CDRI – Cambodia's leading independent development policy research institute

Vulnerability and Adaptive Capacity to Climate Change: Gender and Inclusive Growth

Provincial Consultation Workshop

Prepared by Nang Phirun

Facilitated by Dr Chem Phalla

With the support of Sam Sreymom, Lonn Pich Dara and Ouch Chhuong

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07 June 2013
Provincial Department of Water Resources and Meteorology (PDWRAM)
Kampong Thom Province

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Acronyms

CBA	Community-based Adaptation
CBNRM	community-based natural resource management
CCCA	Cambodia climate change alliance
CDRI	Cambodia Development Resource Institute
CF	Community Fisheries
CMDG	Cambodia Millennium Development Goal
CPA	Community Protected Area
CPR	Common Property Resources
Danida	Danish International Development Agency
FWUC	Farmer Water User Community
GEF	Global Environmental Fund
GHG	Green House Gas
MAFF	Ministry of Agriculture, Fisheries and Forestry
MOE	Ministry of Environment
MOWRAM	Ministry of Water Resource and Meteorology
N/PCDM	National and Provincial Committees for Disaster Management
NAPA	National Adaptation Programme of Action to Climate Change
NCDD	National Committee for Sub-national Democratic Development
NSPD	National Strategic Development Plan
NSPSPV	National Social Protection Strategy for the Poor and Vulnerable
NTFPs	Non-timber Forest Products
PBCRC	Provincial Branch of the Cambodia Red Cross
PDA	Provincial Department of Agriculture
PDE	Provincial Department of Environment
PDRD	Provincial Department of Rural Development
PDWA	Provincial Department of Women's Affairs
PDWRAM	Provincial Department of Water Resources and Meteorology
UNDP	United Nations Development Programme

I. Background

The growing number of natural disasters in Cambodia, including floods, storms and droughts, has serious implications for agriculture, natural resources and food security. Rural communities, particularly women and vulnerable groups, are in the frontline of climate-related risks because they generally rely on natural resources and agriculture for their daily subsistence. In addition, population growth exerts ever-greater pressure on natural resources, while livelihood security and poverty reduction require efficient use of environmental resources and sustainable development. Towards achieving these goals and overcoming the associated challenges, the work of CDRI's Natural Resource and Environment (NRE) programme focuses on the key issues of natural resources governance and management, the impact of climate change, and the way human activities affect the natural environment.

The NRE team, through a generous grant from the Swedish International Development Agency (Sida), started work on the project *Climate Change, Adaptation and Livelihoods for Inclusive Growth* in June 2011. This project aims to identify adaptive capacities and options of vulnerable groups facing different conditions in each of the four agro-ecological zones. It looks at community-based natural resource management and gender equality mainstreaming models for climate change adaptation, and indentifies the capacity and technology development needs at local, provincial and national levels to enable all Cambodians – but particularly vulnerable groups – to adapt to climate change.

II. Workshop Objectives

To respond effectively to climate change impacts, it is necessary for all those involved to collaborate. Thus, the workshop aimed to provide a forum for all involved to engage in comprehensive and collective discussion. This included the institutions, local communities and authorities concerned so that appropriate climate change adaptation measures could be identified and developed. To make NRE's research findings even more relevant to those stakeholders from whom preliminary information was collected, this dissemination workshop sought their feedback, comments, concerns and resolutions for integration into CDRI's future research. Specifically, the workshop aimed to:

- Present the status of climate change impacts on agriculture, natural resources and livelihoods, and present the status of the National Adaptation Plan for Action (NAPA);
- Disseminate research findings to stakeholders so that they became fully aware of, and could use, research evidence in their workplaces and communities and in formulating plans and strategies
- Discuss different concerns raised and challenges experienced by stakeholders (especially local communities and authorities), and identify the roles of local communities, relevant institutions and important mechanisms in learning to cope with climate change impacts; and
- Seek suggestions and recommendations to shape the NRE programme's strategies, and expected results, as well as to identify research directions to meet local needs.

The participants, who came from the provinces of Kampong Thom, Preah Vihear, Kampong Chhnang and Pursat, included representatives from Farmer Water User Communities (FWUCs), Community Fisheries (CFis), Community Protected Areas (CPAs) and their respective commune councils, and the provincial departments of the ministries of: water resources and meteorology; agriculture, forestry and fisheries; women's affairs; and the environment. Acknowledging the focus and nature of these different groups, the presentations were organised in the ways that closely matched the actual practices and experiences of the participants so that they could actively contribute their ideas to the workshop, and benefit from it in a practical way.

III. Expected Outputs

Participants

The intention was that, as a result of attending the workshop, participants would be able to:

- Expand their knowledge of community-based natural resource management under the concept of good governance, inclusive growth, livelihood improvement and gender equality mainstreaming for climate change adaptation and food security;
- Benefit from greater cooperation between various government institutions and local communities to strengthen institutional arrangements and performance.

CDRI

It was also expected that CDRI's researchers would be able to:

- Integrate the concerns and issues raised (both progress and constraints at local and sub national levels) into the research strategies and priorities of CDRI in general, and into its NRE programme in particular.

The results of the workshop discussions (i.e. this report) are being published and disseminated to the public through CDRI's web page: www.cdri.org.kh

IV. Participants

There were a total of 48 participants from Farmer Water User Communities (FWUCs), Community Protected Areas (CPAs), Community Fisheries (CFis), relevant communes and from the Provincial Department of Water Resources and Meteorology (PDWRAM), the Provincial Department of Agriculture (PDA), the Provincial Department of Women's Affairs (PDWA), the Provincial Department of Rural Development (PDRD), the Provincial Department of Environment (PDE), and the Provincial Branch of the Cambodia Red Cross (PBCRC) of Kampong Thom, Preah Vihear, Kampong Chhnang and Pursat provinces. Researchers from CDRI and others as described in Annex 2, also attended. The half-day workshop took place on June 07 2013 in the PDWRAM premises in Kampong Thom province.

Mr Hak Puthy, deputy director of PDWRAM, presided at the workshop with Dr Chem Phalla, a representative of CDRI and programme coordinator of CDRI's NRE Programme.

V. Workshop Rationale

After Master of Ceremonies Ms Sam Sreymom told participants about the workshop agenda, Dr Chem Phalla introduced the CDRI researchers working on the climate change project, which is funded by Sida. As well as Ms Sreymom, these included Mr Nang Phirun, Mr Lonn Pich Dara, and Mr Ouch Chhuong.

Starting with a brief speech on the rationale behind the climate change research, Dr Phalla pointed out that disasters such as flood, drought and storm, as well as changes in temperature - that led to changes in crops, nature and wildlife - were taking place more frequently, not just in Cambodia, but around the world. The initial impact was on water because the hydrological cycle started with the process of evaporation which occurs when heat reaches the surface of the water, allowing precipitation. Scientific research has shown that high temperatures cannot now be avoided so we have to adapt to the changes. Given that poor and vulnerable groups will be hit the hardest, and that most of them live in rural communities, it was deemed important for the research to be conducted from the perspective of the local community. This would produce information that would enable them to adapt to the new climate context.

