A mother and child holding a cassava leaf, an essential part of household food security in Liquicia.

Livelihood security in a changing climate

Insights from a program evaluation in Timor Leste

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The original summary report can be accessed by contacting CARE Australia.

Executive Summary

Climate change is emerging as a serious threat to progress in developing countries. In response, there is increasing focus on the importance of integrating climate change adaptation into development planning and programs to ensure that activities are effective and sustainable. This will reduce the risks posed by climate hazards to the success of programs and will help to ensure that development initiatives contribute to reducing the climate change vulnerability of project stakeholders.

CARE Australia works in many countries that are recognized as being particularly vulnerable to climate change and many of our programs are in some way related to or dependent on the climate and weather patterns. Climate change is already affecting lives and livelihoods in many of the communities where we work, and will increasingly do so in the future. Recognizing the magnitude of this challenge, CARE Australia has committed to working with vulnerable people to respond to climate change and to ensure our development work is appropriate and effective in a changing climate.

This report draws on the findings of a recent evaluation which focused on the effectiveness, impact and sustainability of CARE programming in Timor Leste in relation to climate hazards. The evaluation looked at four projects in Liquicia District, an area of steep, coastal frontal hills with villages located at varying altitudes. It sought to evaluate the effectiveness and sustainability of selected projects in relation to household adaptive capacity and reduced vulnerability to climate hazards. Drawing on the work of the evaluation, this report looks to distil key conclusions and recommendations which will be of particular relevance for livelihoods programming, in Timor Leste and beyond.

Rain-fed maize is the primary staple food crop in Liquica District. Maize is cultivated mostly for household consumption, however some households also sell maize at times when they need cash. Complementing maize, most households cultivate a range of other crops including cassava, beans, sweet potato, and taro. Rice is cultivated in some lowland villages. Items such as rice, oil and beans are often purchased from local markets. As well, wild foods are consumed throughout the year by most households and are considered an important and normal part of household diets. Many households raise livestock that are regularly sold or bartered for cash and food as part of their normal annual activities. Coffee is grown as a cash crop by most households, but it does not represent a significant strategy for poorer households, who lack the necessary land to scale it up. Despite the range of food sources, many households experience food shortages at some point in the year. Poorer household are particularly vulnerable to food insecurity as they are heavily reliant on maize production and have fewer alternatives available in times of significant reductions in yields.

In this context, a range of projects engaged in food security and disaster risk management activities in different parts of Liquica District were evaluated. The goals of these projects included community-based disaster preparedness, drought mitigation, reduced vulnerability, increased resilience and improved food security.

The report presents the key conclusions drawn from the evaluation, as well as a set of recommendations that may be more broadly applicable for integrating climate change adaptation in livelihoods programming, in Timor Leste and beyond. These recommendations are primarily intended to inform CARE's work, but may be of interest for civil society organizations, local government institutions, and other actors engaged in food security and livelihoods programming with climate-vulnerable populations, both in Timor Leste and in other parts of the world.

Key conclusions from the evaluation

The key conclusions from the evaluation included:

Households in Liquica District face a range of hazards with varying frequency and degrees of impact.

The evaluation revealed a great deal of complexity with respect to hazards and their impact. The hazards experienced in Liquica District include a range of different types of rain variability, strong winds, heavy rain leading to flooding (in lowland areas), landslides and pests, such as rats and locusts. Each of these occurs with different frequency and affects people's livelihoods to a different degree.

Climate hazards and their effects are extremely localised.

There is little consistency in the location, frequency, duration, or severity of hazards experienced by the communities participating in the evaluation. This demonstrates the challenges encountered in using climate projections, which are typically available at the national or regional level, at the local level. This is particularly true in a small, mountainous, tropical island such as Timor Leste. Similarly, the effects of hazards vary considerably across and within communities.

Poorer households are more vulnerable to increased food insecurity because their livelihoods are more reliant on a staple food crop that is sensitive to climate hazards.

The evaluation determined that poorer households are more dependent on maize production for food and income than other households. It also found that maize is the crop most sensitive to the hazards experienced in Liquica District, including climate hazards such as rain variability. This clearly demonstrates a linkage between poverty and vulnerability to climate change. Due to poverty, these households also have fewer alternative food and income sources available to them when maize crops fail, resulting in increased food insecurity because of the the lack of stability in availability and access.

Diversified livelihood strategies contribute to increased resilience to climate hazards.

In contrast with the poorest households, who are heavily reliant on maize production and therefore strongly vulnerable to climate hazards, comparatively better-off households in Liquica District are able to employ a greater range of different livelihood strategies. Diversity and expandability of these alternative livelihood options mean that households can adjust relative contributions to meet food and income needs when a particular component of their livelihoods is affected by a stress or shock. Because wealthier household have a wider range of less climate-sensitive alternatives available to them, they are less vulnerable to climate hazards.

The complexities of vulnerability are not well understood, therefore program designs do not respond to differential vulnerability.

The evaluation concluded that program impact to date is limited in part because vulnerability is not well understood. Despite regular reference to "vulnerable households" in project documents, the characteristics and criteria of vulnerability are not described, and differential vulnerability between communities, between groups within communities and within households has not been well analyzed. Overall, the evaluation found that analysis for project planning needed to better explore the relationships between hazards and the particular vulnerabilities of women and poorer households. Without this understanding, project design could not reflect how different shocks and stresses might be affecting particular groups or households differently.

Stronger linkages between programs and climate hazards could have achieved greater impact.

None of the four evaluated projects was designed explicitly to address climate change, but they had goals related to drought mitigation, disaster risk management and/or food security, all of which are connected in varying degrees to climate and weather patterns. However, most project activities did not reflect the linkages between critical hazards and livelihoods. Given the importance of climate hazards in Liquica District and the risks they pose to food and income security, the evaluation concluded that activities could have achieved a stronger impact if they had more specifically designed responses in relation to relevant hazards.

Recommendations for integrating climate change adaptation in livelihoods programming

Building on the above conclusions, and drawing on our experience in other parts of the world, we can make the following recommendations:

Ground livelihoods programming in comprehensive and participatory analysis, including analysis of vulnerability to climate change and disasters.

The necessary starting point for designing livelihoods programming that responds to current and future climate hazards is a rigorous, detailed, and participatory analysis of livelihoods and vulnerability to climate change and disasters. A comprehensive and rigourous analysis should start with identification and some degree of quantification of production data that includes staple, non-staple and non-food production; purchases; wild food collection; and expenditure choices. It should include identification of the current hazards that affect the target population, including their characteristics, seasonality, frequency, severity, and variability. It also involves assessment of the sensitivity and adaptive capacity of the target population to the identified hazards, to gain a better understanding of who is affected, by which hazards, how, to what degree and why they are affected. This analysis must be disaggregated by gender, wealth and/or livelihood group, and any other significant differences that may affect vulnerability within communities or households.

