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Research Article

Development of a framework for climate change adaptation actions' effectiveness evaluation

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Abstract: This paper presents the development of a framework for effectiveness evaluation of climate change adaptation actions. The top–down approach was used to develop criteria for evaluating adaptation actions at national level and their effectiveness in enhancing adaptive capacity at provincial level. The bottom–up approach was used to develop criteria for evaluating the results of adaptation actions at provincial level and their effectiveness in achieving the national adaptation objectives. The criteria are expected to be part of the results–based climate change adaptation monitoring and evaluation system to be developed for Viet Nam.

Keywords: Climate change; Adaptation actions; Criteria for effectiveness evaluation; Monitoring and evaluation (M&E) framework.

1. Introduction

Being one of the most affected countries by climate change, in recent years, Viet Nam has been implementing many climate change adaptations (CCA) actions, and thus, it is necessary to evaluate the effectiveness of these actions with the aim to scale up or make adjustment accordingly. Viet Nam is in the process of development of a monitoring and evaluation (M&E) system, in which, effectiveness of CCA actions is the most important part of the system. Results of M&E system will be used in preparing reports on progress and achievements of national adaptation actions to submit to the National Committee on Climate Change, the Government. The results will be also used in the National Communication, Adaptation Report, and Transparent Report to be submitted to the Secretariate of UNFCCC.

The M&E of CCA policies and actions is necessary for efficient implementation and management of CCA actions. According to [1], the M&E of CCA actions can be conducted during the implementation (mid–term) or after completion and has important implications, including: (i) M&E of CCA actions can help to identify efficient and inefficient actions and causes as the basis to develop and carry out mechanisms and solutions for adaptation adjustment, making adaptation actions more efficient; (ii) M&E of adaptation actions can be used to check whether the adaptive capacity of a country, sector or community has been strengthened to face potential future climate change (CC) impacts or not; (iii) Indicating the effectiveness of national and international resources for adaptation.

Currently, the number of national adaptation strategies and actions in countries around the world and in Viet Nam is increasing and the financial need for adaptation is also greater. Therefore, the M&E of CCA actions has become an urgent requirement to ensure efficient

and rational fund allocation for the implementation of CCA actions. Effectiveness evaluation for CCA actions can be done using criteria, which can be used to quantify the level of contribution to achieving CCA objectives. These criteria must be selected to ensure that the effectiveness of CCA actions can be monitored. In addition, these criteria need to be able to measure adaptation processes and quantify their results.

Based on the analysis of international experience in building M&E system for CCA, this study will propose methods and criteria framework for assessing climate change adaptation activities in order to serve state management.

2. International experiences in M&E of CCA

The M&E system mainly focuses on three directions, including: (i) community–level M&E; (ii) action–level or project–level M&E (program/project); (iii) policy–level M&E (local, national or regional) [1–2]. The process of developing M&E frameworks and criteria for effectiveness evaluation for CCA actions often apply a top–down approach, based on the reporting and information needs of climate finance mechanisms and donors' requirements. On the other hand, the community–level M&E framework tends to apply a bottom–up approach. This framework is often developed for sectors related to livelihood and disaster risk management based on consideration of community's vulnerability. Recently, many M&E frameworks are being developed based on a two–way approach with the interaction between top–down and bottom–up components. The United Nations Development Program (UNDP's M&E framework has been developed for implementation activities within the CCA financing framework of the United Nations Framework Convention on CC (UNFCCC), including: The Least Developed Countries Fund (LDCF) and the Special CC Fund (SCCF) [2].

Figure 1. UNDP's M&E Framework [2].