Climate change had also led to variation in rainfall intensity, Dr Phalla continued. For example, PDWRAM had reported that, although the annual rainfall level had not changed very much, the rainfall period had altered. The month when the rain usually fell now had less rain, while, once the rain had arrived, its intensity was often so fierce that flash floods resulted. This abnormal rain pattern, as well as the longer droughts, had affected the people's livelihoods, in particular the rural poor, women, the disabled and marginalised groups, as they depend so heavily on natural resources. Previous studies had shown that almost every province in Cambodia is vulnerable to changes in natural patterns as Cambodians depend on water and paddy fields: changes in the natural water supply had had an impact on the environment, biodiversity, fish and many other elements of everyday life. These are the reasons why, as a country, Cambodia is particularly vulnerable.

These factors had, therefore, influenced the focus NRE's researchers had chosen. Through their studies, they had aimed to provide guidance for those who were charged with preparing policies and plans to enable people in rural communities to adapt to climate change. The NRE researchers had also been keen to discover to what level climate change had affected the river ecosystems, especially river water levels, and the impact this had had on local livelihoods. Given that people could not prevent these catastrophic phenomena, NRE also wished to find out how they cope so that this knowledge could be gathered and disseminated to others.

Dr Chem Phalla continued that CDRI conducted much research related to policy development, engaging with local and regional economic sector representatives, and with people involved in the processes and reforms relating to decentralisation and deconcentration (D&D) who work closely with the Ministry of Interior or the National Committee for Sub-national Democratic Development (NCDD). There was also close collaboration with key people from the natural resource sector who work closely with the Ministry of Environment (MOE), and with the Ministry of Water Resource and Meteorology (MOWRAM), and the Ministry of Agriculture, Fisheries and Forestry (MAFF). In conducting their policy development research, CDRI researchers also engage the social studies sector including education, health and other social development programmes. Research findings disseminated by NRE mainly focused on natural resource governance primarily to enhance sustainability. Thus, for all work related to water, land, fish and forestry, CDRI had consulted directly

with ministries and provincial departments concerned, and in this way, the NRE Programme hoped that its research could contribute knowledge to guide policy decision makers to formulate and implement relevant and effective plans.

This research had been funded by the Sida, he continued, which is part of the Swedish government. SIDA's invaluable support had enabled CDRI to conduct research on the natural resource sector, and particularly to discover what impact climate change was having on people. In particular, the team had focused on gender and vulnerable groups in rural areas of Cambodia, on how these people had been affected by climate change and on what might be done to protect their livelihoods.

The participants at the workshop came from the target provinces selected by the research team, who, in common with their normal practice, were using the opportunity to disseminate the results to the national, provincial and local levels and to invite attendees to formulate solutions to the problems identified.

VI. Opening Speech

In his opening speech, Mr Hak Puthy, Acting Director and Deputy Director of Kampong Thom PDWRM, confirmed that rural livelihoods in Cambodia depend heavily on agriculture and abundant natural resources - water, soil, forest, and fisheries. To ensure that those rural people continued to benefit from these natural resources, the government had been trying to reform public administration as well as promoting D&D processes by focusing on power delegation to local authorities and participation from all stakeholders. These stakeholders include CPAs, CFs, FWUCs, and CFis. These D&D reforms aim to promote good governance, which is at the core of the government's Rectangular Strategies. Mr Puthy confirmed that Cambodia was among the countries that had particularly suffered from disasters such as flood, drought and storm, which had destroyed properties, infrastructure and even people's lives. For instance, in 2011, flood affected 17 cities and provinces, and the Ketsana storm in 2009 caused havoc to 17 provinces. Moreover, these crises posed risks to agriculture, water, forest, and fisheries which were the main resources for local livelihoods, particularly affecting vulnerable groups such as women, children and old people. Climate-related disasters linked to temperature rise, changes in sea level, heat waves, and human and crop diseases were becoming more frequent and rain patterns were changing affecting agricultural productivity and local livelihoods. Poverty, still among Cambodia's biggest issues, increases vulnerability. For this reason, he added, Cambodia has been a signatory of the United Nations Framework Convention on Climate Change (UNFCC) since 1995. The Government, development partners, and civil society had, furthermore, been keen to mainstream gender into policy and workplan implementation with NAPA and other activities, given that climate change is a cross-sector issue and demands integrated involvement from all stakeholders in its solution. Women play a key role in this and there is a clear need to ensure that they play a full role in all associated activity.

In relation to activities, programmes, and the policy of PDWRAM on water resource management in response to climate change, Mr Hak Puthy stated that, in parallel with the government's policy that put the agriculture sector at its core as key to the alleviation of poverty, PDWRAM had endeavoured to promote water resources and irrigation management. These were vital in efforts to boost local agricultural productivity, he said. PDWRAM had always taken the sustainability of natural resources into account in the development of Cambodia's irrigation schemes, he added, and had been conscientious about ensuring that policy took climate change adaptation and water law principles into account to ensure effective water management. PDWRAM had, furthermore, made efforts to enhance the dissemination of information on rainfall, flood and drought, and prepared, and put into action, plans to help farmers during disasters.

This workshop was, he stressed, a great opportunity for all relevant representatives to understand the impacts of climate change on local livelihoods and natural resources, update the NAPA, and to identify the strategies necessary for adaptation. It could also help to define the roles of stakeholders, to identify concerns and challenges at local level, and to provide constructive comments and recommendations to support CDRI's research findings.

Mr Hak Puthy urged participants to contribute to the workshop by taking an active part, and hoped that it would produce fruitful results. He also thanked the development partners -particularly Sida and CDRI - for supporting natural resource management and governance policy and programmes, and for facilitating climate change adaptation through technical and financial support and research, which had contributed to the associated planning and strategising.

VII. Presentation and Results Dissemination

After the opening speech, MoE representatives and CDRI researchers gave presentations under the following headings:

1. National Adaptation Programme of Action to Climate Change (NAPA) to date;
2. Review of Climate Change Impacts and Adaptive Capacity in Cambodia: Inclusive Growth and Community-Based Adaptation; and
3. Gender and Water Governance: Women's Role in Irrigation Management and Development in the Context of Climate Change.

The presentations were conducted in a manner that related closely to the practical experiences of the participants to enable them to understand and discuss the topics in more detail. As all participants were Cambodian, the whole workshop was conducted in Khmer. Although there were some key legal terms, the coordinators simplified meanings and kept explanations simple.

1. Cambodia National Adaptation Plan for Action (NAPA) to date

In a presentation about current national plans to address the challenges of climate change, Dr. Heng Chan Thoeun, deputy director of the climate change department of MOE reported that, based primarily on the NAPA, Cambodia had been implementing climate change adaptation strategies since 2006. NAPA, which is part of an international initiative, was designed to respond to Cambodia's unique needs, and some 17 provinces and provincial towns were surveyed during 2004 in its initial planning stages, along with relevant documents. In 2005, NAPA was submitted to the Cabinet of Ministers to come into effect from 2006. NAPA focuses mainly on agriculture, water resources, forestry, ecology, the coastal zone and human health.

Giving the history leading up to the present, Dr Heng Chan Thoeun reported that Cambodia became a signatory of the UNFCCC in 1995, and has since received funds to study climate change: he particularly mentioned the study conducted from 2008-2009 by the Canadian Economy and Environment Program for Southeast Asia, in which he had taken part, which revealed that the adaptation capacity of Cambodia and Laos were similar but lower than other countries in southeast Asia such as Thailand, Malaysia, Indonesia , Vietnam and Philippines. This made those two countries particularly vulnerable.

