

# Guidance Manual for Climate Change Adaptation Case Studies - ASEAN

A Methodology to determine where 'Adaptive Capacity' is needed, and where it already exists, in Value Chains in ASEAN

This document is a guidance manual aimed at the 7 research teams that will undertake research into identifying good practice in climate change adaptation in food security value chains in ASEAN Member States in the GAP-CC Project. Each institute has 40 days between January and April 2014 to complete the task. Support will be provided by Climate Sense.

## Introduction

This methodology has been developed as part of a project for the ASEAN-German Programme on *Response to Climate Change (GAP-CC)*. The project seeks to review and develop the **adaptive capacity**<sup>1</sup> of stakeholders in ASEAN's regional network, using a value chain mapping approach for visualisation, stakeholder analysis and identification of priority areas, for selected ASEAN Member States. The resulting project research outputs will support a process of regional cooperation, through sharing knowledge and good practice, to help engage with the topic of climate change related threats to the agriculture sector; specifically, food security. An aim of the overall programme is to facilitate a process of regional agreement amongst AMS, on where adaptive capacity is needed as a priority to be addressed through cooperation.

### The methodology seeks to cover the following three objectives:

- A. To identify instances of good practice in the ASEAN Region, which address climate change related vulnerabilities that could lead to food insecurity, in the following critical regional food crops: Rice, Maize and Cassava using a value chain mapping approach. (The detailed methodology/approach is described in the sections following this introduction).

**Output A:** Good Practice Case Studies of improvements to the adaptive capacity of rice, maize and cassava supply in AMS.

- B. To identify where vulnerabilities exist or are likely to exist, in the supply of the identified food crops, with a primary focus on production and related inputs and a secondary focus on post-production activities; specifically drawing out where regional collaboration could be most valuable.

**Output B:** List areas of vulnerability related to the production of Rice, Maize and Cassava as well as regional mechanisms for cooperation and action to address the identified vulnerabilities.

- C. To use the learning from these to stimulate and spread meaningful action across the region

**Output C:** Targeted dissemination of research outputs to stakeholders across the AMS to facilitate knowledge sharing, cooperation and communication on building adaptive capacities for food security.

<sup>1</sup> **Definition of Adaptive capacity** – The ability of a 'system'/organization/sector to design and implement effective adaptation strategies to adjust to information about potential and actual climate change (including climate variability and extremes), to moderate potential damages, to take advantage of opportunities, or to cope with the consequences.

## Overview of Approach

In order to meet the project objectives effectively we must make an assessment of where adaptive capacity is needed in the value chain now and in a climate-impacted future, as well as what level of adaptive capacity currently exists. This methodology provides you with a step-by-step process for such an assessment.

This methodology has been designed to make the best use of existing information, studies and experience in the region. There is **no primary research** intended. Each step of the methodology will therefore involve literature review, your own judgement, and the judgement of other experts that you come into contact with. The methodology is not intended to be an exact science, but rather to provide direction to you that will lead you to providing the project with directly comparable information to allow structured sharing of good practice between AMS. While 'Value Chain Mapping' is used as a visualisation tool, this methodology does not contain a full value chain analysis. Those of you already familiar with value chain analysis will therefore have to bear in mind that within this methodology, the use of value chain mapping is much more high-level (not as detailed) than you are used to. The methodology has been developed from specific aspects of numerous tried and tested approaches and is only unique in the way that it has been brought together as a methodology for this project.

### Primary focus on production activities within the value chain

The focus of this project is on 'Food Security'<sup>2</sup>, and it follows the work of a previous project phase in early 2013 that determined the three main staple food crops that are vulnerable to climate change in the region as Rice, Maize and Cassava. In order to ensure the scope of this project remains regionally manageable, the **primary focus** of this analysis is on climate change vulnerability and adaptation interventions in the **'production' phases** of these foods in the ASEAN region. Hence, when addressing food security, the focus is on availability and stability of food supply, rather than accessibility and utilisation.

In other words, we are looking specifically at the resilience to climate change (ability to withstand extreme weather events and future changes in climate), of the production systems of rice, maize and cassava in South East Asia. This includes the inputs and resources needed for growing, harvesting and storing the respective crops (e.g. land and water management, fertilizers, seeds, labour, machinery, factories, storage facilities and practices, extension services etc.). With the production systems a holistic approach is considered and does not only factor in technical issues, but also institutional aspects, policies and services.

Furthermore, particular focus lies again on areas of **regional collaboration**, and **in trans-boundary aspects** of the value chain and the production systems, with the overall aim of identifying regional strategies and instruments to promote coherent approaches on climate change adaptation (and mitigation where possible). *Though the focus is on adaptation, this initiative does not exclude mitigation in identification of good practices or areas of regional collaboration. Appendix 1, has a table of 'framework conditions' that can help provide some insight into the sorts of things that can inform a 'regional' approach. Please feel free to use and to add to these examples.*

### Secondary focus on post-production activities

In order not to miss other valuable 'good practices'<sup>3</sup> of climate adaptation in the supply of these crops, a secondary focus is encouraged where the production process does not yield sufficient instances of 'good practice'. This secondary focus can move beyond the 'production phase' (including farm-level inputs and

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<sup>2</sup> The FAO defines 'Food Security' as the: "availability and accessibility of food by people at all time to meet their dietary needs and food preferences for an active and healthy life"

<sup>3</sup> Some Good practice examples are provided in Step 4 of this guidance.

post-harvest storage) to other elements of the value chain such as: trading; processing; transport; markets, etc. However, with 'production' as the primary focus, those who wish to have a secondary focus outside of production should only do so once instances of good practice within the scope of the primary focus have been exhausted.

### A maximum of two crops and five 'Good Practice Case Studies'

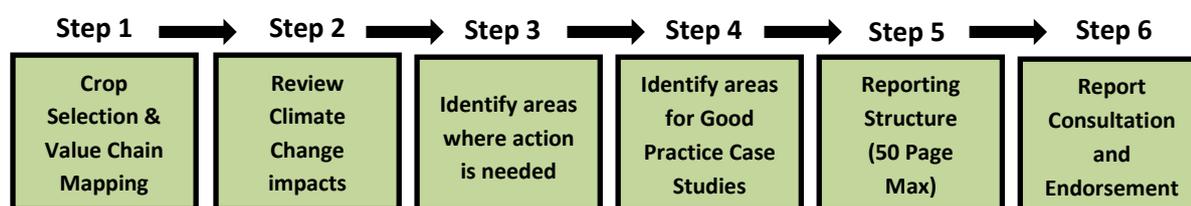
Each research institute is invited to select two crops to look at: rice, plus one other of either maize or cassava. For rice production, more than one production system for each crop (e.g. rain-fed lowland rice production, rain-fed upland rice production, etc) can be looked at if it is warranted in terms of national economic importance, food security and vulnerability to climate change. However, there will be a maximum of 5 good practice case studies for you to complete for both crops (Rice plus Cassava *or* Maize). Not all production systems can therefore be looked at in detail. Step 1 of this methodology guidance explains how to make your selection.

### Project exclusions and limitations

Climate change is of course not the only threat to food security in the region. Socio-economic factors, population growth, political factors, economics, and other variables are also key influences. Whilst we do not ignore these in this methodology, climate change (and adaptation) remains the focus.

A **6-Step Methodology** has been designed to pinpoint where there are vulnerabilities in the supply of the three crops (rice, maize and cassava) in ASEAN, as well as where there are pockets of 'good practice' with potential for scaling regionally.

### 6-Step Methodology for scoping adaptive capacity of Value Chains



**This guidance has a section on each step. They can be summarised as:**

- Step 1 – Crop Selection & Value Chain Mapping:** Select your area of focus and produce a Value Chain Map for your country. This will be for - 1) Rice 2) Maize or Cassava<sup>4</sup>.
- Step 2 – Review Climate Change Impacts:** Review information sources on current and future Climate Change impacts for your country.
- Step 3 – Identify areas where action is needed:** locate points in the value chains, or in activities designed to develop the value chains, that are vulnerable to climate change impacts (highlighting those areas that could benefit from regional collaboration).
- Step 4 – Identify areas for Good Practice Case Studies:** determine projects and other areas of effective climate adaptation activity relevant to the selected value chains.

<sup>4</sup> The selection of value chains which the member states will focus on will be undertaken by the focal person from ATWG ARD in consultation with the national research teams. This will be based on national priorities, production, and consumption contributions to food security in the member states.

**Step 5 – Reporting Structure:** How to organise your findings and structure the report for feeding back to the project – allowing direct comparison and collective analysis to be made using data from multiple countries.

**Step 6 - Report Consultation and Endorsement:** National and project consultation process prior to official endorsement and sign-off by AMS Ministry.

### Schedule of Activities

A schedule of activities running from January 2014 to May 2015, agreed at the Thailand Workshop in January 2014 at Nong Nooch can be found in Appendix 2 of this document. Steps 1 to 6 of this methodology have to be completed by July 2014. The month of completion for each step of this methodology is also mentioned in each respective step, but can be summarised as follows:

Step	Completion Date
Step 1	By February 2014
Step 2	By February 2014
Step 3	By March/April 2014
Step 4	By March/April 2014
Step 5	By May 2014 (for next regional workshop)
Step 6	By July 2014

## Step 1 – Value Chain Selection & Mapping

### 6-Step Methodology for *scoping* adaptive capacity of Value Chains



– By end of February 2014

#### Step 1 - objectives

The objective of Step 1 is to help you select which crops (including production systems) you will focus on in your country, and to produce a value chain map for it (either rice and maize or cassava). There will be a **primary focus** on production activities, including the ‘inputs’ to production i.e. water management and seed supplies; and a **secondary focus** on post-production activities i.e. secondary processing (e.g. rice processing, storage, trading, distribution and retailing).

#### Basis for selecting your value chain

Value chain selection will have been finalised and agreed during the kick-off workshop in January 2014. The process for selection (below) will have been delivered jointly by the focal person of the ASEAN Technical Working Group on Research and Development (ATWGARD) alongside their respective Ministry. The national research teams have supported with data collection and collation for this purpose. The selection process assesses the importance (see criteria below), of the differing rice production systems. Different production systems for either Cassava or Maize are to be considered in a similar way if the variation between the systems is considered significant enough in your country.

Furthermore the scope of focus for the production system could be:

- Nationwide: covering several regions
- Representative regions: sub-national (representative provinces/regions for production system)
- Production hubs: top crop producing areas for rice, and maize / cassava

We consider the following *production systems* for the rice value chain:

- a) Irrigated lowland production system,
- b) Rain-fed lowland production system and
- c) Upland production system

Some criteria for you to consider in your choice of production system are:

- i. The current relative economic importance of the crop
- ii. The importance of the crop for national food security

- iii. Your initial top-level estimate/scoring of vulnerability to climate change both currently and in the future. This will be covered more extensively in Step 3; in this step, your own judgement, based upon some basic background desk research, is all that is needed.