UNDP's M&E framework is designed to aggregate data from the project to portfolio level and to encourage the use of consistent metrics, organized into six adaptation sectors of IPCC, including: food security/agriculture, water security, public health, disaster risk reduction, coastal areas and natural resource management. A set of criteria for effectiveness evaluation of CCA actions is designed to determine: (i)the level of stakeholders' involvement in the project; (ii) the level of achieving intended outcomes or changes made to support the project objectives; (iii) the project sustainability; (iv) the project scalability (Figure 1). Some of the criteria outlined in the UNDP's M&E framework seem too be too simple, e.g. "the number of communities involved in the project" or not clear, e.g. "the percentage of change in terms of participation" and evaluation results are more quantitative than qualitative. However, the UNDP's M&E framework is still a typical example of an M&E approach towards aligning and aggregating criteria of key sectors, providing and shaping a newer approach compared to earlier frameworks.

Guideline "Implementing adaptation measurement: Concepts and options for M&E in CCA" [1] developed by the World Resource Institute (WRI) and GIZ. This document guides readers to use a step–by–step approach in developing M&E systems for adaptation, incorporating a specific adaptation program socio–economic, environmental, climate, institutional contexts and other important issues (Figure 2). The Guideline proposes a three–pillar framework designed to reflect contributions of adaptation actions, including: adaptive capacity; adaptation actions; and, sustainable development in the context of CC.

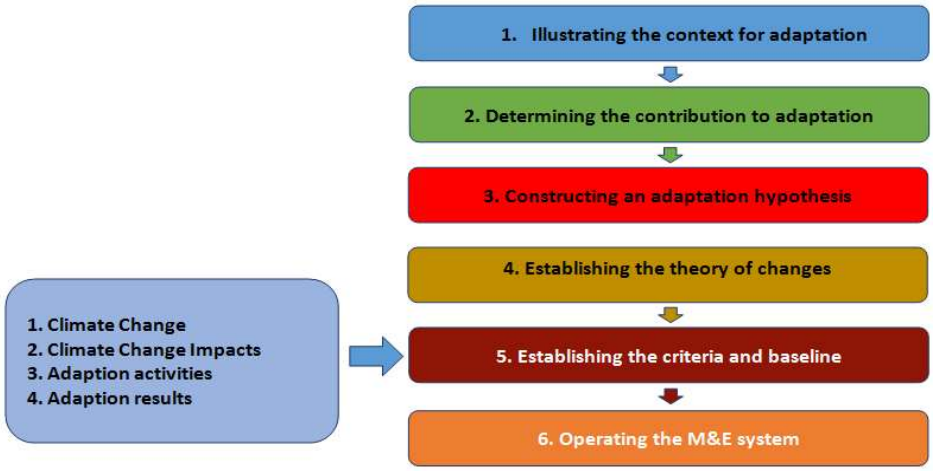

Figure 2. Steps to develop an adaptation M&E system under the adaptation measurement implementation framework [1].

"Adaptation is made to measure: Guideline for results–based design and monitoring in CCA projects" is GIZ's guideline developed by [3]. This document applies a step–by–step approach developed by [1] (Figure 2) with some modifications. Accordingly, Step 3 – developing adaptation hypothesis and Step 4 – presenting the theory of adaptation changes is combined into one step, Step 3 – Developing the result framework (Figure 3).

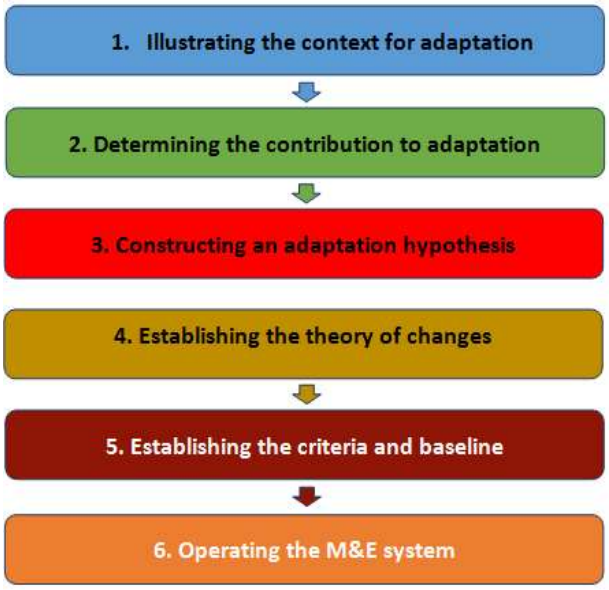

Figure 3. Developing the Results–based M&E system for adaptation [3].