Promote diversification of livelihoods as a risk management strategy.

One way to reduce vulnerability of poor households is to support them in managing risks by assisting them to diversify their livelihood strategies. As well as supporting diversification within agriculture, it may also involve creation of opportunities for diversification to income sources outside agriculture, such as handicraft production and sale or work as tradespeople. Strategies for livelihood diversification must be planned based on the sound analysis recommended above, capturing the full range of hazards people are exposed to, how these hazards interact with each other, and how they affect existing and planned livelihood activities.

Ensure that gender dynamics are captured in analysis and are factored into program planning.

Promoting gender equality and women's empowerment begins with a thorough gender analysis, providing an understanding of gender roles and responsibilities in the household and the community, differences in access to and control over resources and decision-making, and factors that constrain or facilitate equal participation of women and men in community development processes. Gender analysis must also examine the different capacities, needs and priorities of women and men for adapting their livelihoods to climate change. Building on this analysis, program interventions must draw on the existing knowledge and capacities of men, women, boys and girls.

Programming must recognize and respond to differential vulnerability.

For livelihoods programming to benefit those most vulnerable to shocks and stresses, including from climate change, activities must be designed taking into consideration the specific constraints faced by certain communities and by particularly vulnerable groups within communities. In many cases, the factors that make these groups especially vulnerable are deeper structural and systemic issues, related to social and political marginalization, cultural rules and norms and inequitable access to resources and services. This means that livelihoods programs must go deeper in analyzing and responding to differential vulnerability.

Programming should seek to build capacity to analyse risk and plan for risk reduction.

Strategies to promote livelihood security should include capacity building for risk analysis and planning for risk reduction. Participatory analysis of vulnerability provides a first step in empowering communities with knowledge of projected climate trends. In order to facilitate the ongoing analysis and decision-making that will be required to adapt to climate change, capacity building for systematic risk analysis must be integrated into programming, continuing throughout program planning and implementation.

Table of Contents

Introduction

Climate change is emerging as a serious threat to progress in developing countries. In response, there is increasing focus on the importance of integrating climate change adaptation into development planning and programs to ensure that activities are effective and sustainable. This will reduce risks posed by climate hazards to the success of programs and will help to ensure that development initiatives contribute to reducing the climate change vulnerability of project stakeholders.

CARE Australia works in many countries that are recognized as being particularly vulnerable to climate change and many of our programs are in some way related to or dependent on the climate and weather patterns. This includes initiatives in the areas of disaster risk reduction, livelihood and food security, and water and sanitation. Climate change is already affecting lives and livelihoods in many of the communities where we work, and will increasingly do so in the future. Recognizing the magnitude of this challenge, CARE Australia has committed to working with vulnerable people to respond to climate change and to ensure our development work is appropriate and effective in a changing climate.[1]

This report summarizes the findings of a recent evaluation which focused on the effectiveness, impact and sustainability of CARE programming in Timor Leste in relation to climate hazards. The evaluation reviewed projects in disaster risk reduction, water and sanitation and food security in Liquica District. Based on this, and drawing on experience in other areas, a set of recommendations have been developed for future livelihoods and food security programs to maximize their potential to reduce vulnerability to climate change while achieving other development aspirations. These recommendations are primarily intended to inform CARE's work, but may be of interest for civil society organizations, local government institutions, and other actors engaged in food security and livelihoods programming with climate-vulnerable populations, both in Timor Leste and in other parts of the world.

1 CARE Australia (2009). Climate Change Policy.

Background

This section describes the motivation, objectives and process for the program evaluation that forms the basis for this report. It also provides background information on CARE Timor Leste and the specific projects that were evaluated.

Motivation for the evaluation

To reflect on and learn from our programming experience, CARE Australia undertakes at least one major evaluation each year.[2] These evaluations seek to build understanding of how CARE Australia can strengthen the quality, reach and impact of our programs. CARE Australia uses evaluations to promote reflective practice and to provide accountability for effectiveness.

The decision to undertake a climate-focused program evaluation in Timor Leste was motivated by several key developments:

- CARE Australia's commitment to addressing climate change in its programming, articulated in the Climate Change Policy[3]
- A systematic review of the climate sensitivity of the CARE Australia programming portfolio in the Asia-Pacific and Middle East regions.
- Increased momentum on climate change adaptation more broadly in CARE International, including the development of the Climate Vulnerability and Capacity Analysis (CVCA) Handbook[4] and the Toolkit for Integrating Adaptation into Development Projects[5].
- Growing awareness of climate impacts on development progress, generally and in Timor Leste.
- Increased demand for analysis and learning on integrating adaptation into development, in CARE Australia, in CARE International, and in the broader community of development practitioners.

2 CARE Australia (2005). Policy on Evaluation of Projects and Programs.
3 CARE Australia (2009). Climate Change Policy.
4 The CVCA Handbook is available at: www.careclimatechange.org/cvca
5 The Toolkit for Integrating Adaptation into Development Projects is available at: www.careclimatechange.org/tk/integration/en/

Evaluation objectives

The overall objective of the program evaluation was to evaluate the effectiveness and sustainability of selected CARE Timor Leste projects in relation to household adaptive capacity and reduced vulnerability to climate hazards. The specific objectives were:

- To determine the effectiveness and sustainability of CARE's work in water, food security, and disaster risk reduction in the context of a changing climate.
- To document and share important learning from programming.
- To make recommendations to improve future CARE programs in Timor Leste and beyond.
- To provide an opportunity for learning and capacity building of CARE staff.

The evaluation was undertaken by a small team of consultants, supported by CARE staff in Australia and Timor Leste.

Challenges were encountered in accessing historical weather data as well as climate projections for Timor Leste that would be meaningful at the local scale, where the majority of CARE's interventions occur. In addition, the high local variability that was found demonstrated the potential limitations of even provincial weather records as an indicator of local weather conditions. CARE's approach to community based adaptation seeks to combine weather data and climate projections with experiences of community members with respect to impacts of hazards and observed climatic changes. Given the lack of weather and climate information, the evaluation focused on past community experiences of climate hazards using local knowledge as the primary basis for analysis. The learning from this analysis has informed recommendations that aim to address anticipated changes in climate which could be built on as improved projections become available.

Evaluation process

The evaluation began with a review of the secondary literature about climate change in Timor Leste, as well as documentation of the specific projects included in the evaluation. This review informed the planning for the participatory component of the process. The CARE team in Timor Leste was involved in developing criteria for purposeful sampling of sites for participatory analysis. These included the agro-ecological zone, completed and ongoing project activities, comparative success and limitations of farmer groups, and distance from main roads. This resulted in the selection of seventeen villages across three sub-districts in Liquica District.