Completing columns B to E in table 1.1 (overleaf) will help you decide which production system is of most importance.

**Table 1.1 Selecting Which Production System to focus upon for your country**

R I C E	Column A	Column B	Column C	Column D	Column E
	Production System Type	National Production Volume (tonnes)	National Production Value (\$ USD)	Assessment of impact on national / Regional consumption (1-3)	Indication/estimate of <i>relative</i> vulnerability to climate change (1-3)
	Irrigated Lowland				
	Rain-fed Lowland				
Upland Production					

**Obtaining the Information for Each Column in table 1.1**

Information for each of these columns can usually be obtained from internet searches. Columns D & E however will involve your own judgement. To help you make these judgements you should consider the following scoring criteria:

**Column D:**

- **1 = Low:** The production system is estimated to represents less than 30% of domestic rice consumption for national / regional food security, but the other production systems are used more for domestic consumption.
- **2 = Medium:** The production system represents between 30% to 55% of domestic rice consumption for national / regional food security
- **3 = High:** The production system represents over 55% of the supply of rice for domestic consumption and represents the highest percentage of rice supply nationally / regionally.

**Column E** is a broad estimate/indication of the relative climate vulnerability of the type of production system in your country. A sense of this can be obtained from research data available from your own country’s climate experts, the FAO<sup>5</sup> and the International Rice Research Institute. This is not meant to be a detailed impact assessment (that will come later) but a judgement based on the available research material on each country on the *relative* vulnerability of each production system to climate impacts such as flooding, drought, salinity.

- **1 = Low:** Any impact upon the production system is likely to be manageable
- **2 = Medium:** Without intervention, the production system is likely to suffer problems in the future (10 years or more)
- **3 = High:** The production system is already experiencing significant problems with extreme weather events and these are very likely to become more severe in the future.

<sup>5</sup> See, for example: <http://www.fao.org/docrep/017/i3084e/i3084e18.pdf>

## Selecting Maize or Cassava as your second Value Chain

If production systems for maize or cassava differ as significantly as those for rice in table 1.1, then it is wise to produce a similar table as 1.1 for each crop, and then to make your comparison, based upon a similar scoring process. You may also wish to focus on a specific vulnerable group in your country (e.g. some of the poorest households) in order to make your decision. However, please bear in mind that you may also wish to be confident that sufficient data is likely to be available to deliver steps 2 to 4 of this guidance before you make your final selection.

## Producing a Value Chain Map for your Selected Value Chain Production System

Once you have selected which value chains you are going to focus on, you are asked to produce a Value Chain Map for each. Diagram 1 (overleaf) provides a generic value chain map (adapted for this project) to help you map each of your two chosen crops and respective production systems. It is critical that this process is not misinterpreted as a full value chain assessment. It is only a 'Mapping' process which will be used to visualise the main actors in each stage of the value chain (especially the primary focus of: inputs, production & storage) and how they interact with one another. The overall purpose of the exercise is to rapidly visualise the supply of the food crop, and use it as a basis in later steps of the methodology to help you illustrate and describe which areas (and therefore actors) are vulnerable to climate change, as well as to illustrate and describe where there are areas of 'good practice' that address those vulnerabilities. The value chain mapping is the first high-level (not detailed) stakeholder analysis that you will undertake in this methodology.

Again, it is worth emphasising that in developing the map, you are not undertaking 'primary research'. You do not therefore have to hold in-depth stakeholder engagement processes to obtain the relevant data. If you do not have sufficient information to make a first attempt at this yourself, then there will almost certainly be a number of experts in your country who you can contact to help you get started (or indeed tweak what you can do). A small number of such experts (e.g. 2 or 3) would likely be sufficient to produce a value chain map for this purpose. The idea is that the value chain mapping will go into enough detail to be useful to you in understanding who is being affected by (and is affecting) the areas of vulnerability and the areas of good practice that you focus your work upon in subsequent steps of this methodology. The mapping does not have to be perfect, it just needs to illustrate that there has been structured thought processes that can be used as a basis for each AMS to share their experiences between one another.

**Definition of a Value chain (VC):** According to the definition of the value chain (from GIZ Valuelinks Manual<sup>6</sup>), it consists of a functional map combined with a map of VC actors; a value chain depicts the following diagrammatically:

- the *sequence of related business activities (functions)* from the provision of specific inputs for growing and harvesting a specific crop through primary production, distribution, marketing, trading and retailing the final product to consumers (the functional view of a value chain).
- the *set of enterprises (operators)* performing these functions i.e. producers, processors, traders and distributors of a particular product. Enterprises are linked by a series of business transactions in which the product is passed on from primary producers (growers) to end consumers.

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<sup>6</sup> Value Links Manual – The Methodology of Value Chain Promotion, GTZ 2007: <http://www.valuelinks.org/index.php/material>

The value chain map overleaf is designed for you to adapt to your specific national / sectoral context. Value chains for the same commodity will often differ, based on the analytical purpose for which it is being used, and from country to country; it is not an exact science. What we are trying to do in this step is to produce a value chain map which can be used to help us visualise the different elements and relationships within it, and therefore to appreciate and review climate impacts and interventions designed to tackle them.

Value chain maps serve both an analytical purpose and a communication purpose, as they can reduce the complexity of economic reality with its inherently diverse functions, multiple stakeholders, interdependencies and relationships, to a comprehensible visual model. This allows for a systematic approach, as the main actors (and relations) are mapped out along each step of the chain. They are intended to achieve a degree of detail that delivers sufficient information to be useful, but still remains simple enough to be easily understood.

**Definition of a Value chain map / value chain mapping:** The value chain map is a visual representation (chart) of the micro and meso-levels of the value chain along the sequence of business activities and linkages between actors. Usually each 'function' or 'stage' of the value chain will enhance the monetary value (value-added) of the product until the product achieves its final price upon consumption.

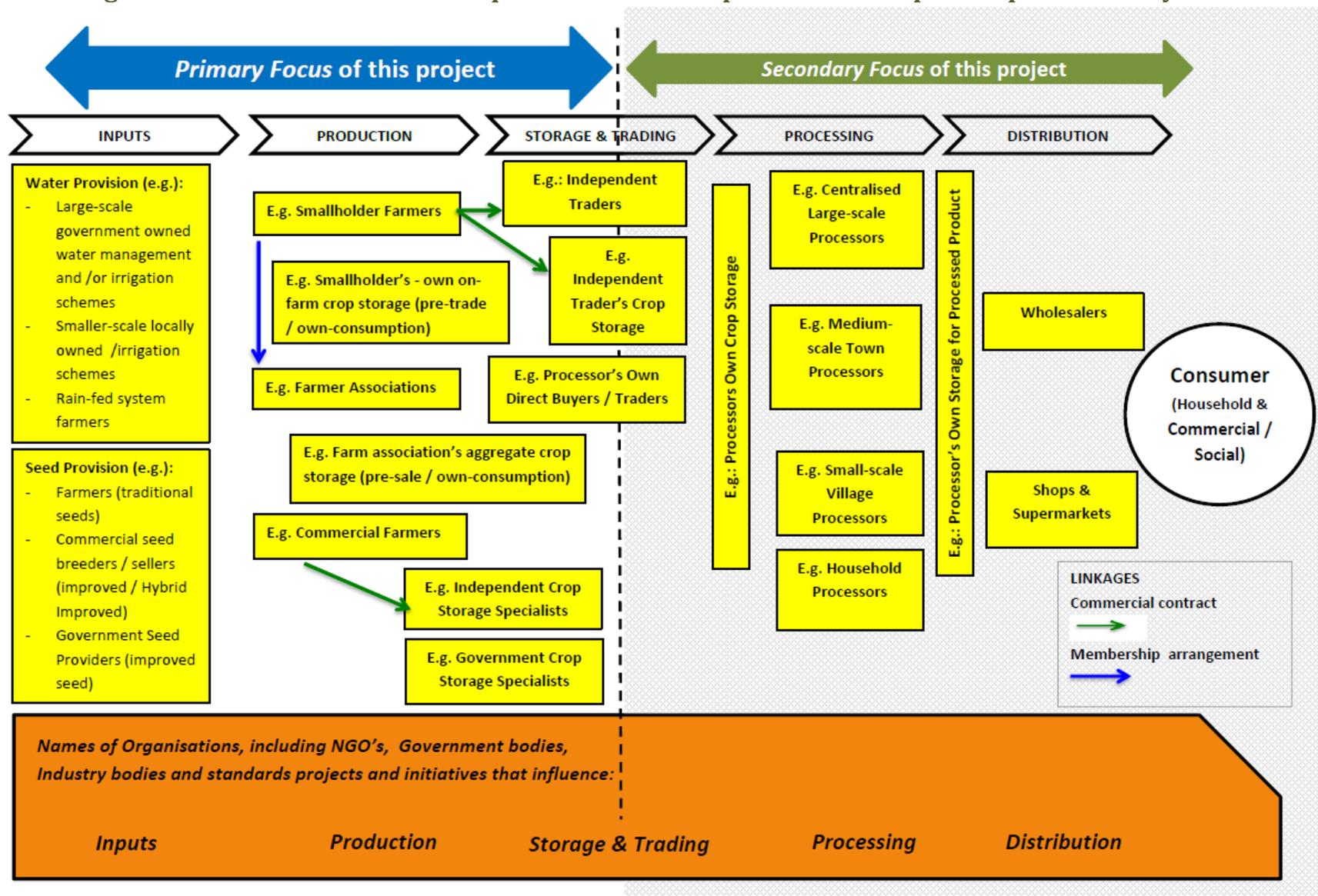
**Definition of Value chain actors and operators:** This refers to all individuals, enterprises and public agencies directly involved in each of the value chain functions. Indirect value chain actors also need to be identified, especially those who are in a position to have a significant impact on the value chain such as government agencies, including regulators at the macro level as well as industry or producer organisations involved in lobbying, marketing and promotional activities.

**Definition of Business linkages:** VC operators relate to each other both horizontally (among enterprises at the same stage of the value chain, pursuing the same type of activity) as well as vertically (between suppliers and buyers of produce). Vertical business linkages can range from accidental market exchanges to a full coordination of activities regulated by contracts. Horizontal business linkages range from informal networks to associations and business membership organizations (BMO).

For your value chain map to be useful in this exercise you may need to revisit it again after each subsequent step that you follow (steps 2 to 5 of this methodology). In step 2, you will start to review the climate scenarios that are expected in your country, and gain a knowledgeable perspective on how these climate scenarios are likely to impact your chosen value chains. As you visualise these impacts on certain parts of the value chain, you may begin to appreciate other subtleties in the value chain that you had not originally mapped (e.g. the role of water engineers in "inputs" or "storage design in "trading", etc.). It is important to start with a VC map of some description in order to test theories as you go through the other steps.