In order to survive, humans, animals, plants – indeed, the whole global ecosystem - have to adapt to a changing climate. To reduce the adverse effects, all available opportunities to adapt needed to be taken, Dr Heng Chan Thoeun stressed. And there were two elements to the associated planning: reducing greenhouse gas (GHG) emissions and climate change adaptation. Unlike developed countries, Cambodia is not mandated to reduce GHGs: these gases are primarily generated by developed countries, who are now expected to support least developed countries, including Cambodia, to lessen the problem.

In terms of the second element, Article 4 of the UNFCCC presents the processes for preparing climate change adaptation programmes. Least developing countries can receive money from the global environmental fund (GEF) and, as one of the beneficiaries, Cambodia received this finance in 2003 to prepare its version of the NAPA (there are currently 36 countries with NAPAs) for formal

approval three years later. Also, through support from the climate change programme of the United Nations Development Programme (UNDP), Cambodia has developed a document as a guide for adaptation.

The final version of Cambodia's NAPA has now been published in Khmer and English, and can be downloaded from the MOE's website.

NAPA is still relevant and valued, and represents the government's ongoing programme of action. Its first focus is on current policy so that gaps can be identified and filled. Here, study showed that national policies and programmes such as the Cambodia Millennium Development Goals (CMDGs) and the poverty reduction strategies had not included global policy related to climate change and had mostly focused on disaster risk response and capacity building. Also there was a lack of consideration in terms of local issues, and only a few long-term programmes. These findings were backed by a ground survey, and municipality and provincial town consultation. Plans had been developed to address these gaps.

Now, climate change adaptation programmes are implemented at local level, and local community and provincial departments can participate in, and receive benefits from, the programmes. Since Cambodia lacks a weather station, research has to be based on data gathered in rural communities to understand weather patterns and the associated disaster risks for which response mechanisms at local level need to be prepared. The CDRI research is based on those provinces that are particularly vulnerable to drought and flood, and it has a particular focus on key issues surrounding water.

NAPA covers 39 projects costing more than USD196 million, of which about 20 are high and medium priority. Those, alone, account for a budget of almost USD129 million, and are divided into three groups: 1) capacity building and training; 2) knowledge improvement and education; and 3) infrastructure development. For example, the development and rehabilitation of irrigation systems, mangrove reforestation, community capacity building in response to natural disasters, and so on, are recognised as key in enabling people to cope with the impacts of climate change.

Turning to on-going and future implementation of NAPA, Dr. Chan Thoeun reported that information about it had been disseminated to relevant ministries and institutions so that they could integrate the issues it covers into their own sectoral strategic plans. The plan is that ministries, NGOs and other partners can also use this information in formulating proposals to seek funding from development partners or donors such as the Least Developing Country Fund (LDCF), the Adaptation Fund, and the Japan Green Mekong Initiative. For example, the Cambodia climate change alliance (CCCA) has received about USD12 million from the European Union (EU), UNDP, Sida and the Danish International Development Agency (Danida) for 2010-2014 for projects that aim to strengthen the capacity of the national committee for climate change adaptation and to provide opportunities for relevant ministries and civil societies to implement priority action plans in respect of climate change. Nineteen projects have been funded by this initiative, covering the sectors of agriculture, fisheries, forestry, water resources, health and infrastructure.

The coastal zone climate change adaption and planning project, costing about USD4.4 million, is funded by CCCA, GEF, LDCF and UNDP for the period 2010 to 2013. This project aims to increase the climate resilience of coastal ecosystems through adaptation plans, field demonstrations in target communities and the dissemination of experiences. Another project aims to reduce agricultural vulnerability due to water resource change, and that is funded to the tune of about USD2.2 million by GEF/UNDP for the period of 2010-2013. A further project costing USD86 million for 2013-2017 is designed to implement strategic plans for climate resilience and launch priority projects in institutional building, infrastructure and policy reform. One more project (which has received

USD4.95 million from the Adaptation Fund for 2013-2017) aims to improve food security, and to reduce soil erosion in the community areas in Boeung Per and Phnom Prich wildlife sanctuary and Phnom Kulen National Park.

In conclusion, Dr. Chan Thoeun commented that the implementation of NAPA would contribute tremendously towards achieving Cambodia's Millennium Development Goals, and that all stakeholders concerned, including the most vulnerable groups, commune councils, government ministries, NGOs and donors, were vitally important to its success.

2. A Review of Climate Change Impacts and Adaptive Capacity in Cambodia: Inclusive Growth and Community-based Adaptation

In this presentation, Mr. Nang Phirun, a CDRI researcher, outlined desk study which examined existing knowledge about climate change impacts, vulnerability and adaptation, and explored the impacts of climate change on livelihoods through three dimensions: (1) agricultural practices; (2) community-based natural resource management (CBNRM) and community-based adaptation (CBA) strategies; and (3) gender equality considerations. His study also assessed the limitations of different frameworks and approaches for future research.

Agriculture, particularly rice farming, had often been subjected to the forces of nature in the form of floods, droughts and storms, he said. However, climate change was increasing the frequency and severity of weather-related disasters, and smallholder farm households were especially vulnerable to such extreme events. For instance, the drought in 2002 affected 442,419 households, equivalent to 2,017,340 people, flooding along the Mekong River in 2000 caused 347 deaths, and storms like cyclone Ketsana, which struck in 2009 killing 43 people, are among the catastrophes that have wrought tremendous damage. As another example, in Stung Chinit, farmers are currently combating momeach thnot (an insect) that causes severe damage to their crops in the dry season every year: this pest has also multiplied as a result of changing weather patterns.

The change in precipitation and the rise in temperature, combined with unsustainable land use and land cover change, are causing notably adverse effects to water, forestry and fisheries resources, Mr Phirun added. These have also had a negative impact on the sustainability of the natural resources and local livelihoods that mainly depend on them.

To support his comments, Mr Phirun cited the definition of sustainable development given by the United Nations World Commission on Environment and Development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs"(UNWCED 1987)[1]. Sustainable development is always based on three dimensions: economic, social and environment.

He added that inclusive growth is defined as "growth that not only creates new economic opportunities, but also ensures equal access to the opportunities created for all segments of society, particularly for the poor" (ADB Review, vol. 24, no. 1, pp.16). Inclusive growth is, therefore, about "raising the pace of growth and enlarging the size of the economy, while levelling the playing field for investment and increasing productive employment opportunities" (Saad-Filho 2010: 13)[2]. Inclusive growth policies are thus an important component of various government strategies to ensure

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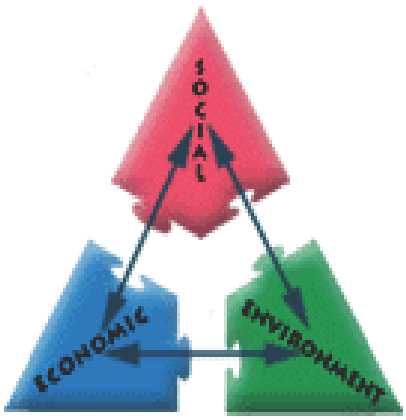
1 UN–United Nations (1987), *Report of the World Commission on Environment and Development: Our Common Future*, http://www.un-documents.net/our-common-future.pdf (accessed 5June 2013)

2 Saad-Filho, Alfredo (2010), *Growth, Poverty and Inequality: From Washington Consensus to Inclusive Growth,* DESA Working Paper No. 100 (London: School of Oriental and African Studies)

sustainable development, poverty reduction, and equal access to opportunities for individuals and firms so they can share the benefits of growth (Ianchonchia and Lundstrom 2009)[3]. As Mr Phirun continued, inclusive growth has been integrated within national policies and strategies such as the National Poverty Reduction Strategy (NPRS) 2003, the National Strategic Development Plan (NSPD) 2009-13, the Cambodia Millennium Development Goals (CMDGs) 2003, and the National Social Protection Strategy for the Poor and Vulnerable (NSPSPV) 2011-15. This is to provide benefits to all sectors of society through productive and decent employment opportunities, health and education services, food security, social protection, community livelihood enhancement, and environmental conservation and protection.