At each site, data was gathered using a combination of semi-structured interviews with key informants and households and participatory tools, including those recommended in CARE's Climate Vulnerability and Capacity Analysis (CVCA) Handbook. The participatory tools were used with focus groups, including a combination of mixed groups and groups of women only. The tools were employed differently in each location for increased triangulation – a central aspect of the methodology alongside direct observation. The team ultimately sought to investigate hazard

characteristics, comparative wealth of different groups, relative importance of food and income sources at different times of the year and sensitivity to climate hazards, among other issues.

The data was reviewed and consolidated in a workshop with the CARE Timor Leste team. Initial recommendations were presented and discussed with senior management at CARE Timor Leste and CARE Australia. Feedback from these discussions is reflected in the final conclusions and recommendations that are captured in the comprehensive evaluation report. This report summarizes the conclusions from the evaluation report that are most relevant to a broader audience, and puts forward a set of recommendations for livelihoods programming in a changing climate.

CARE Timor Leste

In its first decade as a sovereign nation, Timor Leste has grappled with political and social unrest, limited governance capacity and a series of natural hazard events that have presented serious challenges to development. Now in its second decade of independence, Timor Leste is looking to a peaceful future and a focus on long term development.

In this context, CARE Timor Leste seeks hope, tolerance, and social justice in Timor Leste, to achieve a state where poverty has been overcome and all people live in dignity and security. CARE works with poor, vulnerable, and marginalised individuals and families throughout the country to facilitate positive, lasting change.

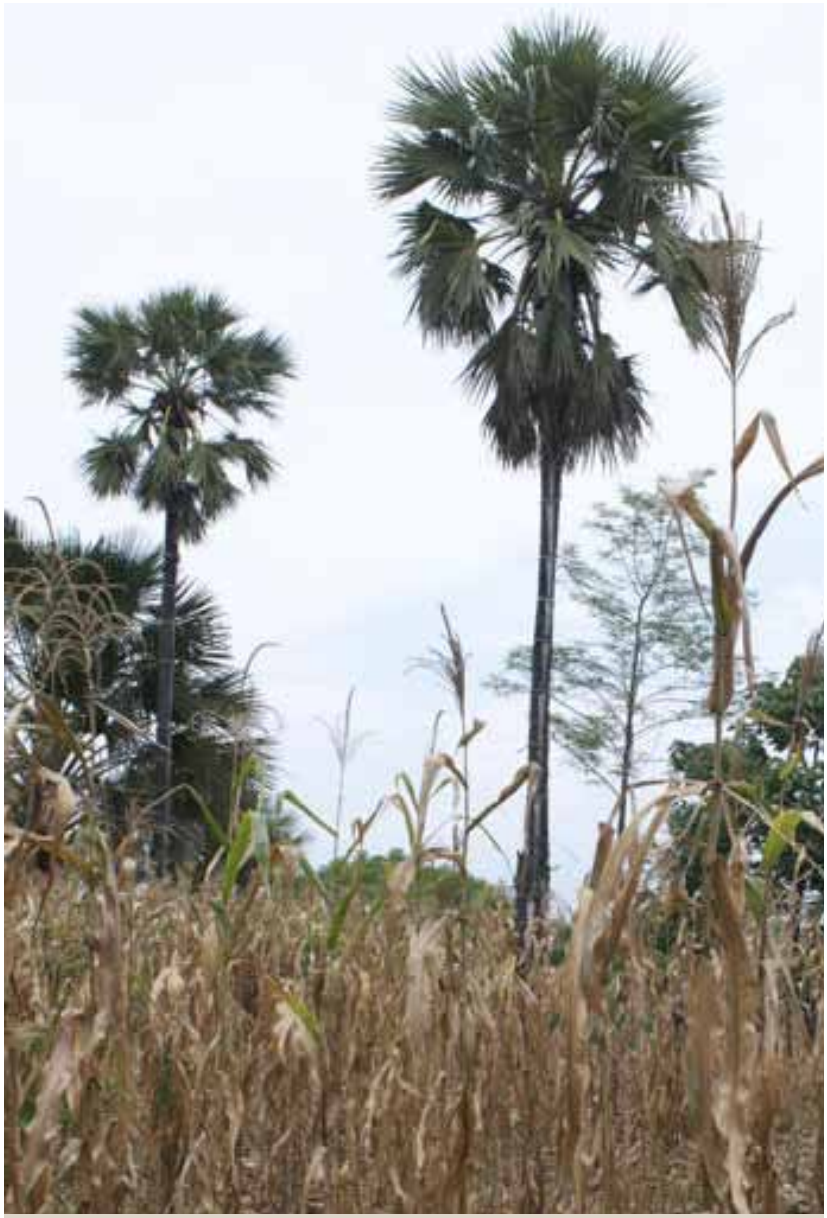
CARE Timor-Leste focuses on long-term sustainable development projects in agriculture and disaster risk reduction, education, community health and nutrition, capacity building, urban community outreach and peace-building, rural infrastructure and employment, and women's participation and gender equality.

CARE's past operations have also included emergency response during the violent events of 1999 and 2006. Currently, CARE works in four districts of the Western Highlands of Timor Leste and is a well respected development partner of the Government of Timor Leste.

The projects

The four projects in Timor Leste that were evaluated were selected based on a broader screening of the CARE Australia project portfolio to assess its sensitivity to climate change. There were four parameters used in this assessment: the climate sensitivity of the area; the level of vulnerability of the target group; the potential of the project to affect adaptive capacity; and the sensitivity of the project interventions to climate change. Based on this assessment, approximately 10% of all CARE Australia projects were ranked as 'extremely' climate sensitive, meaning that they are implemented in areas highly exposed to climate hazards, they work with groups that are particularly vulnerable to climate change, and they have project activities that are strongly influenced by the climate. The projects selected for the evaluation fall within this group of projects. At the time of the evaluation, three of the projects had concluded and one was ongoing.

The projects targeted by the evaluation engage in a range of food security and disaster risk management activities in different parts of Liquica District. The goals included community-based disaster preparedness, drought mitigation, reduced vulnerability, increased resilience and improved food security. The project timelines ranged from a few months to three years. None of the projects were explicitly designed to respond to climate change and they were not designed as an integrated suite of interventions.



Interrupted rain causes a maize crop failure in Maubaralisa, their worst year in the last ten. The palm tree on the right has bands to climb for fermented alcohol collection, a common income source in this village. Alcohol production tends to increase, as maize production decreases.