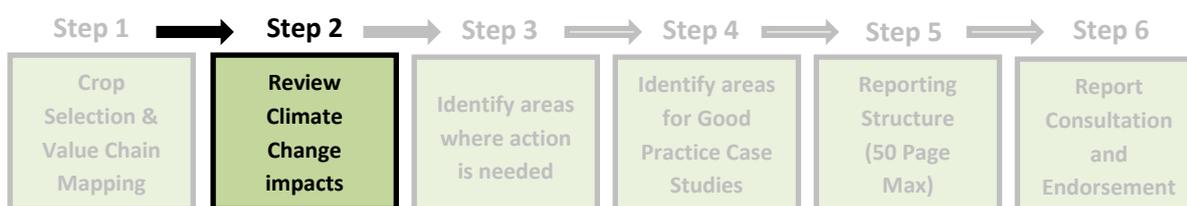
Appendix 3: Hand-out 1 – Value Chains provides more definitions if you wish to look in any more depth. It is the hand-out that was used during the discussion at the kick-off workshop in January 2014 in Thailand.

**Diagram 1. Generic Value Chain map for all 3 Food Crops and their respective production systems:**



## Step 2 – Review Climate Change Impacts

### 6-Step Methodology for *scoping* adaptive capacity of Value Chains



– By end of February 2014

**Identify the direct and indirect climatic impacts for the geographical location of the value chain in question.**

Where the research institutes themselves have not been directly involved in climate modelling for their respective countries, and therefore do not have this information to hand, this step can normally most reliably be done by consulting expert documents<sup>7</sup>. Numerous studies have taken place already for some ASEAN countries and their respective value chains. **Appendix 4** lists source documents by country and by crop, where known. The list is not exhaustive and so the country may have more references that need to be reviewed for a more thorough assessment.

Table 2.1 (overleaf) provides an example of the detail of impact/climate risk information that is required.

**Table 2.1 Historical and projected trends in selected climate variables by Country/Region**

Variable	Specific climate risk / opportunity	Historical trend	Projections	Confidence	References
Evaporation	<i>Increased evaporation</i>		<i>Projected increase by 30% by 2020</i>	<i>High</i>	
Mean temperature					
Minimum temperature					
Extreme heat days					
Precipitation by season					
No rain days by season					

<sup>7</sup> IPCC report (Working Group 2) will be a good place to start as well as the interim report 'Food Security in ASEAN and Climate Change', GIZ 2013 (distributed to ASEAN Member States), followed by climate impact studies conducted at the regional and local level that have been conducted by each AMS. Specific attention should be given to the impacts on the crop (i.e., Rice, Maize, and Cassava). Country reports such as national climate change strategies and plans and national communications to the UNFCCC for example, are also good sources; consultation with the climate experts in the country will also yield potential sources of climate impact information.

It is important to document whether scenarios exist at sufficient resolutions to support value chain decision-making. Where they do not exist, vulnerability analysis becomes more challenging. As part of the process of adaptive capacity intervention, recommendations should be made as early as possible to highlight where gaps exist and where research is needed to develop scenarios at sufficient resolution for local decision-making.

Speaking with climate, technical and policy experts as well as other experienced value chain stakeholders can also prove very helpful in determining what information on climate impacts is available and useful, and where there are gaps that need addressed.

Once an initial assessment is made of the potential climate impact on your chosen functions of the value chain (bearing in mind the primary focus is production) then a more detailed investigation into the likely bio-physical impact (direct impacts) and socio-economic impact (indirect impacts) in terms of production can take place. Table 2.2 overleaf provides a good structure to manage this data.

**Examples of areas where climate change (and extreme weather events) are likely to have an impact upon the value chains:**

**Primary Focus:**

- Crop breeding and seed marketing programmes
- Water supply for irrigation (capture, storage and use)
- Flood prevention (flash, fluvial and sea-inundation)
- Soil quality (salinisation, erosion, etc.)
- Loss of productivity due to high temperatures affecting growing seasons
- Shifts in traditional growing seasons
- Farming practices
- Choice of crops/varieties
- Technological applications
- Storage location and design (30% of rice yields is currently lost post-harvest)

**Secondary Focus:**

- Processing location and design (flood prevention, storage, working conditions, etc.)
- Communications
- Economics/Finance/Insurance
- Transport infrastructure for accessing agricultural supplies and markets
- Marketing

## Table 2.2 Impacts on Crop Production

Table 2.2 below provides a useful structure on which to document the information you obtain. This has been adapted from a GIZ Climate Proof Training Manual produced for a regional training course:

1 System of interest	2 Geographical Location	3 CC trend / signal	4 Biophysical Impact	5 Socio-economic impact	6 References
Rainfed Lowland Rice Flowering	South East Lowland	Temperature Rise	Rice sterility	Lower rice yields	
Rain water harvest	South West Lowland	Erratic Rainfall	Lack of irrigation for production	Lower rice yields	
On-farm Crop Storage	National	Humidity Increases	Increases losses in storage	Post-harvest losses	

**In Column 1**, identify the system of interest (e.g. rice rotation, rainwater management, flood prevention, irrigation, crop yield, storage losses, etc.).

**In Column 2**, document the geographical location of the systems in column 1. If there are numerous, then please add a row per location. At this stage, these can however be generic descriptions (e.g. 'southern region, uplands'). We will go into more detail on location when we look at vulnerability in the next step of this methodology (step 3).

**In Column 3**, identify the key climate change signals of concern (increased temperature during flowering, more intense rainfall, sea level rise, drought, shorter growing season, etc.)

**In Column 4**, brainstorm the potential impacts to the biophysical part of the system (direct climate change impacts) by considering column 2 in combination with other sensitivity factors (e.g. consider if and how the system of actors and assets are currently sensitive to climate variability - think of ecological and social sensitivity – e.g. crop water requirements, crop storage requirements, access to improved seed for the agri-zone, access to processing and markets, etc.)<sup>8</sup>

**In Column 5**, brainstorm the socio-economic impacts (indirect climate change impacts) that you expect to result from climate change and the biophysical impacts.

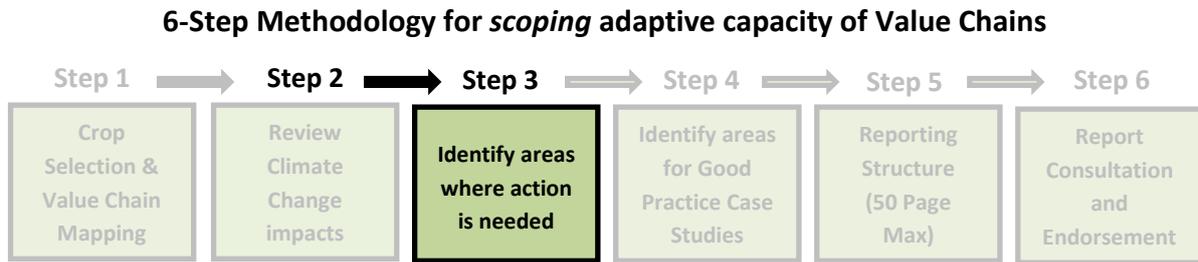
**In Column 6**, please take note of any references that have brought you to these conclusions.

### Discuss columns 4 and 5 using the following questions:

- How relevant are the potential impacts to food security?
- How likely is the impacts' occurrence?
- What is the extent of expected damage?

<sup>8</sup> Integrating climate change adaptation into development planning: A practice-oriented training based on an OECD Policy Guidance, Training Manual, GIZ 2011

## Step 3: Identify areas where action is needed



– By March/April 2014

**The objective of this step is to locate points in the value chains, or in activities designed to develop the value chains, that are vulnerable to climate change impacts (highlighting those areas that could benefit from regional collaboration).**

We are therefore looking for actions in the value chain that fall into one of two distinct camps:

1. Specific elements of the value chain that are deemed vulnerable to extreme weather events and climatic changes (identified by you in Step 2) where, to the best of your knowledge, there has so far been little or no action leading to improved climate resilience.
2. Future plans to improve the value chain (e.g. irrigation system investments, flood defences, infrastructure investments, new technologies, new markets, financial assistance, etc.) that do not consider the impacts of extreme weather and climate change (over the life of such plans and actions) but that could be vulnerable to these impacts.

This is done by reviewing your findings in table 2.2 (in Step 2) and estimating a vulnerability rating (very low, low, medium, high or very high) for each of the biophysical and socio-economic impacts you have identified. This can be done by adding an additional column to table 2.2 (see table 3.1 below). The vulnerability rating is assessed based on your assessment on exposure, sensitivity and ability of the system to respond. This vulnerability rating provides a preliminary indication of the need for action.

***Vulnerability is a function of exposure, sensitivity, and the ability to respond.***

Take into account the ability for the system of interest to respond. If the system can respond effectively to impacts without external support, it is considered less vulnerable. Where external support is provided and improves the ability to respond, please still score as vulnerable (we will identify the good practice which is addressing this vulnerability in Step 4). These assessments will be made from your own judgement and from those of other experts. These are the best guess you make from the information and experience that is available to you. They are to provide a rough estimate that allows us to better understand where there are areas that are vulnerable, and where there are areas that technical and human responses are making a difference. It is not an exact science, but a method of illustrating the state of play from existing knowledge and experience.

Thus, in defining the vulnerability rating, you should carefully assess available knowledge related to exposure, sensitivity, and ability to respond of a system of interest. You may have your own

judgement or you may gain the knowledge from other experts or from literatures. For example your of interest is Rainfed lowland rice flowering system (see Table 3.1). You may consider the system has 'high exposure' since South East Lowland area already is main low land rice production centre and the average temperature has reached at the high end of the tolerable level. The system also has 'High sensitivity' if you also know that most of farmers in the region still use less tolerant varieties to high temperature. You may rate ability to respond as "Low' if say you know that more tolerant varieties to high temperature are not available or accessible by farmers in this region, and existing extension services institution is still weak. It would be good if you could find a number of information (quantitative or qualitative) that support your rates. The vulnerability rating is derived based on your rates to the level of exposure, sensitivity and ability to respond (Table 3.2). Appendix 5 provides further explanation on deriving the vulnerability rating.

Special attention must be given to the impact upon and role of women, as there is a strong gender focus to this project. When reviewing vulnerability, it is therefore important to be asking gender specific questions. Some useful preliminary gender-specific questions can be found in the box below.

Summarise your findings by indicating 1-3 for the extent of vulnerability as follows:

Where 'ability to respond' is medium and high, and exposure and sensitivity is medium and high, these are likely to start providing examples of good practice that could start to be written up in the next steps of this methodology (Step 4 to Step 6). This is dealt with in more detail in the next section (Step 4).