GIZ also provides a set of indicators available online from adaptation projects in a variety of sectors [4]. The authors classified indicators according to measured results of specific adaptation processes [1]. The first pillar focuses on developing adaptive capacity. Indicators related to developing potential capacities to improve the readiness to CC response, focusing on the governance, information, risk management and underlying strategies, frameworks and support systems for developing adaptive capacity. The second pillar focuses on actual adaptation actions on vulnerability, resulting in output and outcome indicators for these actions. The third pillar ensures global development goals in the context of CC, using climate–adjusted sustainability indicators.

The Tracking Adaptation and Measuring Development (TAMD) framework has been developed by the International Institute for Environment and Development (IIED) to evaluate adaptation actions and adaptation–related development in different situations. The first M&E direction (Direction 1) uses top–down criteria, focusing on institutional and policy capacity of institutions to efficiently undertake climate risk management actions. Meanwhile, the second M&E direction (Direction 2) focuses on impacts of adaptation measures to reduce vulnerability, process and results that those actions contribute to bottom–up development [5].

The top–down criteria assess the CC risk management level integrated into development processes, actions and institutions. These criteria assess the reduction of human vulnerability level to CC. The TAMD Framework and Criteria are currently being piloted in five countries: Ghana, Kenya, Mozambique, Nepal and Pakistan.

TANGO's Resilience Assessment Framework was developed by the Food and Agriculture Organization (FAO) of the United Nations and the World Food Program in 2013. This framework integrates livelihood, natural disaster risk reduction and CC to address the underlying causes of vulnerability. The assessment criteria belong to three groups similar to those used by [1, 3], including: (i) strengthening risk management capacity (with short–term adaptation actions); (ii) enhancing adaptive capacity; (iii) enhancing development (can be understood as towards the possibility of transformation).

Later, the TANGO framework was modified by [6], differentiating community assets, types of competencies required and five general action groups including: disaster risk reduction; conflict management; society protection; natural resource management; property management and public services.

Germany is one of the countries that developed the M&E framework for CCA actions. The M&E framework includes 3 components: (i) Vulnerability assessment, which is a descriptive form of assessment of the progress achieved in the adaptation process; (ii) Evaluation is based on criteria to assess adaptation actions over time (past and present); (iii) Assess the level at which actions have been taken or planned to address potential risks and opportunities caused by CC [7].

The German M&E system's criteria are developed based on the DPSIR approach (Driving Force–Pressure–State–Impact–Response), focusing on developing impact and response criteria. These criteria have been developed for 15 sectors including agriculture, forest and forestry, and fisheries, etc. These criteria aim at policy makers and communities interested in and affected by CC. For example, criteria assessing impacts on crop yield and quality include: variation of wheat yield in winter season (per hectare), and year–on–year yield variation [8].

Kenya based on TAMD framework developed IIED to propose M&E criteria for provincial, sectoral and national level. Accordingly, in the first M&E direction, Kenya developed 63 national–level criteria, which are process criteria to measure institutional adaptative capacity for more than 300 proposed adaptation actions. From these 63 criteria, 28 criteria based on provincial results were proposed. Through consultation, these criteria were then short–listed into 10 criteria.

In the second M&E direction, consultation with stakeholders is necessary to assess and measure the vulnerability criteria to complement 62 institution–related criteria on adaptive capacity developed in the first M&E direction. Accordingly, 62 provincial–level criteria (bottom–up) for vulnerability assessment were developed, such as changes in rainfall and drought, heavy rain and flood, sea level rise, hail and frost, etc. Based on these provincial–level criteria, 27 national performance–based criteria were developed, then 10 were selected. These criteria aim to assess and measure the effectiveness of adaptation actions at local and provincial level and efforts to reduce vulnerability at national level [7].