Context

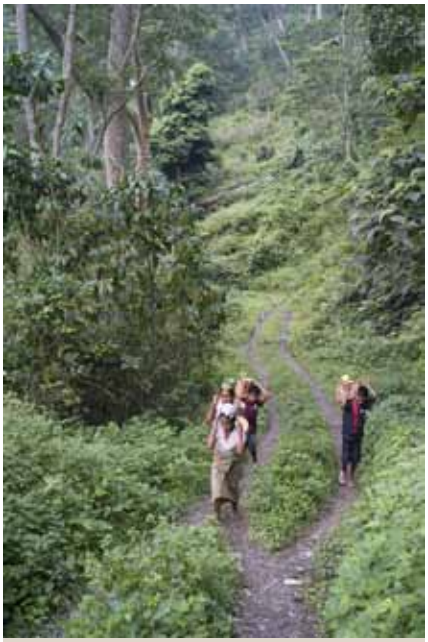
Geography and climate

The small island state of Timor Leste forms part of the Indonesian archipelago. The geography of the country is characterized by mountainous terrain, shallow rocky soils and approximately 700 km of coastline.[6] As a result, arable land is scarce.

Timor Leste's tropical climate is highly variable. It is significantly influenced by the El Niño Southern Oscillation. El Niño years bring delays in rainfall of up to three months, as well as changes in the volume of precipitation, both during the El Nino year and during the following year.[7] The country is already prone to severe and recurrent drought, flooding and landslides. Tropical cyclones, earthquakes and tsunamis also represent risks.[8]

Climate data for Timor Leste is limited. The data available suggests that annual temperatures will rise, droughts and floods will increase in frequency and intensity, and seasonal patterns will be increasingly unpredictable. These effects will exacerbate existing climate variability, and an increase in natural hazard events has potentially devastating consequences.

Liquica District is characterised by steep, coastal frontal hills with villages located at varying altitudes from sea level to approximately 1500 metres above sea level. Lowland communities tend to be drier and flatter and have better infrastructure and access while highland communities are wetter, steeper and more isolated. The unimodal rain season typically begins in November and continues until April/May with an average annual rainfall of 500-1500 millimetres in the lowlands and 1500-3000 millimetres at altitudes above 500 metres.[9]



Forest products are particularly important for highland communities.

6 Central Intelligence Agency (CIA), United States of America. World Factbook: Timor Leste. Accessed June 24, 2011 at: https://www.cia.gov/library/publications/the-world-factbook/geos/tt.html

7 Bureau of Meteorology Research Centre (BMRC) (2003). Effect of El Nino on East Timor Rainfall. BMRC, Dili. Retrieved from http://www.bom.gov.au/bmrc/clfor/cfstaff/jmb/east_timor_5.html

8 Bureau of Meteorology Research Centre (BMRC) (2003). Effect of El Nino on East Timor Rainfall. BMRC, Dili. Retrieved from http://www.bom.gov.au/bmrc/clfor/cfstaff/jmb/east_timor_5.html

9 World Food Programme (WFP) (2005). Food Insecurity and Vulnerability Analysis: Timor Leste.

Livelihoods and poverty

Over 80 percent of the population in Timor Leste rely on subsistence agriculture for their livelihoods. The country is strongly rural, with approximately 85 percent of the population living in rural areas. In rural areas, 46 percent of people live below the poverty line.[10] On average, 64 percent of the population suffers from chronic food insecurity and experiences cyclical food shortages during the lean season.[11] This is due to a combination of shortages in agricultural production and a lack of income alternatives that would facilitate the purchase of food when production runs out.

In Liquica District, rain-fed maize is the primary staple food crop. It is cultivated from approximately November to April, depending on the onset of rain. Several varieties of local maize are cultivated based on their maturation times, with fast maturing varieties planted earlier in the season for immediate consumption. Slower maturing varieties are harvested later in the season and are carefully managed for use through the year. Despite this rationing practice, many households experience shortages at some point in the year. Maize is cultivated mostly for household consumption, however some households also sell maize at times when they need cash. Farmers usually store their own seed for use in the following season. There are limited opportunities to increase the land area under maize cultivation, due to restraints in household land holdings and labour availability.

Complementing maize, most households cultivate a range of other high energy food crops including cassava, sweet potato, and taro. These cultivated tubers, in addition to their wild versions, constitute up to 20-25% of annual household food energy needs for most households. Except in extremely dry conditions of limited rainfall, cassava is not particularly vulnerable to moisture stress. Households often increase the amount of tubers they harvest, dry, and sell when anticipating shortages of food or cash during bad maize production years. They similarly increase cassava weeding to increase tuber growth when poor maize harvests are expected. Rice is cultivated in some lowland villages. Most households also grow beans, peanuts, bananas, and papaya. Extensive wet season vegetable gardens are cultivated individually by most households, in which they produce a range of vegetables including leafy greens, tomatoes, onions, garlic, and chilli. Most households regularly purchase items such as rice, oil and beans from local markets. As well, wild foods are consumed throughout the year by most households and are considered an important and normal part of household diets.

10 Barnett, J., Dessai, S. and Jones, R.N. (2007). Vulnerability to Climate Variability and Change in East Timor. Ambio, 6(5), pp.372-377.

11 Government of Timor-Leste (2005). Millennium Development Goals - where are we now?

Many households raise livestock that are regularly sold or bartered for cash and food as part of their normal annual activities. Chickens and pigs were found to be the most common animals, owned by the majority of households engaged in the evaluation. Goats and cattle are less numerous and tend to be owned by wealthier households. Routine food purchases are the most common reason for animal sales, although expenditure on other household necessities such as education and health are typical. Households typically increase livestock sales to cover food and cash needs, but it is exceptional for them to sell reproductive females. Coffee is grown as a cash crop by most households, but it does not represent a significant strategy for poorer households, who lack the necessary land to scale up production. Some poorer households earn cash by selling betel nut, fermented palm liquor, or firewood. This is done in all years, but can be expanded by households if cash needs increase as a result of less maize production.

Selling labour is an important source of income for many households. Weeding maize fields and coffee plantations, harvesting, land preparation, and working on government projects are the most common opportunities for labour work. It is common for households facing food or livelihood stress to expand paid labour opportunities. This can be within the village but can also include sending a family member, usually male, to a district centre or even to the capital, Dili. Despite the varying livelihood strategies that most households practice, the better off practice a wider range than most other households and in some cases these tend to be more lucrative than for poorer households (eg. coffee production, selling cows rather than chickens, and selling labour in more distant places such as Dili which have higher incomes.