### **Areas where Regional Collaboration can strengthen approaches**

The GAP-CC team are currently helping ASEAN develop a regional Food, Agriculture and Forestry strategy (FAF) for 2016 – 2020. Regional areas of collaboration and focus would therefore serve as inputs.

Step 4 of this guidance looks in more detail at the 'good practice' which exists in your countries that are designed to address these vulnerabilities in the chosen value chains. In step 4 you will also be determining where regional collaboration will be useful for scaling these good practice examples. However, these examples will not necessarily be able to cover all the areas where regional collaboration would be useful in improving the adaptive capacity of the sectors.

There is a need therefore in this step (Step 3), to also highlight any other areas in your chosen value chains where regional collaboration would be of benefit (i.e. where the capacities of individual countries could be strengthened through regional collaboration). This could be, for example, in researching new rice varieties, or, in seeking external support from the United Nations or World Meteorological Organization on improving seasonal forecasting and climate data. There may be many other examples (river basin management, agreements, policies, guidance, standardised approaches, etc.). We encourage you to speak with experts in your country and seek out where regional support could be useful. Please also comment on how welcome you feel this regional support might be.

**Table 3.1 Vulnerability Rating (continuation from previous examples)**

<b>1 System of interest</b>	<b>2 Geographical Location</b>	<b>3 CC trend/signal</b>	<b>4 Biophysical Impact</b>	<b>5 Socio- economic impact</b>	<b>6 Exposure</b>	<b>7 Sensitivity</b>	<b>8 Ability to Respond</b>	<b>9 Vulnerability Rating (need for action)</b>	<b>10 References</b>
Rainfed Lowland Rice Flowering	South East Lowland	Temperature Rise	Rice sterility	Lower rice yields					
Rain water harvest	South West Lowland	Erratic Rainfall	Lack of irrigation for production	Lower rice yields					
On-farm Crop Storage	National	Humidity Increases	Increases losses in storage	Post-harvest losses					

**Table 3.2. Matrix for estimating vulnerability rating**

<b>Exposure</b>	<b>Sensitivity</b>	<b>Ability to Respond</b>	<b>Vulnerability Rating</b>
High	High	High	High
High	High	Medium	Very high
High	High	Low	Very high
High	Medium	High	Medium
High	Medium	Medium	High
High	Medium	Low	Very high
High	Low	High	Low
High	Low	Medium	Medium
High	Low	Low	High
Medium	High	High	Medium
Medium	High	Medium	High
Medium	High	Low	Very high
Medium	Medium	High	Low
Medium	Medium	Medium	Medium
Medium	Medium	Low	High
Medium	Low	High	Very Low
Medium	Low	Medium	Low
Medium	Low	Low	Medium
Low	High	High	Low
Low	High	Medium	Medium
Low	High	Low	High
Low	Medium	High	Very Low
Low	Medium	Medium	Low
Low	Medium	Low	Medium
Low	Low	High	Very Low
Low	Low	Medium	Very Low
Low	Low	Low	Low

## Stakeholder Analysis

For each vulnerability rating, please take note of the main stakeholders and their respective geographical locations that you and others you speak with identify as being affected by, and who are affected. Where possible, please update your value chain map from step 1.

Keep note of not just those who will be impacted, but also for those stakeholders who create and influence 'framework conditions': these are the policies, guidance, regulation, legislation, incentives, etc. that shape the system of crop production.

<p><b>Delivery Organisations</b></p>	<p>E.g.</p> <ul style="list-style-type: none"> <li>• Farmers</li> <li>• Households</li> <li>• Farmer Associations</li> <li>• Farmer Cooperatives</li> <li>• Local traders</li> </ul>
<p><b>Framework Organisations</b> (please see Appendix 4 for a list of examples of the types of conditions these organisations may provide)</p>	<p>E.g.</p> <ul style="list-style-type: none"> <li>• Government Department</li> <li>• Research Institutes</li> <li>• Local NGOs</li> <li>• Agriculture Unions</li> <li>• Extension Staff</li> <li>• Regulators</li> <li>• Banks &amp; Insurance</li> </ul>

- What perceived barriers and enablers to action are there and who is involved in these?
  - What supports or blocks the action possible (policy, funding, time, labour, expertise, research, motivation of individual, motivation of many, etc.)
- Who are the main delivery stakeholders (always checking value chain map)?
- What actions are they involved in?
- Who designs relevant framework conditions?
  - Is it government, or, Research institutes, or, NGOs, etc?

*NB. When documenting stakeholders, please include:*

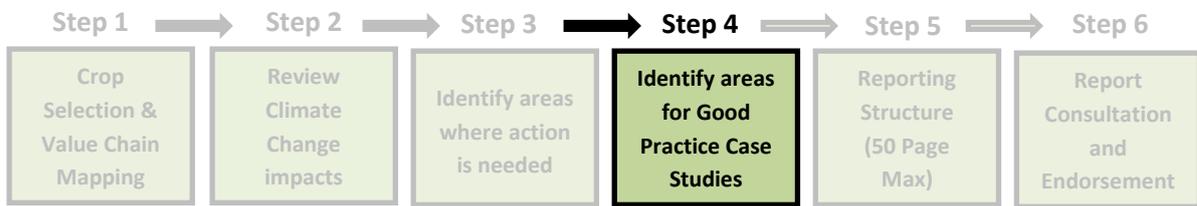
- *Role and type of organisation (in general, as well as, directly relevant to the good adaptation practice),*
- *Size of organisation, and*
- *Contact details of main contact (permission to share these with the project must be agreed with the contact, please do not share any details unless they have agreed).*

## Gender Specific Questions

1. Are the risks from the climate impacts different for women than for men? If so, what are the differences?
2. What is the impact of recommended improvements in food production on women? (e.g. increasing workloads of women and girls)

## Step 4 – Identify areas for Good Practice Case Studies

### 6-Step Methodology for scoping adaptive capacity of Value Chains



– By March/April 2014

**Identify projects and other areas of good practice on climate change adaptation in your chosen Value Chains - these will become the Good Practice Case Studies to written-up in Step 5.**

**Each research team is to identify a maximum of 5 good practices in their country. Please bear in mind that there is a maximum of 50 pages for you to report back (structure provided in Step 5).**

Considering what you already know about climate change in your country and specifically related to the value chain in question (from previously, or through the work you have carried out in steps 1 to 3 of this methodology), we are looking to identify instances of good practice that have potential to be shared regionally to help promote climate resilient food security in the region. Some examples of good practices are: rain water harvesting, subsidies for agricultural pump sets, shifts to drought/salt resistant varieties of crop, crop-diversification.

Along the value chain, 5 existing successful practices, and/or projects for tackling climate change related threats and increasing resilience to climate change are to be identified. These will be the 5 good practice case studies in your reports. We are looking specifically at those practices which address areas of high vulnerability. In table 3.1 in Step 3, you will have scored certain areas as having ‘high’ vulnerability. If you know of any good practices which are aimed at developing the capacity to address these highly vulnerable areas, then these are certainly worth considering in this section. Likewise in Column 8 in Table 3.2 (‘Ability to Respond’), where you have scored something as ‘high’, and the overall vulnerability rating (Column 9) is therefore scored as ‘medium’ or ‘low’, then this ‘ability to respond’ is itself also worth considering as a ‘good practice’ for your 5 case studies.

Special attention is also to be paid to those practices (or specific elements of that practice) that have potential to be replicated and scaled-up within the region. This can be anything from technical know-how at the input and production level, through to institutional enablers (the factors that have made action possible). In general, actions that would profit from a regional approach are of special interest in this respect. To help with identifying these, Appendix 4 provides a list if the types of conditions that might be useful to scale regionally. This is however not an exhaustive list, and you encouraged to add your own.

**A particular focus will be made on those practices that improve the situation of women:**

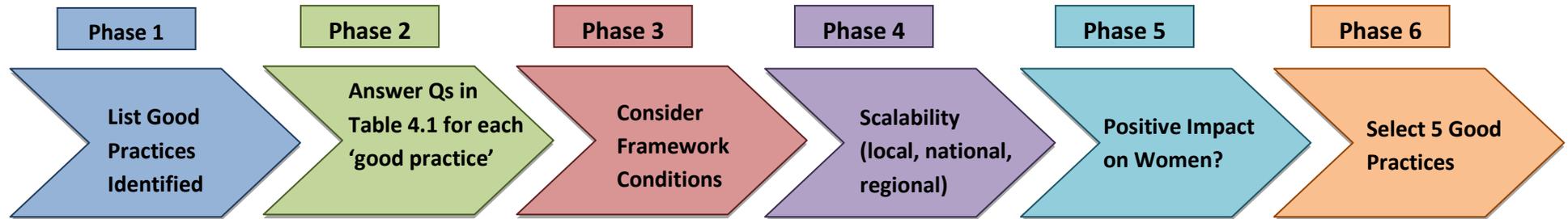
Who benefits from improvements?  
 Who makes the investments (financial and time) in generating improvements?  
 Do improvements require additional labour from women which is not compensated?

However, not all of what is assumed to be good adaptation practices are in fact good adaptation practices. It is critical to be able to differentiate between what is intended to be good practice, and what actually is good practice. For example, climate modelling is often critical to good adaptation options, however, the models themselves do not constitute an adaptation action (they are designed *to inform* action, not *be* action). Likewise, increasing utilisation of water resources may help one area, while causing troubles for downstream users. Another example where what might first appear to look like good practice but may not necessarily be so, could be in clearing forests to create new agri-zones that keep up with shifting climatic zones in order to retain the production of a specific crop, while the deforestation itself creates soil erosion.

A 6-phase methodology for identifying and then prioritising which good practice case studies to select can be found overleaf.

## IDENTIFYING GOOD PRACTICE

Instances of good practice that you discover through your individual research need to be tested for relevance to this project. The following steps will help to assess this:



**Phase 1** LIST GOOD PRACTICES IDENTIFIED THROUGH YOUR RESEARCH

**Phase 2** FOR EACH GOOD PRACTICE IDENTIFIED, ANSWER THE QUESTIONS LISTED IN TABLE 4.1 (SEE SEPARATE SHEET)

**Phase 3** CONSIDER WHETHER ANY RELEVANT FRAMEWORK CONDITIONS EXIST FROM APPEDIX 4 (USE APPENDIX TABLE TO STRUCTURE YOUR THOUGHTS)

**Phase 4** MAKE AN ASSESSMENT OF WHETHER THIS PRACTICE MAY BE RELEVANT TO OTHER GEOGRAPHICAL LOCATIONS & AMS IN THE REGION AND/OR HAS ELEMENTS THAT COULD USEFULLY BE SHARED/SUPPORTED REGIONALLY. HOW SCALABLE IS THE GOOD PRACTICE?