The UK's M&E system has been developed to monitor the implementation of the NAP. The country's CC readiness is monitored and evaluated through UK's vulnerability assessment, planning and reporting process in the context of CC, particularly focusing on climate risk management. Therefore, this approach is based on the CC risk management framework (i.e. focusing on monitoring exposure, vulnerability and impacts). At the local level, monitoring is not usually carried out. However, in many cases, national criteria can be assessed and data can be collected from local or regional level to identify trends of vulnerability.

The M&E framework includes a set of criteria focusing on three main groups: (i) criteria on the level of risk, exposure and vulnerability; (ii) criteria on climate impacts; (iii) criteria on adaptation actions. The data system for M&E is mainly based on existing data sources collected and reported by the Government or related agencies. For example, flood and water resource risk data are provided by the Environment Agency (EA). M&E is carried out with a combination of qualitative and quantitative assessments, expert judgments on interpretation of criteria and economic and policy analysis. In addition, with the implementation of M&E through continuous and cyclical vulnerability reports, lessons learned will be drawn, promptly applied and integrated into the main policy making cycle. This is a highly scientific and efficient way to ensure that policies and adaptation actions are update and inclusive. However, this approach required sufficient data sources and political support, particularly in ensuring that data are cross–checked, compared and updated over time [9].

3. Approaches for assessing effectiveness of climate change adaptation

3.1. Climate change adaptation evaluation and monitoring framework

From the review of M&E criteria and frameworks in the world, the authors have proposed to develop a set of criteria to evaluate CCA actions in Viet Nam based on the result–based evaluation and monitoring framework for adaptation projects proposed by GIZ [3] combined with the TAMD proposed by IIED [5]. The M&E framework is developed using "step–by–step approach" with the following four (04) basic steps: (i) Step 1: Assessing adaptation context; (ii) Step 2: Identifying contributions to the adaptation process; (iii) Step 3: Developing a result–based analytical framework; (iv) Step 4: Defining criteria; with a top–down and bottom–up assessment approach (Figure 3).

Adaptation targets corresponding to specific actions/action groups are identified based on two (02) recent CC adaptation and response policies of Viet Nam, including: The NAP for the period 2021–2030, with a vision to 2050 (Decision No.1055/QD–TTg dated 20th July, 2020) and the Draft National Action Plan on CC Response for the period 2021–2030 (to be submitted to the Prime Minister by the end of 2020).

Accordingly, adaptation actions/action groups are classified according to three (03) main objectives, including: (i) Strengthening resilience and adaptive capacity; (ii) Being proactive and ready to respond to natural disasters, mitigate disaster risks and damages caused by natural disasters and CC; and (iii) Strengthening national adaptive capacity through institutional improvement, capacity building, securing resources, promoting international cooperation and implementing international obligations corresponding to priorities of the

national development strategy. The steps for developing an M&E framework are presented in the following steps:

Step 1: Assessing adaptation context

Information on climatic and non–climatic factors that are likely to affect the implementation of adaptation measures plays an important role in the process of developing assessment criteria for CCA actions. This information will help regulators to define the baseline to calculate results to be obtained during and after adaptation actions are taken. Information used in determining adaptation context includes indicators and potential CC impacts, risks and vulnerability of sectors, areas and localities to CC (Figure 4).