Gender issues

The Constitution of Timor-Leste prohibits discrimination on grounds of gender, and promotes equality between women and men in all areas of life: family, political, economic, social and cultural.[12] Despite this, the culture of Timor Leste remains patriarchal, with women often viewed as second class citizens. This is manifested through different roles, functions and social status for women and men, which determine their access to basic services, such as health, education and justice systems. Cultural rules and norms may limit the scope of women's participation in decision-making processes (including at household level) and leadership, including religious and spiritual leadership. In some parts of the country, customary laws prevent women from inheriting land and property.[13]

The maternal mortality rate in Timor Leste is about 800 per 100,000 live births, representing one of the major health concerns in the country. This is related to insufficient reproductive health services and high fertility rates. [14] Gender-based violence is widespread, especially cases of domestic violence. For example, one study indicated that 51 percent of women had felt unsafe in their relationship with their husband in the previous 12 months.[15] Some of the primary causes contributing to sexual and gender-based violence in Timor Leste include the existence of a dowry system and the practice of polygamy, where older wives are sometimes abandoned or discriminated against.[16]

The obstacles for women to fully participate economically and politically include obligations related to domestic chores, low status of women, lower levels of education or skills, and lack of social mobility. Access to credit has also been identified as a challenge. Despite this, women traditionally play an important economic and social role, taking care of children and the elderly, managing household food production, and bearing the responsibility for the education of children through the transmission of values and behaviours. However, these contributions are unpaid and largely invisible.[17]

In rural areas such as Liquica District, where the predominant occupation and income source for many households is agriculture, there is a marked gender division of labour. Women are most often responsible for managing the household food and water supplies, for specific agricultural tasks and for marketing of vegetables. Men tend to be responsible for raising and selling livestock. Since men do not usually help with household work, women often endure heavy workloads, as chores such as collection of fuel wood and water can be very time consuming.[18]

12 CARE International Timor Leste (undated). Gender Strategy, Hadia Agrikultura no Nutrisaun (HAN) Project.
13 CARE International Timor Leste (2007). Gender and Diversity Strategy (DRAFT).
14 Health Care Sector Investment Program (2006).
15 Asia Pacific Support Collective Timor-Leste (APSCTL) (2009) Baseline Study on Sexual and Gender-Based Violence in Bobonaro and Covalima.
16 Asia Pacific Support Collective Timor-Leste (APSCTL) (2009) Baseline Study on Sexual and Gender-Based Violence in Bobonaro and Covalima.
17 CARE International Timor Leste (2007). Gender and Diversity Strategy (DRAFT).
18 CARE International Timor Leste (undated). Gender Strategy, Hadia Agrikultura no Nutrisaun (HAN) Project.

Key conclusions from the evaluation

The following is a summary of the key conclusions from the program evaluation.[19]

Households in Liquica District face a range of hazards with varying frequency and degree of impact.

Focus group discussions around hazards and their impact on livelihoods in Liquica District revealed a great deal of complexity. As shown in Table 1, participants distinguished four different types of rain variability (collectively referred to as drought in English): rains that arrive late, rains with less volume over the usual period, rains that start on time but have a shorter duration than expected and interrupted, erratic rains. Each of these scenarios occurs with varying frequency and has a different degree of impact on key livelihood resources.

In addition to various drought patterns, participants cited strong winds, heavy rain leading to flooding (in lowland areas), landslides and pests as the primary hazards affecting their lives and livelihoods.

Given the importance of maize as the primary food staple crop, discussions on the impacts of hazards tended to focus on the impacts on maize production. Late rains and less rain were identified as the most frequently occurring hazard, but interrupted rains were described as having a greater impact on maize production. Floods occur infrequently but have a major negative impact, sometimes destroying an entire standing crop. Pests can cause significant damage to both standing crops and stored maize, but they were deemed to be more predictable than the climate-related hazards.

The interaction of hazards also came out strongly in the discussions. For example, in cases where strong winds occur in combination with heavy rains, waterlogged maize plants are blown over by the wind, providing easier access for rats that are able to climb the fallen plants more easily and do damage to the cobs. The combination of these effects can result in significant yield losses.

19 The evaluation gave a rapid glimpse into a complicated but not fully documented project history. Therefore, the conclusions, and the analysis that supported them, were made based on the individuals and groups consulted during evaluation fieldwork, and not meant to represent Liquica District or Timor Leste as a whole.

Table 1: Hazard Profile for Liquica District

Hazard	Tetum Translation	Characteristics
Late rain	Udan tarde	• Rain that should have started in Oct/Nov but did not begin until Nov/Dec
Less rain	Udan menos	• Rains that start on time, end at normal time, but with overall less volume
Short rain	Udan badak	• Rains that start on time but finish early
Interrupted, erratic rain	Udan maran	• Rain that starts on time, then stops (at the time maize should flower), then restarts
Strong wind	Anin bo'ot	• Mostly affecting exposed highland areas
Heavy rain/flood	Udan bo'ot/Mota sa'e	• Distinguished differently in different locations: rain and flood, the latter only affecting lowland areas
Landslide	Rai halai	• Only affecting highland areas
Pests	Pesti	• Primarily rats but also locusts, monkeys, worms, snails, and storage weevils

Climate hazards and their effects are extremely localised.

While participants in focus groups and key informant discussions across the evaluation sites consistently cited variability in rainfall as a key hazard affecting livelihoods, there is little consistency in the location, frequency, duration, or severity of this variability. This demonstrates the challenges encountered in using climate projections, which are typically available at the national or regional level, at the local level. This is particularly true in a small, mountainous, tropical island such as Timor Leste. While these larger-scale projections can provide some insights into broad trends that may be experienced in the future, they do not provide sufficient detail to support decision-making for adaptation at the local level.

The degree of damage to maize production is equally varied, as evidenced by many focus groups and key informants citing a different "worst year in the last ten years". The cause and impact of these bad years also differs geographically. Even villages that are only fifteen minutes apart, at the same altitude, and on the same road often described different "worst years". This highlights the role that sensitivity and adaptive capacity play in determining vulnerability to climate hazards. Even with a similar level of exposure to hazards, different communities within a sub-District area, and different groups within the communities, including women and men, experienced the hazards in differing ways based on both the degree of negative impact and on the ability to respond.

Poorer households are more vulnerable to increased food insecurity because their livelihoods are more reliant on a staple food crop that is sensitive to climate hazards.

The combination and type of livelihood strategies that any particular household pursues is a function of their relative wealth status, defined largely in relation to assets such as cultivable land, livestock and improved shelter. The evaluation determined that poorer households are more dependent on maize production for food and income than other households. It also found that maize is the crop most sensitive to the hazards experienced in Liquica District (see Table 2 below). Maize is particularly vulnerable to rain variability in the early growth stages before the cobs have developed. Once the cobs have matured, the plants are susceptible to water logging, wind, and pest damage. Finally, even once harvested, maize is vulnerable to weevils that are responsible for a reported average loss of 20 to 30 percent.[20] CARE is working with farmers, partners and the government to support multiplication and use of a more drought tolerance maize variety.

