerable as they are typically more exposed to risks and have access to fewer coping mechanisms that can permit them to deal with the natural disasters. Many households use sub-optimal or even harmful coping options such as reducing consumption expenditures on food, health and education services, and trying to increase incomes by sending children to work. In addition, as the poor are more likely to reside in hazardous locations and in substandard housing, they are more susceptible to natural disasters. Finally, exposure to natural hazards (and to that extent to natural disasters) affects income-generating decisions, which can have long-term implications in the form of lower future income streams, longer recovery periods and poverty traps.

We looked at the impact of the 2011 flood at the macro level on livelihoods, rice production, and physical infrastructure in several provinces including Kampong Thom and Siem Reap (Area Cluster 2), Kampong Cham (Area Cluster 3), and Prey Veng (Area Cluster 4). While the impact of the flooding in 2011 was extremely high at the household level (affected households and resettlement), the damage to rice and agricultural activities, together with the effect on physical infrastructure (roads and schools) will have a long-term impact.

4.2 Impact of Natural Disasters on Household Welfare

In assessing the impact of natural disasters on household welfare in Cambodia, we follow the framework of "entitlement failures" proposed by Sen (1981) and elaborated by Devereux (2007). In rain-fed agricultural systems as Cambodia, erratic rainfall can have comprehensive and devastating impact on affected livelihoods and local economies. Addressing the sequence of entitlement failures caused by droughts or floods can prevent them from evolving into a food crisis, and can keep people out of poverty.

According to Devereux (2007), entitlement failures can occur sequentially. Production failure first leads to labor market failure, then commodity market (trade-based entitlements), and finally transfer failures. Table 3.2 illustrates that droughts and floods cause not only crop failures but a sequence of knock-on shocks to local economies and societies, where effective intervention, or lack of it, could mitigate or exacerbate the shock. Some of these policy responses will be discussed later in the context of the risk management system.

Using our household data from socioeconomic survey data collected in 2004 and 2009, the chapter tests whether droughts or floods can lead to one of the entitlement failures: production, labor markets, commodity markets (trade-based entitlements), or transfer failures. However, due to the limitation of the data, the specific failure cannot be identified. Only the consequence of these failures, i.e. low income or consumption is available in the data set. We use statistical regression to investigate how our dependent variables of income or consumption) at the household level are

Table 3.2 Entitlement failure as the result of natural disasters

Entitlement category	Impacts of drought and flood	Policy response
Production based	– Harvest failure	– Productivity-enhancing safety nets' (Starter Packs)
Labor based	– Employment opportunities decline	– Public work program
	– Real wage rates fall	
Trade based	– Market failure	– Open market operations
	– 'Failure of exchange entitlements' (terms of trade decline)	– Food price subsidies
		– Pricing policies
Transfer based	– Failure of informal safety nets	– Food aid
	– Food aid failure	– Cash transfers
	– "Priority regimes"	– Weather insurance

Source: Adapted from Devereux (2007)

a function of a set of explanatory variables that captures household characteristics and concerned variables (drought or flood-prone areas). Controlling for other household characteristics, we expect that households in the drought or flood-prone areas will have lower consumption than otherwise. Our study uses socioeconomic survey data collected in 2004 and 2009 corresponding to some sites in the 7 provinces and 5 clusters of the surveyed areas in April 2012. A total of 160 households were identified living in the same commune out of which 120 households resided in the affected villages. Age, gender, marital status, literacy of household head, household size, and irrigated land area are used as control variables.

We conduct a simple regression and check the impacts of the drought or floods on households' welfare, measured by their consumption. Results from the regression show that household consumption is dependent on literacy, size, and irrigated land area at the 1 % level of statistical significance. More importantly, the consumption level of households in drought or flood-prone areas is significantly lower than otherwise, confirming the negative impact of natural disasters on their livelihood. The negative sign of the coefficient of irrigated land area suggest that drought or flood compounds the impact on those households with larger holdings of cultivated land dependent on irrigation.