Figure 1: the three dimensions of sustainable development



Services	**Equity**	**Biodiversity**
Household Needs	**Participation**	**Natural Resources**
Industrial Growth	**Empowerment**	**Carrying Capacity**
Agricultural Growth	**Social Mobility**	**Ecosystem Integrity**
Efficient Use of Labour	**Cultural Preservation**	**Clean Air and Water**

Source: WB 2013[4]

Turning to community-based natural resource management (CBNRM) he explained that this is a mechanism for the management of common property and natural resources that people live with and depend on, and which can potentially solve some of the problems within community areas (WWF 2006)[5]. The important reality recognised by CBNRM is that to protect the natural resource base, the people who live with and use natural resources should have authority over their management and benefit from using them because they have a direct interest in the sustainability of the resources upon which they depend. At the core of the CBNRM framework are the principles of participatory democracy and of building networks and links both within and among stakeholder groups, levels of government and economic sectors as well as between different disciplines (Gruber

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3 Ianchonchia, Elena & Susanna Lundstrom (2009), *Inclusive Growth Analytics Framework and Application,* Policy Research Working Paper 4851,http://www-wdsworldbankorg/servlet/WDSContentServer/WDSP/IB/2009/03/03/000158349_20090303083943/Rendered/PDF/WPS4851pdf (accessed 10 June 2012)

4 See also in http://www.worldbank.org/depweb/english/sd.html (accessed: 3 June 2013)

5 WWF (2006), *Community-based Natural Resource Management Manual*, http://assets.wwf.no/downloads/cbnrm_manual.pdf (accessed 4 March 2013)

2013)[6]. At the same time, CBNRM promotes cooperative decision-making on access to, control over, entitlement and ownership of community processes and assets.

As Mr. Phirun continued, various studies had found that there must be bottom-up approaches to building resilience because the local community is the core factor in determining suitable measures to respond to the impacts of climate change (for example Chishakwe *et al.* 2012)[7]. He further explained that community-based adaptation (CBA) is based on the assessment of community vulnerability and adaptive capacity to climate change so that initiatives can be designed that can be integrated into livelihood and natural resource management programmes (CARE 2009)[8]. The essential elements of CBA are capacity building and awareness rising to help build community ownership that underpins adaptation initiatives and community resilience (UNDP 2009)[9]. Furthermore, CBA integrates indigenous and scientific knowledge in the process to potentially strengthen community adaptive capacity and resilience. It also focuses on four essential elements: promoting climate-resilient livelihoods; disaster risk reduction; capacity development for government and civil society; and addressing the underlying causes of vulnerability (CARE 2010: Community-Based Adaptation Toolkit, pp 37)[10]. CBA enables local communities to participate in the management and development of initiatives focusing on common property resources, while ensuring equitable opportunities for all community members, including men, women and marginalised groups who are most vulnerable to the impacts of climate change.

Successful development

Adhering to these frameworks, he continued, government institutions, private sector and civil society organisations had gradually stepped up their climate change adaptation activity in the most climate sensitive areas. In the **agriculture sector**, this had been conducted through on-farm demonstrations of new heat- and drought-resistant crop seed varieties, land and water management, and soil fertility enrichment and restoration. The introduction of climate-smart agricultural practices and technologies had been adopted to help to improve land husbandry and water use efficiency and these had generated multiple benefits: they had, for instance, promoted the resilience and adaptive capacity of farming systems, agricultural production, income generation and environmental protection.

In the **forestry sector**, Cambodia had planned to maintain at least 60 percent forest cover by 2015 as targeted in number seven of the Cambodia Millennium Development Goals (CMDG7), and to improve forestry governance and management. The country had implemented sustainable forest management policies including the National Forest Programme and REDD+ (Reducing Emissions for Deforestation and forest Degradation, plus) initiatives to maintain and increase forest carbon stocks. They had, furthermore, created community-based natural resource-user groups (CFs and CPAs) and natural "green" migration/ biodiversity corridors, and increased reforestation of

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6 Gruber, James S. (2013), "Key Principles of CBNM: A synthesis and Interpretation of Identified Effective Approaches for Managing the Commons", http://iasc2008.glos.ac.uk/conference%20papers/papers/G/Gruber_132301.pdf (accessed 4 March 2013)

7 Chishakwe, Nyasha, Laurel Murray & Muyeye Chambwera (2012), *Building Climate Change Adaptation on Community Experiences*, International Institute for Environment and Development, London, http://pubs.iied.org/pdfs/10030IIED.pdf (accessed 27 March 2013)

8 CARE International (2009), *Climate Vulnerability and Capacity Analysis Handbook*, http://www.careclimatechange.org/cvca/CARE_CVCAHandbook.pdf (accessed 16 February 2012)

9 UNDP–United Nations Development Programme (2009), "Thematic Area: Scaling Up Local and Community-based Actions", http://unfccc.int/files/adaptation/application/pdf/undp_ap_update_sep_09_cba_1_sp.pdf (accessed 4 March 2013)

10 CARE 2010: Community-Based Adaptation Toolkit, http://www.careclimatechange.org/files/toolkit/CARE_CBA_Toolkit.pdf (accessed 3 June 2013)

denuded forest areas.

In the **water resource management sector**, the government had integrated climate change adaptation into coastal zone development and management plans, improved water governance and strengthened water management institutions. They had also developed and rehabilitated irrigation infrastructure and flood protection in lowland areas, established weather/climate variability forecasting information sharing and early warning alarm/alert systems and strengthened community-based water resource management (in the form of FWUCs). At the same time, new water sources had been explored.

In the **fisheries sector**, management and sector reform had been undertaken. More Community Fisheries (CFis) had been created to manage and protect local fishery resources. Livelihood diversification, e.g. into ecotourism, market gardening, and micro-businesses, had been undertaken to reduce pressure on rapidly depleting fish stocks.

But challenges remain

However, he added, due to under-resourcing (specifically funds, equipment, and qualified extension workers) Cambodia faced challenges in implementing the above actions. Particularly affected are agricultural research, training and extension development. There was also a lack of access to weather forecasts, limited irrigation infrastructure and smart agriculture technologies, barriers to financial services (loans and credit) in rural areas, and geographical conditions that made it difficult for local farmers and communities to change their traditional attitudes and practices. In the forestry sector, some barriers that hinder climate change adaptation efforts included illegal land encroachment, and logging and forest clearance. Lack of knowledge and understanding of carbon markets, carbon pricing and budgeting were also hampering progress, as were the complexities of good governance in natural resource management, along with limited resources (human, expertise and finance) for strengthening co-management roles. In the water sector, challenges included inadequate irrigation coverage and capacity, a lack of local ownership and good governance, and limited human and financial resources. There were, furthermore, limited climate-change adaptation/ resilience building processes and mechanisms to increase women's participation. (It is noteworthy that in most existing CBNRM activity, women's participation remains low.) Lastly, in the fishery sector, issues included limited human and financial resources to improve government officials' and local communities' capacity to manage and protect fisheries, as well as low integration of irrigation development, fisheries management and climate change adaptation strategies. Limited enforcement mechanisms to stop fish habitat destruction were a further problem.