This is a clear demonstration of the linkages between poverty and vulnerability to climate change. Poorer households are dependent on the strategy that is most sensitive to climate hazards. Due to poverty, they also have fewer alternative food and income sources available to them when maize crops fail. This results in food insecurity because of the the lack of stability in availability and access: poor households with the greatest maize losses stated that they have sometimes needed to reduce meal frequency from three to two per day. Despite this, participants in focus group discussions were insistent that they do not experience hunger, even during the worst maize production years they could describe. Even if reducing meal frequency, nobody reported sleeping with an empty stomach.

At the same time, the secondary literature describes problems with food insecurity and particularly high levels of both chronic and acute malnutrition in Liquica.[21] The reasons for these problems are complex and likely to be the result of several factors. In addition to climate hazards, agricultural production is limited by steep terrain, limited opportunities for using mechanized tools, and land degradation due to unsustainable land use practices. This may lead to seasonal fluctuations in food access, particularly for poorer households as described above. Poor food utilisation due to hygiene and quality issues may also be a factor. It may also be that individuals have adequate kilocalorie consumption but inadequate micronutrients and proteins, which is possible in a carbohydrate-based diet like that found in the evaluation area.

It was beyond the scope of the evaluation to assess malnutrition and the apparently problematic relationship between food access and utilisation. However, it is clear that the degree to which poorer households can or cannot meet their annual food needs, and the role that the climate plays in determining this, are not particularly well understood. This limits appropriate design and targeting of activities in food security initiatives.

A farmer in Maubaralisa demonstrates how moisture stress impairs cob development.

20 Food and Agriculture Organization of the United Nations (FAO) & World Food Programme (WFP) (2003). Crop and Food Supply Assessment Mission to Timor Leste.

21 See Timor Leste (2007). Survey of Living Standards and Dubray, C. and Rose, A. (2004). Assessment of Nutritional Status and Vaccine Coverage in Timor Leste (Liquica, Covalima, and Bobonaro Districts).

Table 2: Vulnerability of food sources to hazards

Food Source	Hazard			
	Late/Short/Less Rain	Heavy Rain	Wind	Pest
Maize	1	1	1	1
Rice	2	4	2	2
Cassava and Sweet Potato	3	3	7	3
All Gardens	4	2	3	4
Wild Foods	6	5	5	5
Own Livestock	5	6	4	6
Market Purchase	7	7	6	7

In this ranking exercise conducted in Lisadila village, food sources were ranked based on their vulnerability to the shock, with 1 representing the most vulnerable food source and 7 the least vulnerable.

Diversified livelihood strategies contribute to increased resilience to climate hazards.

In contrast with the poorest households, who are heavily reliant on maize production and therefore strongly vulnerable to climate hazards, comparatively better-off households in Liquica District are able to employ a range of different livelihood strategies. Complementary strategies to maize production include cultivation of cassava, coffee production, livestock rearing, collecting wild foods, purchasing at market and selling labour. These are comparatively resilient to climate hazards and therefore provide other sources of food and income when maize crops fail due to erratic rainfall, flooding or pests.

Although these complementary livelihood strategies were sometimes identified as "coping strategies" in project documentation, it was found that in fact they are employed in good and bad production years alike. However, the relative importance of the different strategies varied from year to year, demonstrating the existing adaptability of households with diversified livelihoods strategies. Flexibility and expandability of these alternative livelihood options mean that households can adjust relative contributions to meet food and income needs when a particular component of their livelihoods is affected by a stress or shock. Because wealthier household have a wider range of less climate-sensitive alternatives available to them, they are less vulnerable to climate hazards. Despite the varying livelihood strategies that most households practice, the better off practice a wider range than most other households and in some cases they tend to be more lucrative than for poorer households (eg. coffee production, selling cows rather than chickens, and selling labour in more distant places such as Dili which have higher incomes. Group garden and pond activities to diversify food sources were supported by CARE.

It is important to note, however, that some of these strategies are subject to other hazards. Vulnerabilities to reductions in global coffee prices, for example, can be an income shock for many households, as can livestock diseases.

The complexities of vulnerability are not well understood, therefore program designs do not respond to differential vulnerability.

The evaluation concluded that program impact to date is limited in part because vulnerability is not well understood. Despite regular reference to "vulnerable households" in project documents, the characteristics and criteria of vulnerability are not described, and differential vulnerability between communities, between groups within communities and within households has not been well analyzed.

For example, differences in vulnerability to hazards (and conversely relative wealth) between highland and lowland communities, which were immediately apparent in the evaluation, seem not to have been taken into consideration in project design. The lowland communities consulted during fieldwork were close to the Dili road, connected to the electricity grid, and included many concrete houses with zinc roofs and metal poles – sometimes with parabolic television dishes mounted outside. Compared with the highland communities visited during the evaluation, where road connections were more problematic and houses were typically constructed of bamboo, it was difficult to understand why these lowland sub-districts were included in the same kind of programming. The only rationale appears to be the well-intended approach of distributing project inputs across an administrative area rather than prioritising particular locations with targeted criteria based on vulnerability.

At the community level, livelihood analysis did not take into account the potentially subtle differences based on gender or wealth groups and hence project design did not respond to these. Similarly, the participatory disaster risk assessments that were conducted at village level describe different production responsibilities of women, men, and children but do not then link these to analysis of hazards and their impacts.

Overall, the evaluation found that analysis for project planning needed to better explore the relationships between hazards and the particular vulnerabilities of women and poorer households. Without this understanding, project design could not reflect how different shocks and stresses might be affecting particular groups or households differently.[22] There is some evidence of efforts to ensure participation of women in project activities - for example, in one of the evaluated projects, half of the farmer groups are exclusively female. However, more meaningful integration of gender considerations was not found.[23] Consequently, it is unclear whether gender-specific vulnerability or capacity in relation to hazards is addressed.

22 There are resources available to support a better analysis such as CARE's Household Livelihood. Security Assessments http://pqdl.care.org/Practice/HLS%20Assessment%20-%20A%20Toolkit%20for%20Practitioners.pdf that could be used as part of a wider Climate Vulnerability and Capacity Analysis using CARE's CVCA Handbook

23 There are resources and tools to support this process such as CARE's Gender Toolkit http://pqdl.care.org/gendertoolkit/default.aspx which could be used to supplement a wider analysis of Climate Vulnerability and Capacity Analysis using CARE's CVCA Handbook

Stronger linkages between programs and climate hazards could have achieved greater impact.