**Phase 5** FOR EACH GOOD PRACTICE IDENTIFIED, ASSESS WHETHER THE BENEFITS WILL POSITIVELY IMPACT UPON THE SITUATION OF WOMEN.

**Phase 6** FINALISE LIST OF FIVE GOOD PRACTICES – SORT DATA AS PER TABLE OVERLEAF

**Table 4.1 Criteria and indicators for appraisal of adaptation measures**

<b>Criterion</b>	<b>Indicators / sub-criteria</b>	<b>Questions to be asked</b>
Effectiveness of adaptation	Adaptation function	Does the measure provide adaptation in terms of reducing risks, reducing exposure, enhancing resilience or enhancing opportunities?
	Robustness to uncertainty	Is the measure effective under different climate scenarios and different socio-economic scenarios?
	Flexibility	Can adjustments be made later if conditions change again or if changes are different from those expected today?
Side effects	No regret	Does the measure contribute to more sustainable water management and bring benefits in terms of also alleviating already existing problems?
	Win-win (or win-lose)?	Does the measure entail side-benefits for other social, environmental or economic objectives? E.g. does it: <ul style="list-style-type: none"> <li>• contribute to closing the gap between water availability and demand?</li> <li>• affect the delivery of other objectives (e.g. river flow)?</li> <li>• create synergies with mitigation (e.g. does it lead to decreased GHG emissions)?</li> </ul>
	Positive spill-over effects	Does the measure affect other sectors or agents in terms of their adaptive capacity?
	Negative spill-over effects	Does the measure cause or exacerbate other environmental pressures? Does it contribute to greenhouse gas emissions?
	Trade-offs	Does one adaptation measure cause the need for another (e.g. creating downstream water pressures, or creating soil erosion, etc)?
<b>Criterion</b>	<b>Indicators / sub-criteria</b>	<b>Questions to be asked</b>
Efficiency/costs and benefits	Low-regret	Are the benefits the measure will bring high relative to the costs? (If possible, consider also distributional effects [e.g. balance between public and private costs], as well as non-market values and adverse impacts on other policy goals)

Framework conditions for decision-making	Equity and legitimacy	Who wins and who loses from adaptation (remember to pay specific attention to the role of, and impact upon, women)?
	Are decision-making procedures accepted by those affected?	Who decides about adaptation? Are there any distributional consequences of the climate change impacts or of the adaptation measures?
	Do they involve stakeholders in Decision-Making?	
Feasibility of implementation	<p>What barriers are there to implementation at a regional level / scaling up and replication?</p> <ul style="list-style-type: none"> <li>• technical limitations</li> <li>• Social limitations (number of stakeholders, diversity of values and interests, level of resistance)</li> <li>• Institutional (conflicts between regulations, degree of cooperation, necessary changes to current administrative arrangements)</li> </ul>	
Alternatives	Are there alternatives to the envisaged adaptation measure that would e.g. be less costly or would have fewer negative side-effects?	
Priority and urgency	<p>When are the climate change impacts expected to occur?</p> <p>At what timescales does action need to be taken?</p>	How severe are the climate impacts the adaptation measure would address relative to other impacts expected in the Area/river basin/country?

We are looking for the projects which in your opinion score highest against the criteria in the above table (there will not always be the quantitative information to be completely certain of your opinion and so qualitative analysis may be needed – i.e. your own perspective, or the perspective of others, may be what we will need to rely upon at this stage of the project).

We are not expecting to find areas where all (or even many) of these criteria can be answered positively. However, thinking about the questions in this table when identifying good practice will bring us more rapidly in touch with those actions which are ahead of the game. Based on your analyses, the capacity needs to implement the potential solutions (technical farm-level to institutional and economic aspects) at national and at regional level are to be identified.

Particular focus lies again on areas of **regional collaboration**, and in **trans-boundary aspects** of the value chain, with the aim of identifying regional strategies and instruments to promote coherent approaches on climate change adaptation (and mitigation where possible). These could include, among others, such actions as: river basin management, regional collaboration, collaborative research and implementation projects, knowledge exchange programmes, mentoring opportunities, sharing specialist expertise, etc.). Though the focus is on adaptation, this initiative does not exclude mitigation in the identification of good practices or areas of regional collaboration. In practice mitigation and adaptation tend to be approached separately though there are substantial benefits of addressing them together, in particular where they can be integrated. For example, with annual crops, changing from conventional tillage to soil conservation can achieve both goals: more water is captured and soil organic matter increased (mitigation); and yields of maize and other crops can be 20–120% higher (adaptation)<sup>9</sup>. Appendix 4 has a list of the kinds of ‘framework conditions’ that have potential for regional scaling. These are worth considering in context with any initiatives or support you identify. The examples are not an exhaustive list, so please also feel free to add to them.

### Table 4.2 Structuring Your Good Practice Adaptation Options

Below is a useful structure to summarise your findings for this step (Step 4). There is no need to present your findings as a table – it is the structure that is important.

Case Study	Brief Description	Meeting Criteria in Table 4.1?	Regional Relevance	Impact on women (-ve / +ve / neutral)	References
1					
2					
3					
4					
5					

<sup>9</sup> <http://blog.worldagroforestry.org/index.php/2013/11/11/agriculture-can-mitigate-and-adapt-to-climate-change/#sthash.IRRdVEa8.dpuf>

## Stakeholder Analysis

For each of the good climate change adaptation practices, please take note of each of the stakeholders you and others you speak with identify as being affected by, and who affect this good adaption practice.

Keep note of not just those who will be impacted and who may have a direct local role in delivering the good practice, but also for those stakeholders who create and influence framework conditions (policy, guidance, regulation, legislation, incentives, etc.).

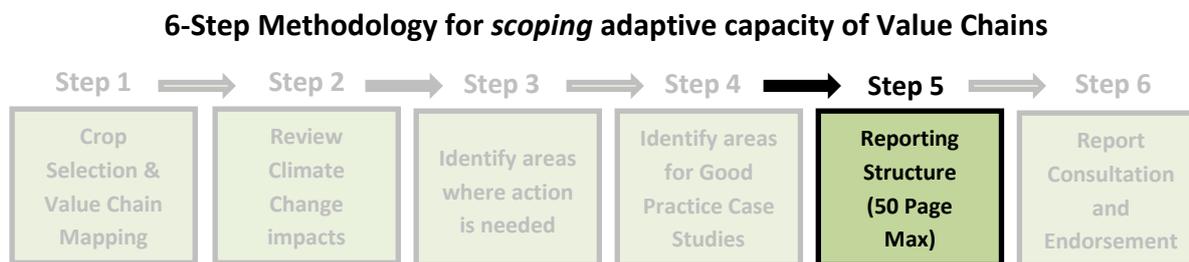
<p><b>Delivery Organisations</b></p>	<p>E.g.</p> <ul style="list-style-type: none"> <li>• Farmers</li> <li>• Households</li> <li>• Farmer Associations</li> <li>• Farmer Cooperatives</li> <li>• Local traders</li> </ul>
<p><b>Framework Organisations</b> (please see Appendix 4 for a list of examples of the types of conditions these organisations may provide)</p>	<p>E.g.</p> <ul style="list-style-type: none"> <li>• Government Department</li> <li>• Research Institutes</li> <li>• Local NGOs</li> <li>• Agriculture Unions</li> <li>• Extension Staff</li> <li>• Regulators</li> </ul>

- How effective are they at delivering their objective?
- What perceived barriers and enablers to action are there and who is involved in these?
  - What supports or blocks the action possible (policy, funding, time, labour, expertise, research, motivation of individual, motivation of many, etc.)
- Who are the main delivery stakeholders (always checking value chain map)?
- What actions are they involved in?
- Who designs relevant framework conditions?
  - Is it government, or, Research institutes, or, NGOs, etc?

*NB. When documenting stakeholders, please include:*

- *Role and type of organisation (in general, as well as, directly relevant to the good adaptation practice),*
- *Size of organisation, and*
- *Contact details of main contact (please make sure that you get permission to share contacts within the project before doing so)*

## Step 5 – Report Structure



– Draft by May 2014 (prior to May workshop)

It is important that your findings are written up to a specific structure, as results from multiple countries across the region will be brought together for direct comparison and analysis. There is a maximum of **50 pages** (to include both crops) for the 5 good practices that you select, including the identification of areas of regional collaboration (from Steps 3 and 4). Please ensure that all references are appropriately ‘cited’ throughout the report, and that references are provided. Please also submit a copy of each reference when you submit your reports.

Some elements of the report writing will need to be completed for each individual crop (and potentially crop production system) that you have chosen, while other parts of the report are designed to cover both. You do not need to write a separate report for each crop production system.

A report structure is provided below. Where sections need to be repeated for each crop and/or production system (divergence), it is indicated. Where the report section should cover all crops and production systems that you have chosen to cover (convergence), it is also indicated.

**NB.**

**Please submit an annotated version of this report in the structure provided below for consultation with the project team prior to writing the full report. To be submitted to the project team by early April 2014. The need for this is also covered in Step 6.**

**Thank you.**

## Report Structure:

- **Executive Summary**
  - Cover all crops and production systems (i.e. converge)
- **Introduction**
  - Brief description of country and value chains covered in the report (converge)
- **Value Chain Mapping**
  - A value chain map for each crop (and potential production system – it depends how different they are) covered and the reason for selection (please include table 1.1 from step 1) – (diverge)
- **Review of Climate Change Impacts and Vulnerabilities**
  - Description of direct and indirect climate change impacts relevant to each crop and functional area. – (diverge)
  - Table of Climate Change Impacts Assessment and Vulnerability Rating (as in Table 3.1 of methodology – please complete 1 table for each value chain) –(diverge)
  - Include answers to gender specific questions (from Step 4 of Methodology) – (diverge)
  - A brief stakeholder analysis for each vulnerability ratings (diverge)
- **Areas where Regional Collaboration can strengthen approaches**
  - highlight areas in your chosen crops and production systems where capacities could be strengthened through regional collaboration (from Step 3). – (converge)
  - Please also comment on how welcome you feel this regional support might be (converge)
- **Case Studies of Good Practice**
  - 5 good climate change adaptation practices to be described (from two value chains)
  - Please describe the type of practice that is being recommended. (E.g. a project, a technical solution, an action, a plan, etc.)
  - Why have these practices been selected (how do they relate to the criteria indicators in table 4.1 in Step 4?)
  - Which climate change vulnerabilities do they address?
  - Where is this action located?
  - Which part of the value chain is it designed to support/develop? (e.g. inputs, production, trading, etc.)
  - Who is the action designed to benefit?
  - How far into the future is it looking at future climate events?
  - What has changed in the value chain as a result of this action?
  - What have been the main barriers and enablers to this action?
    - Including what are the main policies, regulations, standards, research and expertise that are involved.
  - Could regional support help deliver this action better, or spread it more widely (if so, what). How, if at all, could such an action be scaled nationally or regionally?
  - Who are the stakeholders and what is their role – framework to delivery? (contact details will be needed – please see footnote on previous page)
  - What are the gender implications?