Using our unique survey data from 2012, we compiled information on the impacts of the aftermath of the flood in 2011 on households' consumption, crops, livestock, houses, and health. Table 3.3 summarizes the data on households who reported severe impacts from the flood in terms of damage to crops, livestock and houses, and health problems, differentiated by whether or not they reported a reduction in their consumption. The empirical results of our regression analyses suggest that the larger the size of household reporting severe flooding, resulting in house damage, the greater the likelihood of a reduction in their consumption in the aftermath of the flood in 2011, at the 1–5 % level of statistical significance.

Table 3.3 Summary of household characteristics

Variables	Reported reduction in consumption			Reported no change in consumption		
	N	Mean	S.D.	N	Mean	S.D.
Dummy of household status (poor)	48	0.583	0.498	191	0.524	0.501
Logarithm size of household	48	1.704	0.314	190	1.556	0.428
Severity of flood	48	2.091	0.291	190	1.926	0.509
Dummy for crop damage	48	0.688	0.468	191	0.565	0.497
Dummy for livestock damage	48	0.667	0.476	191	0.482	0.501
Dummy for house damage	48	0.500	0.505	191	0.319	0.467
Dummy for sickness	48	0.646	0.483	191	0.508	0.501

Source: Authors' computed from survey data 2012

5 Household Risk-Coping Strategies and Role of Social Protection in Natural Disaster Risk Management

5.1 Household Risk-Coping Strategies

Natural disasters can fit within the Social Risk Management (SRM) framework. The SRM provides instruments that allow the poor (but also the non-poor) to minimize the impact of exposure to risk and to change their behavior in a way that helps them exit poverty and reduce vulnerability (Vakis 2006; Holzmann and Jorgensen 2000; Holzmann 2001).

SRM instruments can be used at different moments in the risk cycle: there are ex-ante and ex-post coping strategies. Ex-ante measures aim to prevent the risk from occurring (risk prevention), or to reduce its impact (risk mitigation). Prevention strategies include measures designed to reduce risks in the labor market (the risk of unemployment), health care (the risk of preventable diseases) and standards (the risk of building collapse in areas prone to earthquakes). Mitigation strategies help individuals reduce the impact of a future risky event. For example, households may pool uncorrelated risks through informal or formal insurance mechanisms. Rotating credit associations, information exchange, and other approaches can assist disaster-affected communities during crises. Ex-post coping strategies are designed to relieve the impact of the risk once it has occurred. Some examples of coping are drawing from individual savings or borrowing. Similarly, the government may also provide ex-post support in cases of catastrophic events or in the aftermath of an economic shock. In general, household risk-coping mechanisms include: reduction in consumption expenditure while maintaining total caloric intakes, borrowing (credit), accumulation of financial and physical assets, and receiving assistance or remittances (Sawada 2007).

We conducted simple regressions to see how the affected households utilize each of these risk-coping mechanisms. The results suggest that poor households suffering from crop damage would heavily rely on changing crops, using (dis)saving, and

tend not to receive support from the government or NGOs. Those who suffer damage affecting livestock, houses, and health would borrow more money from either relatives or micro-financing institutions. Moreover, poor sick households seem not to be able to change crops but do receive some assistance from the government or NGOs.

5.2 Household Risk-Taking Behavior and Subjective Probability of Loss from Disasters

In this current study, to assess the attitude toward risks, interviewees were asked to bet in three coin-flipping games ranging from the very secure behavior to riskier betting options. In our experiments, refraining from betting brings USD60. If the participant chose to bet, he/she would lose 60 for an unlucky toss with 120 for option 1 and 240 for option 2. In the lhe last game, the riskiest, if they chose not to bet they lose USD60, and when betting, the interviewee would either keep their money if lucky or lose USD120 otherwise.

As shown in Fig. 3.2, most households in all three groups were willing to bet in the second game where they might lose USD 60 or gain USD 240. This game sought to show the willingness of households to invest in measures designed to reduce risks (for example, innovative technology). To assess the relationship between risk-taking behavior and the subjective probability of loss, we conduct a simple ordered logit regression to capture the willingness of household taking riskier bets against their subjective probability of loss from natural disasters.