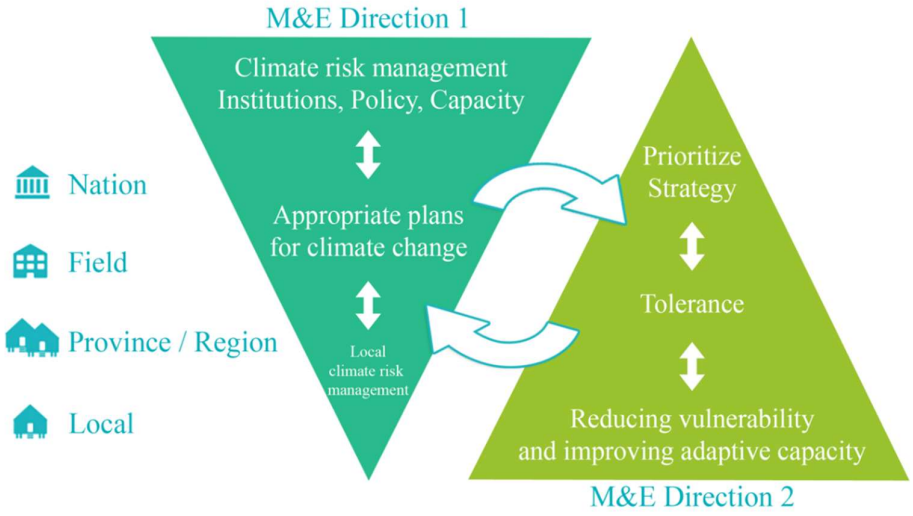

Figure 4. Top–down and bottom–up M&E model according to TAMD.

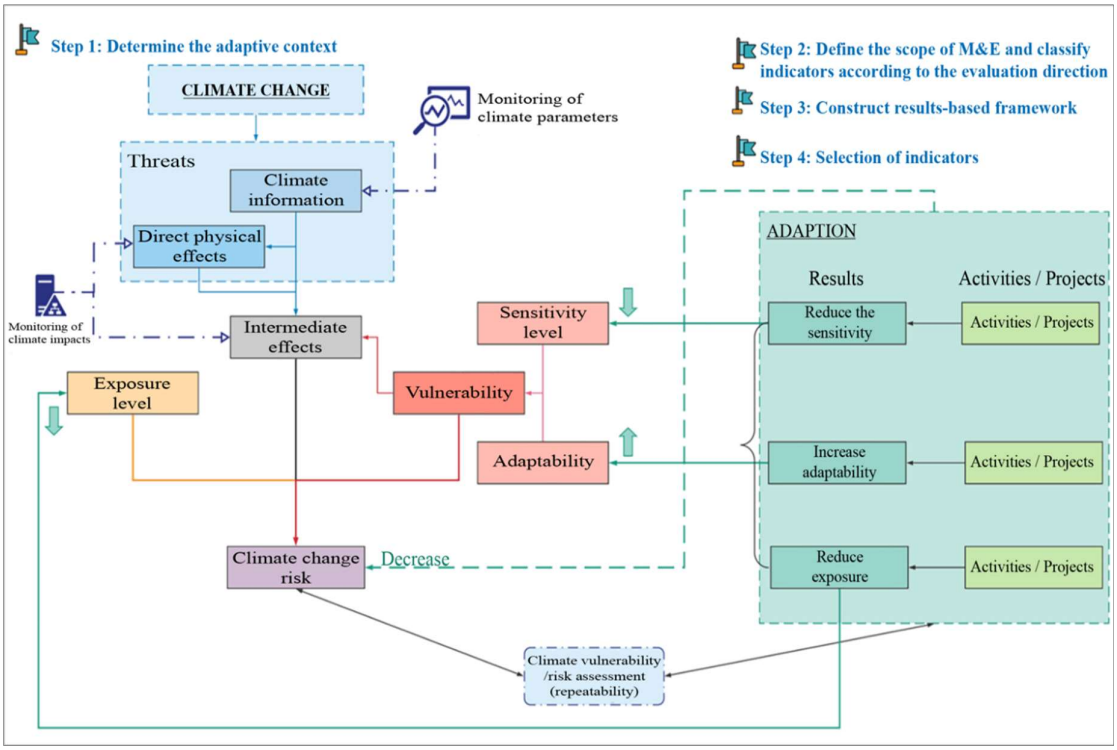

Figure 5. Steps to develop M&E criteria for the adaptation process in Viet Nam [3,10,11].