- Structure a summary of your chosen good adaptation practice as per table 4.2 (in Step 4).
- **Conclusions**
  - a) Recommendations of areas of regional collaboration and sharing of best practices / mechanisms – (converge)
  - b) Exploring any links between good practice and regional collaboration? –(converge)
- **Key documents**
  - Please include any key documents about the good adaption practice
  - Please include a reference page of all literature cited and used

### **How your results will be used:**

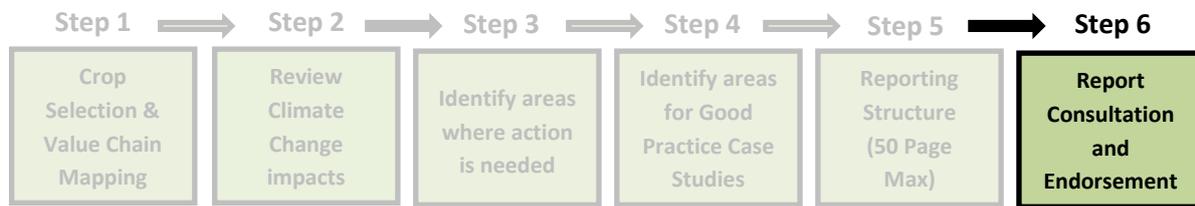
The results of your findings will then be collated for all 7 countries involved in this project for direct comparison to identify where good adaptation practice examples have the highest potential to be scaled regionally. A selection of these will then go through a second round of deeper analysis that defines how best to share the components of that good practice in a way that can support others in the region. This will be done collaboratively with project partners and the relevant stakeholders. The second round of analysis will look deeper at the barriers and enablers that you have identified, and pinpoint the things that have made the good practice possible – and so help us understand what types of intervention could best share that learning and experience in ways that target those that need it most.

The identified areas where action is needed will be discussed in the second regional meeting to agree on key areas and approaches to:

- 1. Sharing best practices**
- 2. Strengthen regional collaboration**

## Step 6 – Report Consultation and Endorsement

### 6-Step Methodology for *scoping* adaptive capacity of Value Chains



– By end of June 2014

**Objective: Provide a National-level and project-level consultation process prior to official endorsement and sign-off by AMS Ministry.**

It is critical that final reports are endorsed and signed-off by each respective AMS's Ministry. You will have your own official processes that you will need to follow, and so we have allocated time for these to be followed.

The process of endorsement and timings to fit with this project are as follows:

1. Annotated report submitted to project by early April 2014 for consultation among project members (no need to endorse at this point)
2. Draft report written up good time for May workshop (some endorsement may be required at this stage depending upon your own internal processes, but as this is still in draft form, and there is still time to make tweaks and alterations, we are hoping that this will not be slowed down by requiring official sign-off – it is still in draft format).
3. Alterations to draft report (post workshop) to be completed by end of May 2014.
4. National consultation process for official endorsement takes place in June 2014
5. Sign-off of report to be completed by end of June (for secondary work to begin in July 2014)

## Appendix 1: Framework Conditions –Examples of things that have potential to be scaled regionally

Are any of these conditions affecting good practice in your country or region?	Please give details	Who is responsible for them?	Who is impacted by this initiative?
Subsidies or other financial incentives			
Well-targeted laws (penalties for non-compliance)			
Effective system of regulation (penalties, trained enforcement, etc)			
Checklists of impacts, consequences and risks			
Sample adaptation policies and strategies that can be adopted			
Simple guidelines and frameworks suitable for use by non-experts			
Simple information and/or advisory services to help farmers and other to get started			
Action programs for farmer and other to engage with climate change adaptation			
Public-private-dialogue to promote engagement in climate change adaptation			
Data on impacts, consequences and risks at a detailed level (e.g. site-specific level)			
Professional standards (e.g. an ISO14000 equivalent applied to adaptation).			
Professional training and certification of expertise			
Best practice guidelines			
Benchmarking processes			
'Improvement clubs' – e.g. action-focussed learning with other practitioners			
Targeted collaborative ('breakthrough') projects with significant goals.			

<b>Are any of these conditions affecting good practice in your country or region?</b>	<b>Please give details</b>	<b>Who is responsible for them?</b>	<b>Who is impacted by this initiative?</b>
Seed funding for innovation			
Early sharing of targeted research			
Projects where learning is seen as more important than outcomes			
Funding of skilled facilitators			
Knowledge exchange networks / enterprise hubs involving both academia and practitioner			
Comprehensive scenarios of impacts & consequences over decision timescales to 2100+			
Progressive and challenging targets over decades – e.g. the Montreal Protocols			
Is there a learning infrastructure to gather and make sense of experience and to redirect the programme accordingly			
International and cross-industry agreements			
Do powerful figures such as Heads of State or Ministers convene meetings on climate change?			
Funded large-scale research programmes addressing long-term strategic challenges			
Active programmes of breakthrough experimentation			

## **Appendix 2: Schedule of Activity** (agreed at Special ATWGARD Kick-off Workshop, 24th January, 2014 – Thailand:

### **Schedule of Activities**

ASEAN Network on the Promotion of Climate Resilience in Rice and Other Crops  
ASEAN-German Programme on Response to Climate Change (GAP-CC)

<b>January 2014</b>	1 <sup>st</sup> Regional Meeting: ATWGARD Kick-off Workshop
<b>February 2014</b>	1 <sup>st</sup> National Consultative Meetings Sector Studies
<b>March 2014</b>	Sector Studies Report Progress to AFCC
<b>April 2014</b>	Sector Studies
<b>May 2014</b>	2 <sup>nd</sup> National Consultative Meetings Finalization of 1 <sup>st</sup> Draft Report to ATWGARD 2 <sup>nd</sup> Regional Meeting (6-7 May 2014)
<b>June 2014</b>	Finalization of Sector Studies
<b>July 2014</b>	
<b>August 2014</b>	ATWGARD to report progress to SOM-AMAF
<b>September 2014</b>	Regional Policies and Strategies
<b>October 2014</b>	Regional documents circulated
<b>November 2014</b>	3 <sup>rd</sup> Regional Meeting
<b>December 2014</b>	
<b>January 2015</b>	Finalization of Regional Plans
<b>May 2015</b>	Endorsement of ATWGARD

## Appendix 3: HAND\_OUT 1

### VALUE CHAIN MAPPING SOME KEY DEFINITIONS, RELATIONSHIPS AND LINKAGES

#### DEFINITIONS

##### Value chain (VC) definition

A value chain is - a *sequence of related business activities (functions)* from the provision of specific inputs for a particular product to primary production, transformation, marketing, and up to the final sale of the particular product to consumers (the functional view on a value chain). - the *set of enterprises (operators)* performing these functions i.e. producers, processors, traders and distributors of a particular product. Enterprises are linked by a series of business transactions in which the product is passed on from primary producers to end consumers.

According to the sequence of functions and operators, value chains consist of a series of chain links (or stages).

Note: The PRIMARY FOCUS of analysis for the ASEAN GAP CC Project is the PRODUCTION PHASE of the value chain i.e. This includes the business activities to provide the inputs and resources needed for growing, harvesting and storing the respective crops (e.g. land and water management, fertilizers, seeds, labour, machinery, factories etc.).

##### VC actor

This term summarizes all individuals, enterprises and public agencies related to a *value chain*, in particular the *VC operators*, providers of *operational services* and the providers of *support services*. In a wider sense, certain government agencies at the *macro level* can also be seen as VC actors if they perform crucial functions in the *business environment* of the value chain in question.

##### VC operator

The enterprises performing the basic functions of a *value chain* are VC operators. Typical operators include farmers, small and medium enterprises, industrial companies, exporters, wholesalers and retailers. They have in common that they become owners of the (raw, semi-processed or finished) product at one stage in the VC.

## **Business linkages**

VC operators relate to each other both horizontally (among enterprises at the same stage of the value chain, pursuing the same type of activity) as well as vertically (between suppliers and buyers of produce). Vertical business linkages can range from accidental market exchanges to a full coordination of activities regulated by contracts. Horizontal business linkages range from informal networks to associations and business membership organizations (BMO).

## **Geographic ‘Cluster’**

A cluster is a geographic concentration of enterprises which are closely connected, along a value chain or as a network settling around an important buyer or industrial company (e.g. *value chain actors* in the cut flower export business all located close to an international airport). A simple definition says: A cluster is a value chain that is concentrated at the same location.

## **Interventions (to promote value chains)**

Interventions are temporary actions of external *facilitators* aimed at mobilising and/or joining *value chain actors* and building their capacity thus promoting change in the value chain. The idea is that an external intervention triggers an internal change of the system, in this case the behaviour of VC actors.

## **Leverage point**

An element in a system, where a small intervention or change can yield large effects in the overall system.

## **Value Chain Mapping**

Mapping always starts by drawing a basic map providing an overview of the entire value chain. The overview map should present the major links (segments) of the value chain. It should visualize:

- the sequence of production (and marketing) functions performed (in hollow white arrows)
- the value chain operators taking these functions (in yellow boxes)
- the business links between the operators (arrows)