In conclusion, Mr Phirun commented that economic growth was necessary for livelihood improvement and poverty reduction, but that the benefits had to be equitably shared. Otherwise, unbalanced development and widening inequality would result. Climate change was complex and could not be addressed in isolation from NRM, good governance, and livelihood and food security, he stressed. The adaptation practices of local communities would not suffice when their livelihood systems were threatened by unsustainable development activities and unexpected climate hazards. Women and the marginalised members of society tended to be particularly vulnerable because they depended more on natural resource-based livelihoods. (The particular issue of gender equality in the governance of water is addressed in the following section.) In addition, sustainable agricultural development and natural resource management, while mitigating the adverse consequences of climate change, were the key to improving livelihoods. Effective adaptation actions had, therefore, to be undertaken at all levels (national, sub-national and local) and targeted to meet the needs of different vulnerable groups and agro-ecological zones. This could be done through close coordination between central and local levels so that appropriate climate change adaptation strategies could be

designed. Improving cross-sectoral coordination to ensure holistic policy interventions, information sharing, incentive mechanisms and financial support to adopt new strategies and technologies to cope with the uncertainties of climate change, were other possible strategies, he said. So, too, were integrating adaptation initiatives into agriculture and irrigation system development and natural resource management, and strengthening CBNRM and CBA, while minimising unfair governance practices, inequality and the lack of opportunities for livelihood diversification. Furthermore, assessing the different effects of climate change in Cambodia's four agro-ecological zones would enable climate adaptation strategies to be formulated that more closely matched actual need.

Mechanisms aimed at providing equal opportunities for men and women so that they were well aware of their rights and obligations in respect of CBNRM and CBA, and promoting gender mainstreaming and the participation of women in decision making and implementation processes for climate change adaptation, would also be beneficial.

3. Gender and Water Governance: Men's and Women's Participation in Irrigation Development under Climate Change

Cambodia is in a tropical monsoon zone that provides good conditions for agriculture. As a result, most Cambodian people, male and female, and have been historically involved in water and irrigation development and management. A number of small, medium and large scale irrigation systems have been constructed, rehabilitated and expanded to support the agriculture sector. At the same time, gender mainstreaming policy has been applied to, for instance, the country's water and agriculture sectors, and the number and capacity of women in leadership roles have steadily increased. This was the message from Mr Ouch Chhuong, programme assistant in CDRI's NRE programme, who presented this section of the workshop agenda.

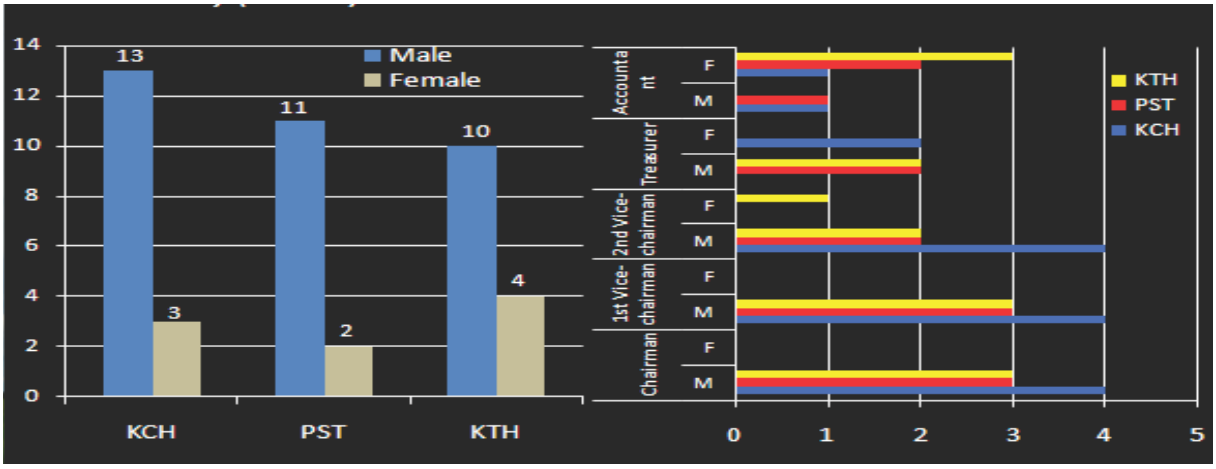
He reported that, in response to the government policy focus on water and irrigation management/ governance and gender mainstreaming policies, the NRE team had undertaken related research. This had identified three main objectives: 1) to understand gender roles, needs and constraints in water governance, agriculture and climate change adaptation (CCA) activities; 2) to seek appropriate opportunities/ means to support farmers in overcoming the major constraints; and 3) to contribute to gender mainstreaming policy and to the equitable and sustainable improvement of farmers' livelihoods.

To promote the achievement of these objectives, three research questions had been developed: 1) What is farmers' (men's/ women's) perspective on women's role in water and irrigation management/governance and CCA? 2) What are the gender roles and constraints/challenges in agriculture, irrigation management/governance and CCA? And 3) what are the needs and effective/ practical measures for minimising the challenges identified?

The NRE team had reviewed various documents relating to gender, water governance and climate change, he continued, and case studies had been conducted focusing on 10 irrigation schemes. The interviewees had included representatives from 10 Farmer Water User Communities (FWUCs), and 10 groups for focus group discussions (FGDs) in three provinces (Kg. Thom, Kg. Chhnang and Pursat). Key informant interviews (KIIs) were also conducted with government officials from different provincial ministerial departments, including women's affairs, water resources and meteorology, agriculture, and environment. The data collected were analysed to determine key gender challenges and appropriate solutions.

The results were that, among the total of 39 members of FWUCs in the three provinces, there were only nine women: i.e they represented just 21 percent of the total. It was also observed that women still had few opportunities in the positions they could hold in FWUCs, and limited self-confidence. In fact, most of them held relatively modest roles as cashiers, treasurers and accountants. Mr. Chhuong explained that men and women played almost the same roles in farming, from seed selection and planting, to applying fertiliser, and so on. However, men mostly dominated all important roles in FWUCs such as chairman and vice chairman (see figure 2).

Figure 2: Gender roles in Famer Water User Communities (FWUCs)



Men do the heavy work that needs physical strength, such as ploughing and transporting seed, but some women were also involved in such activities (see table 1).

It was notable that most men had not attended training or public meetings – whether or not they were related to agriculture and water management. In contrast, most women had. In some cases, women who participated in meetings could even make decisions by themselves without seeking approval from their husbands who stayed at home or worked outside the village/province (i.e. they had migrated to seek employment).

It was further discovered that men and women were affected by climate change impacts (such as floods, drought, high temperatures, windstorms and vector-borne diseases) in different ways due to the resources they used/needed (see table 3). However, men seemed to be able to cope better than women. For example, during droughts, some female-headed households were not able to collect water from the canal due to lack of human resources, water pipes, or water pumping machines. Their rice consequently dried out and was damaged.

In responding to these impacts, men and women needed to have equal rights and access to resources, such as water, land, lakes, rivers and forest. They also needed access and rights to physical resources (including spill-ways, dams, canals and drainage systems, pumping stations/ pumping machines, roads, water gates and bridges), as well as to financial resources from household funds, banks, irrigation service fees, and money saving groups. The human and social resources needed included the provincial institutions concerned (such as PDWA, PDE, PDWRAM, PDA, PDRD, PBCRC, National and Provincial Committees for Disaster Management (N/PCDM) and others), local authorities, FWUCs and other villagers, women's help groups/volunteers, money saving groups and NGOs (see table 4).