Assessing the risks and vulnerability to CC will support regulators and the implementation of adaptation projects to:

- Recognize and better understand climatic (and non–climatic) factors affecting and affected by adaptation interventions. These impacts can be direct or indirect including what risks specific actors will face, what non–climatic factor lead to vulnerability and resilience to social risks;
- Describe stakeholder needs and priorities such as livelihood and public health;
- Identify dual underlying impacts such as the likelihood of increasing risks or overlapping with other development efforts;
- Ensure flexibility in the implementation process towards objectives by applying different options when the original strategy fails.

Data sources used to develop criteria on CC and CC impacts in Viet Nam are as follows: CC manifestations and trends put forward in 2016 CC and sea level rise scenario of Viet Nam [12] and CC impacts can be synthesized and analyzed based on scientific research, results of domestic and foreign studies and projects. CC impacts are normally assessed by: (i) sectors, including natural resources and environment, agriculture and rural development (farming, livestock production, forestry, fisheries, and transportation, housing and urban development, tourism, public health, commerce, energy, industry and gender equality; (ii) regions including the Mekong Delta, the Northern Delta, coastal areas, mountainous areas.

Step 2: Determining the scope of CCA action assessment and classifying criteria by approach

Adaptation actions will be monitored and evaluated at national, sectoral, sub–national and project levels. The M&E framework will be implemented in two directions, including: (i) Direction 1 – top–down assessment of adaptation actions related to institution, policies, and overall capacity building in climate risk management (CRM); and (ii) Direction 2 – bottom–up assessment of adaptation actions, addressing factors directly related to CC vulnerability. Depending on objectives and scope of M&E, directions and assessment objects are applied. For example, the national M&E of adaptation actions covering sectors/areas focuses on evaluating the effectiveness of CRM policies and mechanisms at national level and how these policies are linked to the national development goals (strategic priorities) or the ability to contribute to the resilience of the respective sector/area. Table 1 lists the directions and subjects for assessment at different levels for the adaptation process in Viet Nam.

Step 3: Developing a result–based analytical framework

Based on the context of adaptation identified in Step 1 and the scope of CCA action assessment in Step 2, Step 3 will identify the expected outcomes of an adaptation action/policy and the method to achieve them (strategy) with the Theory of Change (TOC) (Figure 5). Accordingly, for the bottom–up assessment direction, the assessment framework is identified along the roadmap of adaptation action impacts starting from those actions to outputs, direct results to impacts for national development to describe the logical and reciprocal relationship between results and how they contribute to overall development goals. For the top–down assessment direction, enhancing CRM at the national level leads to a better CRM system at the sector/area level, thereby enhancing resilience and adaptive capacity of institutional, environment, economic and social systems for CC.

Step 4: Determining criteria for effectiveness evaluation of CCA

Criteria for effective evaluation of CCA are determined (Step 4) after assessing the adaptation context (Step 1), determining the scope of CCA action assessment and classifying criteria by approach (Step 2) and result–based framework (Step 3) for policies, action/group of actions.

The criteria are designed according to quality criteria of the SMART rule (Olivier, Leiter, and Linke 2012) including: (i) Specific: criteria are precise and well–grounded; (ii) Measurable: criteria are quantifiable; (iii) Agreed: criteria are accepted by project partners; (iv) Relevant: criteria are valid and can describe underlying problem; (v) Time–bound: a temporary time reference is given. Accordingly, monitoring criteria according to objectives of adaptation action/group of actions; monitoring the process and effectiveness of adaptation actions at national, sector/area, sub–national and project levels are implemented.