As noted, none of the four evaluated projects was designed explicitly to address climate change, but they all had goals related to drought mitigation, disaster risk management and/or food security, all of which are connected in varying degrees to climate and weather patterns. However, most project activities did not reflect the linkages between critical hazards and livelihoods. Project activities such as composting, gardening and marketing were designed to strengthen household livelihood strategies, but did not explicitly respond to disaster risks or the range of shocks and stresses affecting livelihoods.

Some of the specific project activities may contribute to reducing vulnerability to climate change, including the introduction of drought-resistant maize varieties to manage erratic rainfall and agro-forestry activities, which can reduce problems associated with wind damage to crops while protecting soil from erosion. These activities, however, fall within the area of development activities that incidentally contribute to adaptation – their contribution to reducing vulnerability to climate change was not by design.[24]

Given the importance of climate hazards in Liquica District and the risks they pose to food and income security, the evaluation concluded that activities could have achieved a stronger impact if they had more specifically designed responses in relation to relevant hazards.

24 McGray, H., Hammill, A. and Bradley, R. (2007). Weathering the Storm: Options for framing adaptation and development. World Resources Institute (WRI). Retrieved from: http://pdf.wri.org/weathering_the_storm.pdf

Recommendations for integrating climate change adaptation in livelihoods programming

The above conclusions apply to the specific context of Liquica District in Timor Leste. Building on these conclusions and drawing on our programming experience in other parts of the world, we can make several recommendations that may be more broadly applicable for integrating climate change adaptation in livelihoods programming, in Timor Leste and beyond.

Ground livelihoods programming in comprehensive and participatory analysis, including analysis of vulnerability to climate change and disasters.

It emerges from the evaluation results that many of the limitations in the programming in Liquica District resulted from inadequate context analysis and consequent gaps between the complexity of livelihoods and hazard linkages and the design of project activities. CARE's experience in climate change adaptation shows us that the necessary starting point for designing livelihoods programming that responds to current and future climate hazards is a comprehensive, participatory and gendered analysis of livelihoods and vulnerability to climate change and disasters.[25]

Analysis of vulnerability to climate change and disasters must begin with identification of the current hazards that affect the women and men in the target population, including their characteristics, seasonality, frequency, severity, and variability. This information can be gained from community observations and should be corroborated with any available scientific data. Information about past and current hazards must be merged with information on future climate projections, at the smallest scale available, in order to predict the frequency and degree of exposure to climate hazards that the community is likely to experience in future. If this is done in dialogue with communities, it can serve to build their awareness of climate change and projected trends.

The next step is to assess the sensitivity of women and men to the identified hazards, to gain a better understanding of who is affected, by which hazards, how, and to what degree and why they are affected. Capacity to respond to these effects is another critical component of the analysis, bringing to light existing and potential capacity to manage climate risks, as well as capacity gaps that represent constraints to adaptation efforts. This analysis must be disaggregated by gender, wealth and/or livelihood group, and any other significant differences that may affect vulnerability within communities or households, such as disability and health status[26].

25 Dazé, A., Ambrose, K. & Ehrhart, C. (2009). Climate Vulnerability and Capacity Analysis Handbook. CARE International. Retrieved from www.careclimatechange.org/cvca

26 CARE's Climate Vulnerability and Capacity Analysis (CVCA) Handbook provides a framework and tools for undertaking this analysis. It is available at www.careclimatechange.org/cvca

Promote diversification of livelihoods as a risk management strategy.

The participatory analysis in Liquica demonstrates the importance of diversified livelihoods in managing risks, including those associated with climate hazards. Wealthier households are those who practice a range of different livelihood strategies. They are consequently more able to absorb shocks and stresses because they are able to fall back on other strategies when maize crops fail or when coffee prices fall. Poorer households are often heavily dependent on maize production, with few alternatives available, making them particularly vulnerable to climate hazards.

This suggests that one way to reduce vulnerability of poor households is to support them in managing risks by assisting them to diversify their livelihood strategies. This could include diversification within agriculture: to new and more climate-resilient varieties of staple crops; to different crops or livestock species that may be able to withstand variable climate conditions; and to new practices which may manage agricultural resources more sustainably. Improvement of storage, processing and marketing of agricultural products can play an important role in maximizing the value of production in good years. It may also involve creation of opportunities for diversification to income sources outside agriculture, such as handicraft production and sale or work as tradespeople.

Handicrafts are a regular source of additional income for some households

Strategies for livelihood diversification must be planned based on the sound analysis recommended above, capturing the full range of hazards people are exposed to, how these hazards interact with each other, and how they affect existing and planned livelihood activities.

Ensure that gender dynamics are captured in analysis and are factored into program planning.

The gender dimensions of livelihoods and vulnerability in Liquica District were not effectively analyzed, and therefore programming did not respond to the specific needs and priorities of women and men within the targeted communities.

Promoting gender equality and women's empowerment involves much more than ensuring representation of women at meetings and working with female farmer groups. It begins with a thorough gender analysis, providing an understanding of gender roles and responsibilities in the household and the community, differences in access to and control over resources and decision-making, and factors that constrain or facilitate equal participation of women and men in community development processes. Gender analysis must also examine the different capacities, needs and priorities of women and men for adapting their livelihoods to climate change.[27]

27 IFAD (Undated). An IFAD approach to gender mainstreaming. International Fund for Agricultural Development: The experience of the Latin American and Caribbean Division. Retrieved from http://www.ifad.org/gender/approach/gender/g_lac.htm

Building on this analysis, program interventions must build on the existing knowledge and capacities of men, women, boys and girls. To do this requires that both women and men participate in planning as well as implementation. Program activities should support women and men to access the resources, rights and opportunities they need to secure their livelihoods and to adapt to longer-term climate change. ln many contexts, it is appropriate to design strategies that explicitly aim to empower vulnerable women and girls. In all contexts, gender equality should be a long-term goal.[28]

Programming must recognize and respond to differential vulnerability.

For livelihoods programming to benefit those most vulnerable to shocks and stresses, including climate change, activities must be designed taking into consideration the specific constraints faced by certain communities and by particularly vulnerable groups within communities. Gender is one important factor determining vulnerability, but it is not the only consideration. This is evidenced by the different situations of lowland and highland communities in Liquica District, and of poorer and better-off households within the communities engaged in the evaluation.

In many cases, the factors that make these groups especially vulnerable are deeper structural and systemic issues, related to social and political marginalization, cultural rules and norms and inequitable access to resources and services. This means that livelihoods programs must go deeper in analyzing and responding to differential vulnerability. Activities to strengthen agricultural production, for example, will have limited impact for marginalized groups if they lack access to land to try new activities. Strengthening agricultural extension services will only benefit women if they are able to access these services. Without understanding these dynamics, project activities may be blind to them, or at worst, may inadvertently reinforce inequalities.