The empirical results from confirm the risk-averse behavior of the poor households, and also that households will only be take higher risks when they believe that the likelihood of disaster occurrence is higher. Subjective probability beliefs and a high degree of risk-averse behavior among the poor would make the demand for catastrophe insurance a potential option.

5.3 Role of Social Protection in Disaster Risk Management

In the absence of an integrated risk management system, it is important to incorporate community-level social protection into the "natural" disaster management system to address the entitlement failures discussed above. Understandably, social protection, including support payments and insurance against risk, does not reduce disaster risk in itself. Nor is it an alternative to development investments in public infrastructure and services, but there are three compelling reasons why social protection can be part of strategic DRM (Vakis 2006).

First, social protection instruments should be considered as part of a larger set of risk management arrangements, to complement and strengthen existing

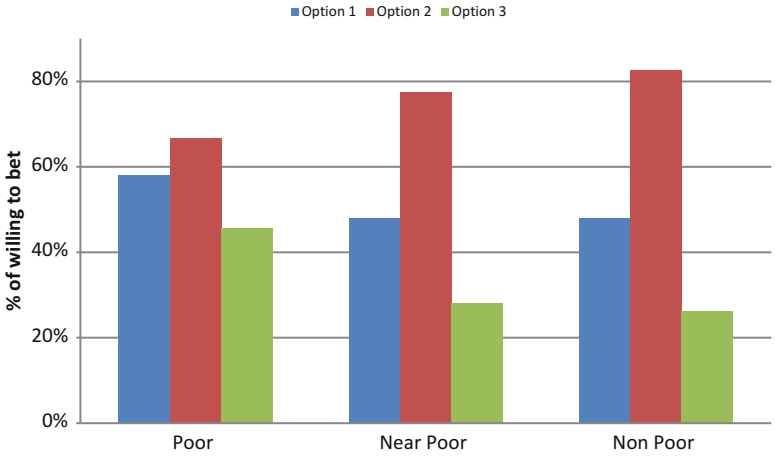

Fig. 3.2 Attitude toward risk as indicated by willingness to bet for different options. *Source*: Authors' calculation from the surveyed data

mechanisms and systems (cf. Aldrich 2012). They should not crowd out other risk management arrangements (informal, market-based or public) but instead be evaluated with other options, based on existing capacities, resources and the potential benefits of each arrangement.

Second, an emphasis on ex-ante instruments (risk mitigation or risk prevention aspects) is more crucial than ex-post, focusing on emergency aid and relief. Taking into consideration a country's limited resources, capacities and other short-term development priorities, the long term costs (and forgone benefits) from an emphasis on ex-ante instruments are large. Finally, an effective natural disaster system requires certain pre-requisites, such as flexibility to adjust and scale up easily, appropriate capacity and effective coordination efforts among government, non-government, private sector and other actors.

Existing schemes draw from informal arrangements, public support from the government and development partners, and civil society and non-governmental organizations (CSOs and NGOs). All these play an important role by complementing one another. It remains clear, however, that even together they do not manage to adequately protect the most poor and vulnerable. A strong case remains for expanding social protection coverage for the poor. A number of initiatives such as cash and food transfer, public works, service fee waiver programs, and microfinance are discussed below by Vakis (2006).

Cash transfers programs provide direct assistance in the form of cash to the poor with low cost of operating and inherent flexibility to scale up during emergencies. This kind of program seeks to address both short-term structural poverty objectives via the income support and also to break intergenerational transmission of poverty through the long-term accumulation of human capital. In the context of natural disasters, cash transfers can provide households with the highest flexibility in terms of how to deal with their problems. In the case of conditional cash transfers, they