Table 1: Men's and women's roles in farming

Activities	Female			Male		
	Not involved	Less involved	More involved	Not involved	Less involved	More involved
Selecting rice seeds and varieties			√		√	
Ploughing		√				√
Planting			√		√	
Applying natural fertilisers		√				√
Apply chemical fertilisers		√				√
Harvesting			√		√	
Threshing			√		√	
Transportation		√				√
Selling products			√		√	
Holding money			√		√	
Others						
Meetings/training			√		√	
Cutting the canal for water		√				√
Cutting the canal for fish	√					√
Cutting the canal for transportation purposes		√				√
Paid labour			√			√
Migration			√			√
Collaborating with farmers upstream to release water downstream		√				√
Resolving water conflicts		√				√

Table 2: Climate-related issues and their impact on men and women

Climate-related issues	Female	Male	Note
Floods	3	3	1= low, 2= medium, 3=high
Droughts	3	3	
High temperatures	3	2	
Windstorms	3	3	
Pests/insects	3	3	
Vector-borne diseases in humans	3	3	
Vector-borne diseases in livestock	3	3	

Table 3: Resources needed according to gender

Type	Resources needed according to gender	Women	Men
Natural resources	Water (including rainwater), land, lakes, rivers, forest and fish	3	3
Physical resources	- Spill-ways, dams, canals and drainage systems - Pumping stations/ pumping machines - Roads , water gates and bridges	3	3
Financial resources	- Household funds - Banks/markets - Irrigation service fees - Money savings groups/ rice banks	3	3
Human resources	- PDWA, PDWRAM, PDAFF, PDE, PBCRD, N/PCDM and others - Local authorities, FWUCs and villagers	3	3
Social resources	- PBCRD and N/PCDM - Local authorities, FWUCs and other villagers - Women's help groups/volunteers - Money savings groups - NGOs	3	3

Note: 1= low, 2= medium, 3=high

Mr. Chhuong stressed that men were still better able to access and control resources such as general family resources or common property than women were, although women controlled household assets and were more involved than men in public meetings or training sessions.

As a final observation, Mr. Chhuong said that farmers fully supported women's role in water and irrigation management/governance and CCA. However, women's capacity was still limited. They lacked self-confidence and had limited opportunities to assume leadership roles. As a result, men still dominated women in such roles at community level, particularly in FWUCs. Men also dominated women in access to and control over family, community and common property resources (CPR).

As already discussed, farmers (especially women) are facing climate change impacts while capacity and resources to adapt/cope with those challenges are limited. Thus, water and irrigation are crucial, and women, who are particularly vulnerable, need to enjoy better rights and access to, and control over, water resources.

VIII. Group discussions to identify priorities

These discussions followed the presentations and question/answers sessions.

Group I: Agricultural Technology Practices

This discussion was designed to reveal the participants' worries and challenges. The roles of community and technical institutions were identified, as were key mechanisms needed to respond to the impacts of climate change. These would guide CDRI's strategy in ensuring that future research conducted continued to match needs at grass-root level.

Question 1: Has the community received any training courses provided by relevant ministries or NGOs on new agricultural practices to cope with climate change?

Question 2: To solve the problems of climate change, has the community applied local knowledge and practices or new agricultural technology i.e. in 1) rice production, 2) animal raising, 3) cropping such as rubber, cassava, corn, beans, pumpkin, sweet potatoes etc., and 4) aquaculture?

Question 3: Did all of those introduce know-how, technologies, and practices that have solved local problems? Does the community have any suggestions for further interventions for the relevant institutions to consider?

Answers of Group Number I

Answer 1: By and large, relevant NGOs and ministries have been training farmers (especially in Pursat, Kampong Thom, and Kampong Chhnang) in up-to-date agricultural technologies.

Answer 2: New innovation and technologies employed by the communities include:

- In rice farming:
  - Selecting rice seeds that are not seasonably influenced like IR 66, local rice seedlings selection namely Saen Pidor and Chul Sar
  - Preparing land: rice fields are better prepared by levelling them so that they can store or drain water well
  - Using 10 types of rice seeds introduced by the Ministry of Agriculture, Forestry, and Fisheries (MAFF). Those have the ability to survive in different climate conditions and environments.
- In animal raising:
  - Determining and locating higher and safer places for cattle in case of flood
  - Getting cattle and other domestic animal vaccinated
  - Planting more grass and other feed/fodders
  - Raising animals in a medium-sized or big farm rather than in one that is traditional/ family-scale.
- In raising fish:

- Expanding aquaculture (however, in the meantime, local producers have not been able to compete with the fish importers particularly from neighbouring countries)

- In cropping:
  - Planting other crops besides rice (rubber, cassava, corn, sweet potato etc.)
  - Using more natural fertiliser (compost)
  - Focusing on market demand.

Answer 3:

- Yes, all of those initiatives offered technologies and new practices to solve problems and could respond to half of the community's needs.
- In terms of all current needs, participants in group suggested that the relevant institutions could consider responding to the following:
  a. Rehabilitating and expanding irrigation systems in the locality since there had been an increasing expansion of agricultural land areas
  b. Reducing the pumping of water from the natural ponds. Pumping must be conducted in line with the consensus (the results of discussions and coordination) reached among the communities who use the ponds
  c. Training the community on producing animal feeds/fodders
  d. Enforcing the existing law on fisheries, forestry, and agriculture related activities
  e. Conducting experiments on soil to find out its nutrient content, PH, chemical content, and so on, so that fertilisers can be applied more effectively.

Summary

Group I said that training courses had been provided in Kampong Thom, Pursat and Kampong Chhnang for farmers about new technologies to support agricultural practices, and that these were conducted and financially supported by NGOs and governmental officials. New innovations and technologies in rice cultivation included the selection of rice seeds that were not seasonally sensitive, like IR 66, and local seeds named Saen Pidor, Chhol Sar, which can accommodate climate change. Recently, however, farmers had shown a preference for IR 66 rice seed and the OM variety imported from neighbouring countries due to their fragrance like the local seed named Rumdoul. This is despite MAFF's recommendation that farmers should use 10 types of rice seeds. Farmers had adopted methods of soil preparation to reduce fertiliser consumption. Farmers also noted that the use of new innovations and technologies in rice cultivation differed from one place to another. For example, the techniques used by upstream farmers are not applicable for the downstream farmers. The 10 rice seed varieties recommended by MAFF have specific characteristics such as resistance to drought, pest, and short-term flood. Safe places were also determined to which animals could be relocated in times of flood.

To combat the effects climate change has had on animal health, MAFF had launched a vaccination programme. It had also supported fodder-planting during the season when animal feed is in short supply, as well as establishing medium-size or big animal farms to replace small or family-scale ones.

The technologies and innovation provided by NGOs and relevant governmental institutions had responded to half of the local communities' needs. The group suggested that irrigation canals should be expanded to meet the demands of increasing agricultural land and the consequently rising demand for water. The team also requested the participants-farmers not to pump all water from the natural ponds so that they could collectively use it for the whole year. Additional training on practical techniques in raising fish and cattle, and in feed production were also cited as a priority for consideration. Furthermore, combating crime linked to fisheries, forestry, and agriculture was cited in the discussion. It was noted that the topic of fish raising had not been a focus in Kampong Thom even though guidelines had been provided in training courses provided by relevant NGOs and the government in other provinces. This is because the quantity of natural fish still available, and the fish from fish farms, cannot compete with stock that has been imported, particularly from neighbouring countries. To conserve the natural fish, strict law enforcement against illegal fishing and pumping water from natural ponds is required. The Group I team also provided opinions about having the soil tested in laboratories so that appropriate fertilisers could be applied in the rice fields: currently, communities have little idea about this. In respect of pumping water from natural ponds, it was suggested that relevant stakeholders should discuss how much water should be pumped to avoid over-exploitation of the water and fish resources in the ponds.