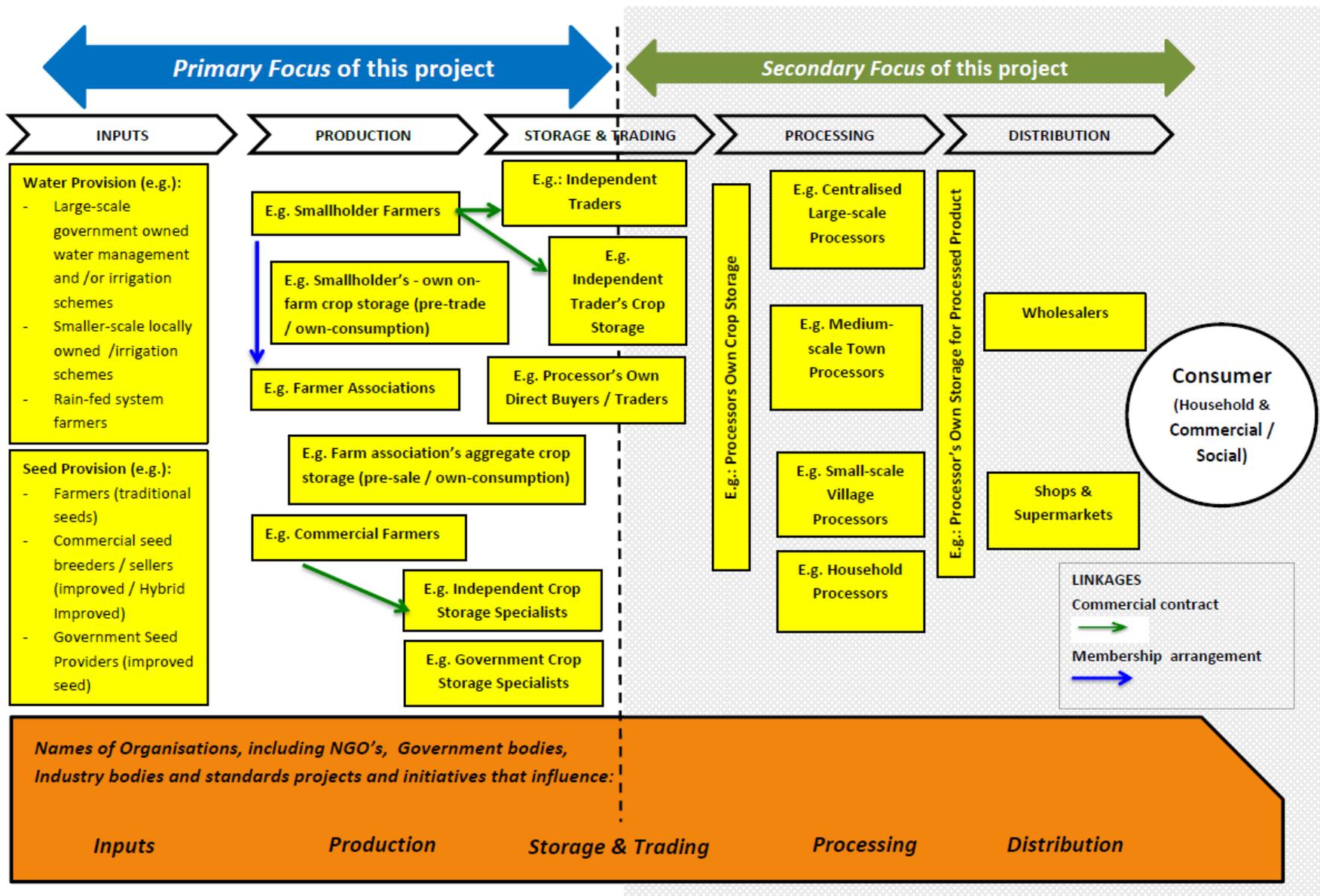
## **Business Linkages**

The coordination between different chain operators is at the core of the value chain concept. Linkages exist both between operators at the various stages of the value chain e.g. small holder farmers and independent traders and between operators working at the same stage, e.g. Smallholder farmers and commercial farmers.

Business linkages are the commercial transactions between enterprises. They are classified as “vertical”, when the transaction (mainly buying and

selling) takes place between enterprises at different stages of the value chain, i.e. along the direction of the arrows in value chain maps. “Horizontal” business linkages refer to the transactions between enterprises operating in the same functional segment of the value chain. These are, for example, joint purchase and sales activities and joint use of equipment and facilities. To the extent that horizontal collaboration is organized in producer groups or business associations, the internal relations between the members are business transactions as well.

*NB. The usual terminology of “horizontal and vertical” does not necessarily coincide with the directions used when visualizing the linkages. Many diagrams show the value chain turned through 90 degrees, so that vertical linkages in fact appear as horizontal. This has pragmatic reasons and is due to the fact that PowerPoint presentations use the landscape format. It does not have any significance for the definitions introduced above.*



## Appendix 4: Source documents by country/region and by crop

### Source documents by country/region and by crop

Country	National/regional Impact assessment sources (e.g. National Communication to the UNFCCC) <sup>10</sup>	Rice: Impact assessment sources	Cassava: Impact assessment sources	Maize: Impact assessment sources
<b>Cambodia</b>	<p>National Communication Ministry of Environment. 2002. National Communication under The United Nations Framework Convention on Climate Change. Phnom Penh, Cambodia</p> <p>Ministry of Environment. 2009. Second National Communication of Cambodia under United National Framework Convention on Climate Change (UNFCC). Phnom Penh, Cambodia</p> <p>Ministry of Environment. 2006. National Adaptation Programme of Action to Climate Change. Phnom Penh, Cambodia</p> <p>Ministry of Agriculture, Forestry, and Fishery and United Nations Development Programme Cambodia. 2010. Annual Project Report 2010.</p>	<p>Masutomi, Y., Takahashi, K. Harasawa, H., Matsuoka, Y. 2009. Impact assessment of climate change on rice production in Asia in comprehensive consideration of process/parameter uncertainty in general circulation models. <i>Agriculture, Ecosystems, and Environment</i> 131:281-291</p>		<p>Mejia, D. 2003. MAIZE: Post-harvest operation. Food and agriculture organization of the United Nations (FAO). Rome.</p> <p>Bala, B.K., Haque, M.A., Hossain, M.A. and Majumdar, S. 2010. Post Harvest Loss and Technical Efficiency of Rice, Wheat and Maize Production System: Assessment and Measures for Strengthening Food Security. National Food Policy Capacity Strengthening Programme, FAO, Rome.</p>

<sup>10</sup> Ibid.

Country	National/regional Impact assessment sources (e.g. National Communication to the UNFCCC) <sup>10</sup>	Rice: Impact assessment sources	Cassava: Impact assessment sources	Maize: Impact assessment sources
	<p>Phnom Penh, Cambodia</p> <p>Magnan N., Thomas T.S. 2010. Climate change to 2050: Cambodia. Paper for Cambodian Food Security and Agriculture Policy Stocktaking Roundtable. Phnom Penh.</p> <p>Royal Government of Cambodia. 2009. National Strategic Development Plan Update 2009-2013; for growth, employment, equity and efficiency to reach Cambodia millenium development goals. Cambodia</p> <p>Shaw R., Prabhakar SVRK., Nguyen H., Perez F. No year. Drought management considerations for climate change adaptation: focus on the Mekong Region. Phnom Penh</p>			
<b>Indonesia</b>	<p>National Communication Ministry of Environment. 2010. Indonesia Second National Communication Under The United Nations Framework Convention on Climate Change. Jakarta, Indonesia</p> <p>y of National Development Planning. 2012. National Action Plant for Climate</p>	<p>Masutomi, Y., Takahashi, K. Harasawa, H., Matsuoka, Y. 2009. Impact assessment of climate change on rice production in Asia in comprehensive consideration of process/parameter uncertainty in general circulation models. <i>Agriculture, Ecosystems, and Environment</i> 131:281-291</p>		<p>Mejia, D. 2003. MAIZE: Post-harvest operation. Food and agriculture organization of the United Nations (FAO). Rome.</p> <p>Bala, B.K., Haque, M.A., Hossain, M.A. and Majumdar, S. 2010. Post Harvest Loss and Technical Efficiency of Rice, Wheat and Maize</p>

Country	National/regional Impact assessment sources (e.g. National Communication to the UNFCCC) <sup>10</sup>	Rice: Impact assessment sources	Cassava: Impact assessment sources	Maize: Impact assessment sources
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Country	National/regional Impact assessment sources (e.g. National Communication to the UNFCCC) <sup>10</sup>	Rice: Impact assessment sources	Cassava: Impact assessment sources	Maize: Impact assessment sources
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<b>Lao PDR</b>	<p>Department of Environment (DoE). 2011. Lao People Democratic Republic: The Second National Communication on Climate Change. Vientiane: Department of Environment Lao PDR</p> <p>Department of Environment [DoE]. 2000. Lao People Democratic Republic The First National Communication On Climate Change. Vientiane: Department of Environment Lao’PDR</p> <p>United Nations. 2009. National Adaptation Programme of Action to Climate Change. Vientiane, Lao PDR</p> <p>Ministry of Agriculture and Forestry. 2010. Strategy for Agricultural Development 2011 to 2020. Vientiane, Lao PDR</p> <p>Foley S. 2009. Growing resilience</p>	<p>Masutomi, Y., Takahashi, K. Harasawa, H., Matsuoka, Y. 2009. Impact assessment of climate change on rice production in Asia in comprehensive consideration of process/parameter uncertainty in general circulation models. <i>Agriculture, Ecosystems, and Environment</i> 131:281-291</p> <p>Boulidam S. 2012. Simulation of climate change impact on lowland paddy rice production potential in Savannakhet Province, Laos. [Thesis]. Viena: University of Natural Resources and Life Sciences.</p> <p>Buddhaboon C., Kongton S., Jintrawet A. 2005."Climate Scenario Verification and Impact on Rain-fed Rice Production." In Chinvano, S. and Snidvongs, A, eds. <i>The Study of</i></p>		<p>Mejia, D. 2003. MAIZE: Post-harvest operation. Food and agriculture organization of the United Nations (FAO). Rome.</p> <p>Bala, B.K., Haque, M.A., Hossain, M.A. and Majumdar, S. 2010. Post Harvest Loss and Technical Efficiency of Rice, Wheat and Maize Production System: Assessment and Measures for Strengthening Food Security. National Food Policy Capacity Strengthening Programme, FAO, Rome.</p>

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	<p>adapting for climate change in Upland Laos main report. EcoAsia Limited. Norwegian Church Aid Actalliance. Working Paper</p> <p>Lefroy R., Collet L., Grovermann C. 2010. Study on potential impacts of climate change on land use in the Lao PDR. Vientiane: International Center for Tropical Agriculture</p>	<p><i>Future Climate Changes Impact on Water Resource and Rain-fed Agriculture Production.</i> Proceedings of the APN CAPaBLE CB-01 Synthesis Workshop, Vientiane, Lao PDR, 29 - 30 July 2004. SEA START RC Technical Report No. 13, 113 pp (page: 51-78)</p> <p>Inthafong T., Jintrawet A., Chivanno S., Snidvongs A. 2005. " Impact of climate change on rainfed lowland rice production in Savannakhet province, Lao PDR (ABSTRACT)." In Chinvanno, S. and Snidvongs, A., eds. <i>The Study of Future Climate Changes Impact on Water Resource and Rain-fed Agriculture Production.</i> Proceedings of the APN CAPaBLE CB-01 Synthesis Workshop, Vientiane, Lao PDR, 29 - 30 July 2004. SEA START RC Technical Report No. 13, 113 pp (page: 25)</p> <p>Kerdsuk V., ongton S., Jintrawet A. 2005. "Impacts of climate change on rice production in Kula Ronghai field" (Abstract). In: Chinvanno, S. and Snidvongs, A, eds. <i>The Study of</i></p>		