Therefore, specific strategies may be needed to address the needs and priorities of particular groups, including women, landless people and minority groups. This includes activities to support and strengthen livelihood security and capacity to adapt to climate change for vulnerable groups, recognizing existing roles, responsibilities and capacities. It may also include strategies to tackle the underlying causes of vulnerability, including advocacy for equitable policies, strengthening participation of vulnerable groups in local governance, or facilitating access to services for marginalized people.

Programming should seek to build capacity to analyse risk and plan for risk reduction.

Strategies to promote livelihood security should include capacity building for risk analysis and planning for risk reduction. Participatory analysis of vulnerability provides a first step in empowering communities with knowledge of projected climate trends. In order to facilitate the ongoing analysis and decision-making that will be required to adapt to climate change, capacity building for systematic risk analysis must be integrated into programming, continuing throughout program planning and implementation.

28 CARE (2010). Working Brief: Adaptation, gender and women's empowerment. Retrieved from http://www.careclimatechange.org/files/adaptation/CARE_Gender_Brief_Oct2010.pdf

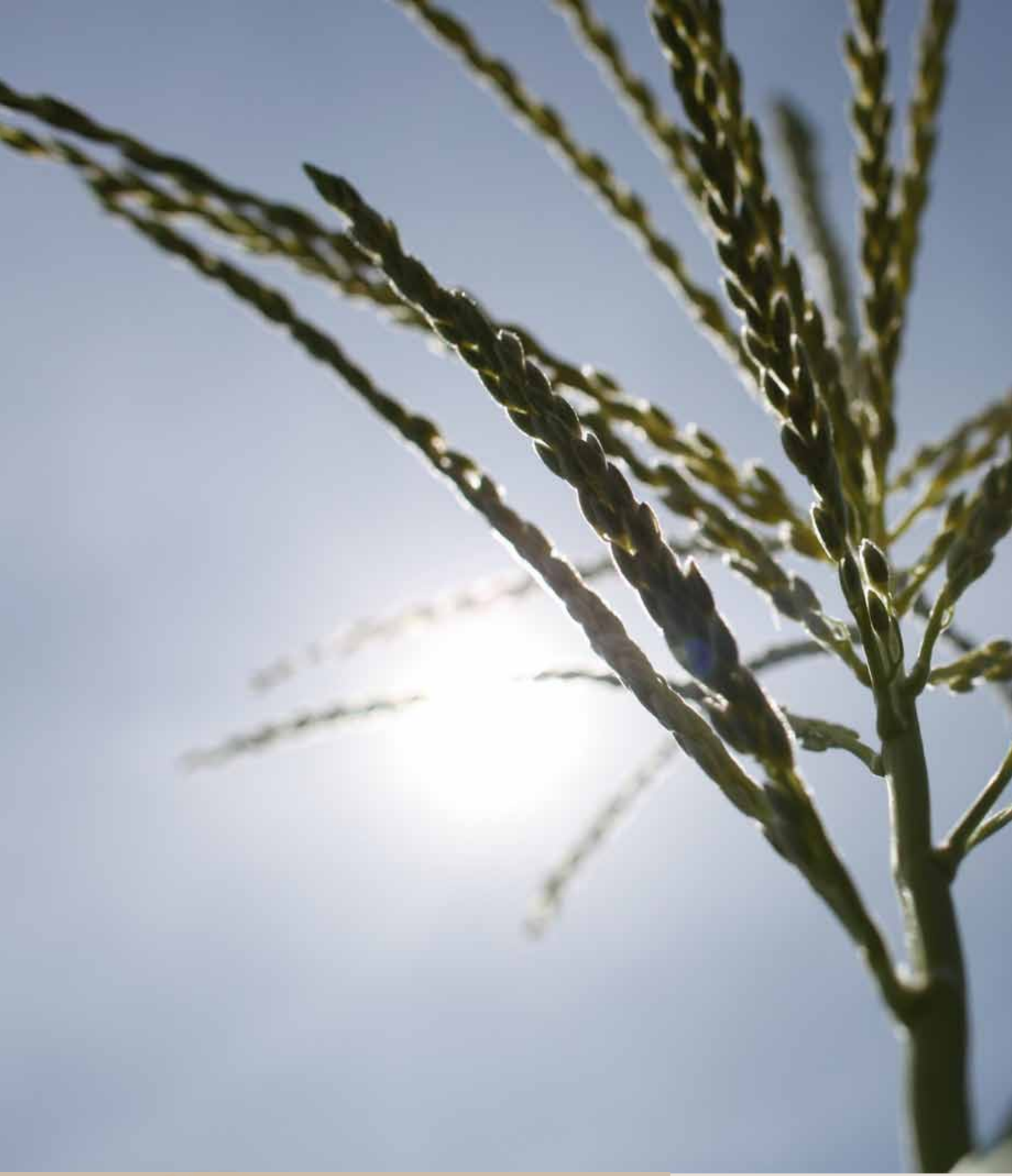
This is important at a number of different levels. At the individual and household level, women and men must have access to the information they need to make decisions to protect their livelihoods. This often requires strengthening of climate information systems, for example using community radio to ensure that farmers are able to access seasonal forecasts, or establishing early warning systems for rapid-onset hazards such as floods. At the community level, it may involve capacity development for disaster risk management, to ensure that community-based organizations and local government authorities are proactively managing risks associated with hazards and preparing to respond when disaster strikes. Engagement of national-level stakeholders may also be useful to ensure that appropriate policies and systems are in place to support local disaster management efforts. Ideally, risk reduction will be integrated within livelihoods programming to maximize the impact of complementary approaches to reduce vulnerability.

The Way Ahead

The experiences from Liquica District demonstrate the critical role that the climate plays in the livelihoods of rural people in Timor Leste. They also highlight the complexity of the relationships between hazards, livelihoods, gender and vulnerability, and the challenges that poor women and men face in managing the evolving risks they face from increasing climate variability. Understanding of this complexity is critical in order to design programming that is targeted, effective and sustainable in the context of climate change and that benefits women and men equally.

The analysis and recommendations presented in this report are designed to stimulate discussion and learning on integrating climate change adaptation in livelihoods programming. While the program evaluation focused on the specific case of Liquica, the findings provide insights that may be applicable in other parts of Timor Leste, and in livelihoods programming in other parts of the world. The findings will inform the implementation of the CARE Australia Climate Change Policy, as well as efforts in CARE International more broadly to integrate adaptation into programming in climate-sensitive sectors.

It is hoped that the learning from this process will support practitioners in facilitating a process that is empowering to local stakeholders - particularly the most vulnerable among them - and that leads to targeted, effective and sustainable interventions for livelihoods security in a changing climate.



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