Table 3.4 Primary purposes of using cash transferred at different levels

		Amount of cash transferred ($)		
		10	20	30
Poverty	Purposes	If transferred before the Flood 2011		
Poor	Domestic	57.32	53.66	41.46
	Business	36.59	42.68	51.22
	Health	2.44	1.22	2.44
	Other	3.66	2.44	4.88
Near-poor	Domestic	71.43	52.1	34.45
	Business	20.17	38.66	52.94
	Health	5.04	3.36	5.04
	Other	3.36	5.88	7.56
Non-poor	Domestic	50	47.37	44.74
	Business	28.95	36.84	39.47
	Health	10.53	10.53	10.53
	Other	10.53	5.26	5.26
Poor	Domestic	58.54	57.32	47.56
	Business	23.17	39.02	46.34
	Health	14.63	3.66	3.66
	Other	3.66	0	2.44
Near-poor	Domestic	68.91	64.71	48.74
	Business	17.65	32.77	41.18
	Health	10.08	1.68	6.72
	Other	3.36	0.84	3.36
Non-poor	Domestic	57.89	55.26	52.63
	Business	26.32	34.21	39.47
	Health	7.89	7.89	5.26
	Other	7.89	2.63	2.63

Source: Authors' calculation from the surveyed data

can deter the use of harmful coping strategies that often occurs after shocks like natural disasters, for example increases in the incidence of child labor, or reductions in food consumption (de Janvry et al. 2006).

Table 3.4 presents the purpose for which cash transfers of USD 10, 20, and 30 would be used by households at different poverty levels. In the cases of transfers both before and after a flood, the poor and near-poor households would allocate the first USD 10 and 20 of any transfer for domestic use. The allocations of USD 10 and 20 for domestic use rather than for business can be observed more clearly after a flood. However, the allocation for business purpose is higher when the transfer is USD 30.

Public works programs are an important counter-cyclical instrument in a country's programmatic portfolio, as they typically provide unskilled manual workers with short-term employment on projects such as road and irrigation infrastructure construction and maintenance, reforestation, and soil conservation.

After natural disasters, public works programs can provide direct income transfers to affected households, which can allow households to meet consumption shortfalls and other immediate needs.

A number of additional social protection instruments can also be used to address natural disasters. For example, service fee waivers, which allow poor households to access a variety of health, sanitation and education services, can be used to reduce the costs of health care and education for affected areas. Food transfer related programs can also address natural disasters. They can take a variety of delivery forms such as direct food relief, food vouchers or food for work (Del Ninno and Dorosh 2003).

Particular attention should be paid to vulnerable groups in the context of natural disasters such as disabled people. Assisting people with disabilities in the aftermath of natural disasters may require additional efforts and complications. Any new construction to replace buildings including a country's health infrastructure needs to take advantage of the opportunity to introduce cost-effective, accessible designs, both for the new contingent of disabled people and for the pre-existing disabled population.

Government should promote and strengthen microfinance schemes to help households diversify their incomes, which can mitigate against widespread natural disasters and can promote participation in civic and political organizations to invest in preventive measures such as drainage, emergency warning systems, and food storage.

6 Conclusion and Recommendation

The patterns of risk and vulnerability faced by poor and vulnerable people in rural areas, particularly those involved in agriculture and other ecosystem-dependent livelihoods, are becoming major causes of chronic poverty. Dependency on subsistence agriculture, in particular for the rural poor in Cambodia, magnifies the impact of stresses and shocks (such as droughts or floods). Cambodia's unique hydrological regime and low coverage of water control infrastructure makes it vulnerable to climatic and natural disasters. Over the past 3 years flooding and prolonged drought have accounted for almost one third of the elapsed time. The levels of flood and drought damage were comparable, even though the severe flood of 2011 was the most extensive disaster.

The above theoretical and field study provides evidence for policy decisions on linking the mechanism of disaster management to social risk management and social protection instruments that best fit the context of the series of flood and drought disasters in Cambodia. Households perceive social risk management instruments differently. Preventive strategies to reduce the probability of the risk occurring are not well understood by poor households.

There is a strong need at the policy level to design social protection interventions to emphasize ex-ante instruments rather than focus the response to natural disasters

as ex-post actions, concentrating on emergency measures and relief. Cash transfer programs provide direct assistance in the form of cash to the poor. Ex-ante cash transfer programs can play a crucial role in encouraging poor households to invest in business rather than spending on food. Microfinance schemes can also help ex-ante income diversification to help households cope with a wide range of natural disasters. Finally, community cohesion, trust, and informal insurance can provide residents with additional mitigation for shocks and crises.

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