Country	National/regional Impact assessment sources (e.g. National Communication to the UNFCCC) <sup>10</sup>	Rice: Impact assessment sources	Cassava: Impact assessment sources	Maize: Impact assessment sources
		<p><i>Future Climate Changes Impact on Water Resource and Rain-fed Agriculture Production</i>. Proceedings of the APN CAPaBLE CB-01 Synthesis Workshop, Vientiane, Lao PDR, 29 - 30 July 2004. SEA START RC Technical Report No. 13, 113 pp (page: 51-78)</p>		
<b>Malaysia</b>	<p>Ministry of Natural Resources and Environment (MNRE). 2000. Malaysia Initial National Communication. Kuala Lumpur: Ministry of Natural Resources and Environment of Malaysia</p> <p>Ministry of Natural Resources and Environment (MNRE). 2011. Malaysia Second National Communication. Kuala Lumpur: Ministry of Natural Resources and Environment of Malaysia</p> <p>Al-Amin AQ, Leal W, Trinxeria JM, Jaafar AH, Ghani ZA. 2011. Assessing the impact of climate change in the Malaysian agriculture sector and its influences in investment decision. <i>Middle-East Journal of Scientific Research</i> 7 (2): 225-234</p>	<p>Masutomi, Y., Takahashi, K. Harasawa, H., Matsuoka, Y. 2009. Impact assessment of climate change on rice production in Asia in comprehensive consideration of process/parameter uncertainty in general circulation models. <i>Agriculture, Ecosystems, and Environment</i> 131:281-291</p> <p>Ministry of Agriculture and Cooperative. 2011. Asean Food Security Information System (AFSIS) Project: Report on ASEAN Agricultural Commodity Outlook. Bangkok, Thailand</p>		<p>Mejia, D. 2003. MAIZE: Post-harvest operation. Food and agriculture organization of the United Nations (FAO). Rome.</p> <p>Bala, B.K., Haque, M.A., Hossain, M.A. and Majumdar, S. 2010. Post Harvest Loss and Technical Efficiency of Rice, Wheat and Maize Production System: Assessment and Measures for Strengthening Food Security. National Food Policy Capacity Strengthening Programme, FAO, Rome.</p>

Country	National/regional Impact assessment sources (e.g. National Communication to the UNFCCC) <sup>10</sup>	Rice: Impact assessment sources	Cassava: Impact assessment sources	Maize: Impact assessment sources
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Country	National/regional Impact assessment sources (e.g. National Communication to the UNFCCC) <sup>10</sup>	Rice: Impact assessment sources	Cassava: Impact assessment sources	Maize: Impact assessment sources
	<p>the impact of climate change in the Malaysian agriculture sector and its influences in investment decision. <i>Middle-East Journal of Scientific Research</i> 7 (2): 225-234</p> <p>Handoko I., Hardjomidjojo H. 2009. Global warming, climate change and impacts to food and agriculture. <i>Paper presented at a Seminar on "Climate Change Scenarios and Its Implication on Ecosystem and Biodiversity, Food Security and Health"</i>, Penang, Malaysia</p> <p>Kavvas M.L., Chen Z.Q., Ohara N. 2006. Final Report: Study of the impact of climate change on the hydrologic regime and water resources of peninsular Malaysia. California: California Hydrologic Research Laboratory</p>			
<b>Myanmar</b>	<p>Harvard Kennedy School. 2011. Myanmar Agriculture 2011: Old Problems and New Challenges. Cambridge, Massachusetts.</p>	<p>Masutomi, Y., Takahashi, K. Harasawa, H., Matsuoka, Y. 2009. Impact assessment of climate change on rice production in Asia in comprehensive consideration of process/parameter uncertainty in general circulation models. <i>Agriculture, Ecosystems, and</i></p>		<p>Mejia, D. 2003. MAIZE: Post-harvest operation. Food and agriculture organization of the United Nations (FAO). Rome.</p> <p>Bala, B.K., Haque, M.A., Hossain, M.A. and Majumdar, S. 2010. Post Harvest Loss and Technical</p>

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		<p><i>Environment 131:281-291</i></p> <p>Ministry of Agriculture and Cooperative. 2011. Asean Food Security Information System (AFSIS) Project: Report on ASEAN Agricultural Commodity Outlook. Bangkok, Thailand</p> <p>Havard Kennedy School. 2011. Myanmar Agriculture 2011: Old Problems and New Challenges. Cambridge, Massachusetts</p>		<p>Efficiency of Rice, Wheat and Maize Production System: Assessment and Measures for Strengthening Food Security. National Food Policy Capacity Strengthening Programme, FAO, Rome.</p>
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<b>Thailand</b>	<p>Ministry of Science, Technology and Environment (MSTE). 2000. Thailand's Initial National Communication under the United Nations Framework Convention on Climate Change. Bangkok: Ministry of Science, Technology and Environment of Thailand</p> <p>Ministry of Natural Resources and Environment (MNRE). 2005. Thailand's Second National Communication under the United Nations Framework Convention on Climate Change. Bangkok: Ministry of Natural Resources and Environment of Thailand</p>	<p>Masutomi, Y., Takahashi, K. Harasawa, H., Matsuoka, Y. 2009. Impact assessment of climate change on rice production in Asia in comprehensive consideration of process/parameter uncertainty in general circulation models. <i>Agriculture, Ecosystems, and Environment</i> 131:281-291</p> <p>Hasegawa T., Sawano S., Goto S., Konghakote P., Polthanee A., Ishigooka Y., Kuwagata T, Toritani H., Furuya J. 2008. A model driven by crop water use and nitrogen supply for simulating changes in the regional yield of rain-fed lowland rice in Northeast Thailand (Abstract)</p>		<p>Mejia, D. 2003. MAIZE: Post-harvest operation. Food and agriculture organization of the United Nations (FAO). Rome.</p> <p>Bala, B.K., Haque, M.A., Hossain, M.A. and Majumdar, S. 2010. Post Harvest Loss and Technical Efficiency of Rice, Wheat and Maize Production System: Assessment and Measures for Strengthening Food Security. National Food Policy Capacity Strengthening Programme, FAO, Rome.</p>

Country	National/regional Impact assessment sources (e.g. National Communication to the UNFCCC) <sup>10</sup>	Rice: Impact assessment sources	Cassava: Impact assessment sources	Maize: Impact assessment sources
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<b>Viet Nam</b>	<p>Ministry of Natural Resources and Environment (MNRE). 2003. Viet Nam Initial National Communication. Ha Noi: Ministry of Natural Resources and Environment of Vietnam</p> <p>Ministry of Natural Resources and Environment (MNRE). 2010. Viet Nam's Second National Communication. Ha Noi: Ministry of Natural Resources and Environment of Vietnam</p> <p>Institute of Strategy and Policy on Natural Resources and Environment</p>	<p>Masutomi, Y., Takahashi, K. Harasawa, H., Matsuoka, Y. 2009. Impact assessment of climate change on rice production in Asia in comprehensive consideration of process/parameter uncertainty in general circulation models. <i>Agriculture, Ecosystems, and Environment</i> 131:281-291</p>		<p>Mejia, D. 2003. MAIZE: Post-harvest operation. Food and agriculture organization of the United Nations (FAO). Rome.</p> <p>Bala, B.K., Haque, M.A., Hossain, M.A. and Majumdar, S. 2010. Post Harvest Loss and Technical Efficiency of Rice, Wheat and Maize Production System: Assessment and Measures for Strengthening Food Security. National Food Policy Capacity Strengthening Programme, FAO, Rome.</p>

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	<p>(Iponre). 2009. Vietnam Assessment Report on Climate Change (VARCC). Hanoi, Vietnam</p> <p>Kien Giang Peoples Committee. 2011. Final Report: Climate Change Vulnerability &amp; Risk Assessment Study of Ca Mau and Kien Giang Provinces, Vietnam. Washington: Asian Development Bank Group</p> <p>World Bank. 2010. Economics of Adaptation to Climate Change: Vietnam. Washington, DC.</p> <p>FAO. 2011. Strengthening Capacities to Enhance Coordinated and Integrated Disaster Risk Reduction Actions and Adaptation to Climate Change in Agriculture in the Northern Mountain Regions of Viet Nam. Food and Agriculture Organisation, Hanoi</p> <p>Zhu, T., and Sihymete. 2010. Climate Change Impacts on Agriculture in Vietnam. <i>International Food Policy Research Institute, 2033 K Street, NW, Washington, DC, USA</i></p>			

## Appendix 5. Vulnerability as function of exposure, sensitivity and ability to respond

Vulnerability assessment is one of the critical steps in developing climate change resilience planning. This assessment helps to ensure that resilience strategies and interventions will target the most vulnerable populations, and address the greatest risks to sectors and systems. The result of the vulnerability assessment could inform what existing capacities to adapt, what the potential differential impacts of climate change, who and what the most vulnerable groups/sectors/systems, what factors that make the groups/sectors/systems vulnerable and how they may be affected, and what adaptation strategies and interventions that enhance their resilience.

By definition **vulnerability** indicates *'the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity'* IPCC (2001, 2007). Thus the vulnerability is a function of exposure, sensitivity and ability of the system to respond. *Exposure* is the degree, duration and/or extent in which the system is in contact with, or subject to, the perturbation (Adger 2006 and Kasperson et al. 2005 in Gallopin 2006). Sensitivity is internal to the system causing the proneness of the system. Adaptive capacity is defined as as the "ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences" (IPCC 2007).

Based on the above definitions, we can qualitatively define the vulnerability rating of a system based on our understanding and judgement to exposure, sensitivity and adaptive capacity of the system. Potential impact of climate change is expected to be 'high' on a system having high level of exposure and sensitivity. This potential impact could be reduced if ability of the system to respond is high. If we use three rating criteria to indicate the level of exposure, sensitivity and ability to respond, i.e. Low (L), Medium (M) and High (H), we may derive the vulnerability rating of the system based on matrix of rating of the potential impact and the ability to respond. Thus there are two steps for derive the vulnerability rating. The first step is to develop potential impact rating matrix using exposure and sensitivity ratings as shown in Table A1 (Top). The second step is to derived vulnerability rating based on the potential impact rating and the ability to respond as shown in Table A1 (Bottom).

Table A1. Deriving vulnerability rating based on exposure, sensitivity and ability to respond

**Step 1: Potential Impact Rating Matrix**

		Sensitivity		
		H	M	L
Exposure	H	VH	H	M
	M	H	M	L
	L	M	L	VL

**Step 2: Vulnerability Rating Matrix**

		Ability to respond		
		L	M	H
Potential Impact	VH	(V)VH	VH	H
	H	VH	H	M
	M	H	M	L
	L	M	L	VL
	VL	L	VL	(V)VL

Note: VVH (Very very high) and VVL (very very low) ratings could be defined as VH and VL in order to reduce rating categories from 7 to 5. If the rating categories is further reduce into 3, the H, VH and VVH could be defined as H and L, VL and VVL as L.