Group II: Roles of Communities in Climate Change Adaptation and Food Security

Question 1: Which are the most important resources (e.g. forests, water and fisheries) in the communities that support local livelihoods? What are the trends in respect of those resources?

Question 2: What are the challenges and risks that hamper effective community-based natural resource management in 1/forests, 2/water, and 3/fisheries?

Question 3: What solutions to those challenges are the most effective in contributing to climate change adaptation and food security?

Answers of Group Number II

Answer 1: The most important resources

- Water: rivers, wells, streams, irrigation, lakes, the Tonle Sap lake, and rainwater
  - Trends reveal that natural rivers and streams have become shallower. Irrigation cannot be used for the whole season. Rainfall is uneven
- Fisheries: fish, turtles, crocodiles, birds, frogs, snails, crab
  - Trends reveal these resources to be in decline, with migration of some species and more illegal hunting among the major causes
- Forest: Non timber forest products (NTFPs), construction wood, biodiversity
  - Trends reveal an increase in forest encroachment, and more illegal hunting and logging.

Answer 2: Challenges and Risks

- Poverty of the community
- Lack of sources of income and financial support
- Corrupt governmental officials
- Population growth, forest fires and polluted water.

Answer 3: Solutions

- Diversify jobs and attract good investors
- Seek financial support
- Enforce the anti-corruption law
- Develop capacity, educate the hunters, conduct a deep study into the sources of pollution (in April before Khmer New Year in the Beuong Tonle Chhmar river where fish have previously been found dead from being poisoned by pollution).

Summary

Group 2 showed that the main natural resources in communities in Kampong Thom Province included water resources such as rivers, streams, canals (irrigation), lakes, the Tonle Sap Lake, ponds, and rainwater. It was reported that lakes and rivers were shallower. Likewise, there was no water for irrigation in the dry season, a situation exacerbated by climate change. Fisheries resources - all types of fish, turtles, crocodiles, frogs, snails, and crab - were declining or migrating and some species had disappeared altogether. In contrast, fishing crimes were increasing. Forest resources consisted of NTFPs and wood for construction. The natural resources and biodiversity that people depended on had been damaged by encroachment for the purposes of agricultural expansion and by illegal logging activities carried out by companies who had been granted economic land concessions, as well as by local hunters for subsistence purposes.

Given the issues listed above, the challenges involved in natural resources management were poverty, access to financial budgets, some bad and unlawful governmental officials, population growth, forest fires, and water pollution. Job diversification for poverty reduction, the attraction of good investors, fundraising, action to curb bad officials (enforcement of the anti-corruption law), capacity building, education for hunters, and studies on water pollution (dead fish, for instance, that had been poisoned, had been found in April in Beoung Tonle Chhmar), were the solutions proposed to combat the challenges and risks associated with guaranteeing everyday livelihood activities for local communities.

Workshop evaluation

Participants were asked to evaluate the presenters with the results shown in Table 5.

Table 5: Evaluation of the presentation and workshop coordination

Description	Satisfied	Average	Dissatisfied	Total[11]
Methodology in presentation and coordination	34	6	1	41
Knowledge gained	31	10	0	41
The meanings of the presentations are easily understood	29	11	1	41
The responses to the audience are adequate	34	6	1	41
The audience members have been motivated to participate and share ideas and experiences	30	9	2	41
Total	158	42	5	205
Percentage (%)	77.07	20.49	2.44	100

The results above indicated that 77 percent of the participants were satisfied with the whole process of the workshop. They reckoned that coordination was good, and that useful new knowledge was gained for cascading to others. Furthermore, explanations were clear, providing suitable times for question and answers. The other 20 percent and 3 percent found the workshop to be average or unsatisfactory, respectively. For the bulk of the participants in these latter categories, a limited knowledge about the topics, coupled with the short length of the workshop, made it difficult for them to understand what was being said.

[11] A total of 41 evaluation forms were received.

IX. Conclusion

Existing natural disasters combined with climate change are having a negative effect on the livelihoods of rural communities who depend on natural resources (water, forest, and fisheries). Women, children, disabled people, and the elderly are particularly vulnerable, and building their adaptive capacity needs to be a focus for government policy if the Cambodia Millennium Development Goals and other National Strategic Development Plans are to be realised.

The NAPA programme has contributed immensely to strengthen national and sub-national efforts to improve adaption capacity at local level. It has done this through various cross-sector projects especially targeting livelihood diversification. To gather the resources that are vital in tackling climate change issues there is a need to gather all practical and strategic experiences from the ground level to be used more generally as a shared guide.

Local communities play an important role in implementing the government's policy of natural resource management, and thereby in promoting inclusive growth and the capacity to adapt to a changing climate. In the governance of water, which plays such a central role in climate change and rural livelihoods issues, the part women can play is now recognised and encouraged, particularly at commune level. There are, however, still gaps in the opportunities offered to men and women and in their capacity to take on management challenges: attitudes, too, need to change. As this happens, women – along with other disadvantaged groups - will increasingly play their discrete role in improving local adaptive capacity to climate change.

X. Results of the Workshop

The indication is that, overall, the workshop succeeded in increasing the participants' understanding. This was achieved through the presentations and discussions related to the present programmes of the NAPA, to issues surrounding gender in community activity, and to water governance in the context of climate change, as well as to technologies in agricultural practices as they relate to strategies to promote climate change adaptation.

In their evaluation forms, participants confirmed that the workshop had:

- Broadened their knowledge about community-based natural resource management in the context of good governance, inclusive growth, livelihood improvement and gender mainstreaming for climate change adaptation and food security
- Increased cooperation between relevant governmental institutions and local communities to reinforce management and practices leading to the capacity to adapt to climate change. Incorporated all worries and problems (from both local and national levels) into prioritised strategies for conducting policy oriented research. This will guide CDRI's Natural Resource and Environment Programme.

The results of this workshop will be used by CDRI's NRE research team in formulating recommendations for further research, a***s*** well as to compose policy briefs for the stakeholders concerned to inform decision making.

Annex 1: Agenda

Venue: Department of Water Resources and Meteorology, Kampong Thom Province

Date: 7 June 2013

Time	Activities	Presenters/Facilitators
7:00-8:00	**Registration**	Ms Sam Srey Mom Mr Ouch Chhuong
8:00-8:30	Welcome Speech by CDRI Team Leader Inception Workshop Opening Speech	Dr Chem Phalla, Programme Coordinator, CDRI Mr Hak Puthy, Deputy Director and currently Acting Director, PDWRAM
8:30-8:40	Project Overview	Dr Chem Phalla, Project Coordinator, CDRI
8:40-9:00	Presentation: Cambodia National Adaptation Plan for Action (NAPA) to date	Dr Heng Chan Thoeun, Deputy Director of Climate Change Department, MOE
9:00-9:10	**Group Photo**	
9:10-9:40	**Coffee Break**	
9:40-10:00	Presentation: A Review of Climate Change Impacts and Adaptive Capacity in Cambodia: Inclusive Growth and Community-based Adaptation	Mr Nang Phirun, Researcher, CDRI
10.00-10:20	Presentation: Gender and Water Governance: Irrigation Management and Development in the Context of Climate Change	Mr Ouch Chhuong, Programme Assistant, CDRI
10:20-10:50	Group discussion on practical climate change adaptation measures: 1. Agricultural Technologies and Practices 2. Role of Communities in Climate Change Adaptation and Food Security	Facilitators: Group 1: Heng Chan Thoeun, Lonn Pich Dara Group 2: Nang Phirun, Sam Srey Mom
10:50-11:40	Group Presentations Plenary discussion	Facilitator: Dr Chem Phalla, Programme Coordinator, CDRI
11:40-12:00	Summary and Closing Remarks	Mr Hak Puthy, Deputy Director and currently Acting Director, PDWRAM
12:00-13:00	**Lunch**	

Annex 2: Participant List

Nº	Name	Sex	Position	Institution	Province	Mobile Phone
1	Hak Puthy	M	Acting Director	Provincial Department of Water Resources and Meteorology (PDWRAM)	Kampong Thom	
2	Chan Phallydeth	M	Cabinet Head	PDWRAM	Kampong Thom	092552360
3	Peng Sothearak	M	Deputy Head of Clean Water Office	PDWRAM	Kampong Thom	012600147
4	Ly Kanara	M	Deputy Director	Provincial Department of Environment (PDE)	Kampong Thom	012888003
5	Kan Salorn	M	Deputy Director	Provincial Department of Agriculture (PDA)	Kampong Thom	012620012
6	Chum Sakhaem	F	Deputy Director	Provincial Department of Woman Affairs (PDWA)	Kampong Thom	012603675
7	Plorng Salorn	M	Office Head	Provincial Department of Rural Development (PDRD)	Kampong Thom	012671074
8	Sab Mee	M	Official	Cambodia Red Cross	Kampong Thom	0973888176
9	Sum Pouch	M	Deputy Cheif	Boeung Per Wildlife Sanctury	Kampong Thom	012792246
10	Eia Kimloun	M	Deputy Governor	Stung Sen Town	Kampong Thom	012846337
11	Chiv Kim Un	M	Sangkat Chief	Sangkat Ou Kanthor	Kampong Thom	012214780
12	Seng Kimsrourn	M	Head of Farmer Water User Committee (FWUC)	Rolous	Kampong Thom	092395761
13	Pich Sethea	M	District Governor	Santuk	Kampong Thom	012723465
14	Sam Chhan	M	Commune Councilor	Chhouk Khsach	Kampong Thom	077979046
15	Uch Ker	M	Head of FWUC	Ou Svay	Kampong Thom	092547870
16	Pen Tem	M	Commune Councilor	Kampong Thmor	Kampong Thom	0886150443
17	Ourn Ann	M	FWUC Member	Stung Chinit	Kampong Thom	0976563705
18	Heng Monor	M	Commune Chief	Phat Sanday	Kampong Thom	012762246

19	Um Meng	M	Head of Fisheries Community	Phat Sanday	Kampong Thom	012715451
20	Meas Sum	M	Commune Chief	Ngorn	Kampong Thom	017573205
21	Kong Chheang	M	Head of Community Protected Area	Chorm Thlork	Kampong Thom	0886577743
22	Ros Sineng	F	Commune Councilor	Sandan	Kampong Thom	092714040
23	Kong Chhert	M	Head of Community Protected Area	Skor Krouch	Kampong Thom	092386960
24	So Sear	M	Commune Councilor	Rommoni	Preah Vihea	0972149083
25	Svay Khin	M	Head of Community Protected Area	Chi Ok Boeung Prey	Preah Vihea	089827259
26	So Salourt	M	Head of FWUC	Damnak Ampil	Pursat	012890602
27	Ngoeun Thy	M	Dam Watcher	Damank Ampil	Pursat	012361249
28	Teng Sokhorn	M	Commune Councilor	Svay Daunkeo	Pursat	012369693
29	Vann Sorng	M	Deputy Head of FWUC	Kampang	Pursat	017560359
30	Em Oeun	M	Head of Fisheries Community	Chin Tay	Pursat	0972703468
31	So Ly Ann	M	Official	PDWRAM	Kampong Chhnang	092932639
32	Kim Chan Bophat	M	Deputy Director	PDE	Kampong Chhnang	012678440
33	Sam Sophal	M	Head of Agri-industry Office	PDA	Kampong Chhnang	012623912
34	Ith Noeun	F	Deputy Director	PDWA	Kampong Chhnang	012928537
35	Ouk Phan	M	Head of FWUC	Trapiang Trabek	Kampong Chhnang	0976865514
36	Uy Vuthy	M	FWUC Member	Trapiang Trabek	Kampong Chhnang	
37	Chan Yoeun	M	2nd Commune Chief	Chaong Maong	Kampong Chhnang	077475094
38	Mao Khy	M	Head of FWUC	Svay Chek	Kampong Chhnang	012861450
39	Chhay Hin	M	2nd Commune Chief	Tang Krasang	Kampong Chhnang	0975725574
40	Chork Somaly	M	Head of FWUC	Tang Krasang	Kampong Chhnang	012479309
41	Chet Soeur	M	Commune Councilor	Toul Kphos	Kampong Chhnang	095174837
42	Khoem Mach	M	Head of FWUC	Pok Pen	Kampong Chhnang	089216833
43	Dr Heng Chanthoeun	M	Deputy Director of Climate Change Department	Ministry of Environment (MOE)	Phnom Penh	016726668
44	Dr Chem Phalla	M	Programme Coordinator, NRE Programme	CDRI	Phnom Penh	012966850

45	Nang Phirun	M	Research Associate, NRE Programme	CDRI	Phnom Penh	0977670766
46	Lonn Pichdara	M	Research Associate, NRE Programme	CDRI	Phnom Penh	011756603
47	Sam Sreymom	F	Research Associate, NRE Programme	CDRI	Phnom Penh	012559824
48	Ouch Chhuong	M	Programme Assistant, NRE Programme	CDRI	Phnom Penh	099880199

* List ended at the number of 48.

Annex 3: Percentage of Participant's View on Presentation and Workshop

Reasons	No.	%
Good coordination	1	3.85
Receiving good experiences for further dissemination	2	7.69
Easy to understand (in Khmer)	2	7.69
Clear explanation	3	11.54
Participants have time for questioning, answering and comment	2	7.69
Participants were provided with enough documents	2	7.69
The meeting was well organised for the time allocated	2	7.69
Participants had previously attended workshop with similar topics	2	7.69
Participant received knowledge 80-90% from the workshop	1	3.85
Workshop helps to strengthen the relationships among the communities from different provinces	1	3.85
Participants received knowledge 75% from the workshop	2	7.69
Participant received knowledge 50% from the workshop	1	3.85
Limited understanding	1	3.85
Time for the workshop is too short	2	7.69
Cannot remember	1	3.85
Presentation is too fast	1	3.85
Total	26[12]	100

[12] Out of the 41 evaluation forms, only 26 participants shared their views on the evaluation forms.

Annex 4: Images of the Workshop

1) Chairman and participants at the workshop

2) Dr. Heng Chan Thoeun's presentation

3) Mr. Nang Phirun's presentation

3) Mr. Ouch Chhuong's presentation

5) Group discussion

6) The presentation of each group