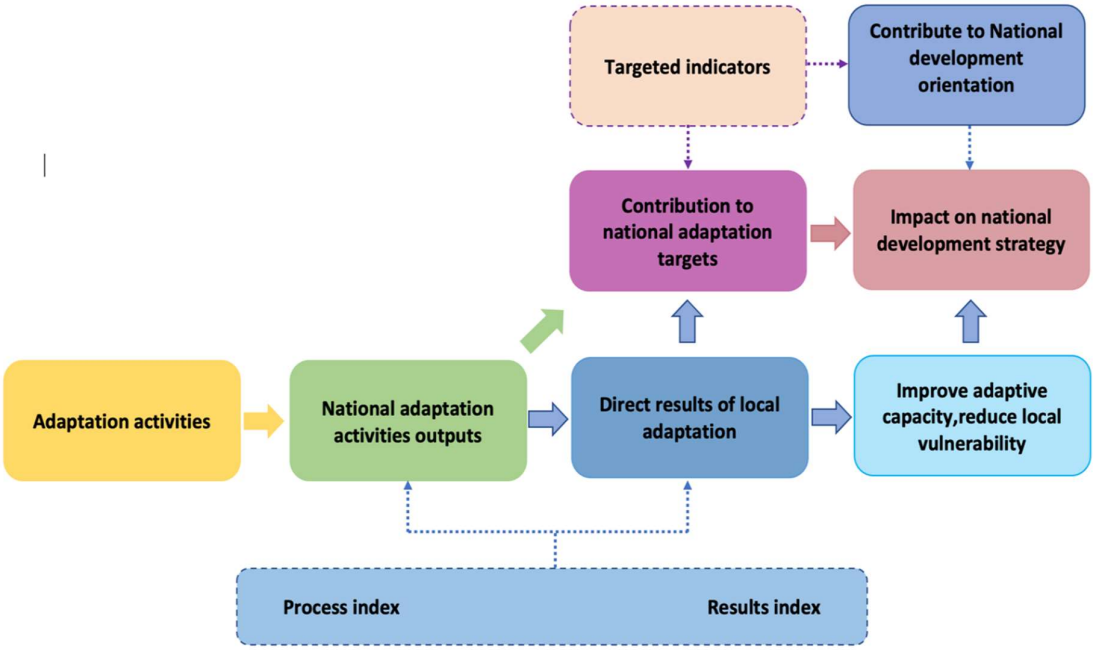

Figure 6. Model for determining assessment criteria according to the impact roadmap.

Table 1. The relationship between the CCA action assessment levels applied for Viet Nam [10].

Objectives of evaluation	Evaluation with TAMD framework	Space and time
Tracking adaptation effectiveness at national level	National institutional mechanism for climate risk management (Direction 1) National strategy priority (Direction 2)	National level Long–term (up to 10 years)
Tracking adaptation effectiveness of specific sectors/areas	Climate risk management at sector/area level (Direction 1) Sector/area resilience (Direction 2) Sector/area adaptation actions (Direction 2) Resilience of people and communities related to sector/area (Direction 2)	National level Long–term
M&E of specific adaptation actions	Specific projects/activities related to climate risk management (Direction 1) and/or resilience (Direction 2)	Local or regional level Short–term
M&E of specific adaptation policies	Specific policies related to climate risk management (Direction 1) and/or resilience (Direction 2)	National or local level From short to medium term

3.2. Determining criteria for effectiveness evaluation of CCA

3.2.1. Monitoring criteria according to adaptation objectives

For each strategic adaptation priority, monitoring criteria that can be used include:

- Is there a plan? Assess if there are policies and plans to adapt to respective climate risks;
- Have actions been taken? Have the adaptation action/group of actions listed in the NAP and the National Action Plan been implemented and are they in line with the set objectives or not;

Have contributions been made to reduce vulnerability? This criterion is used to assess whether, although plans and adaptation actions are being implemented, the vulnerability to CC continues to increase?

3.2.2. Criteria for process and adaptation effectiveness monitoring

As mentioned in the above sections, the criteria are developed with two (02) evaluation directions: (i) top–down (CRM) and (ii) bottom–up (actions aiming at increasing resilience to CC). Table 2 shows criteria in different directions and evaluation levels.

Table 2. Classification of M&E criteria by evaluation and evaluation level.

M&E level	Direction 1: Climate Risk Management (CRM)	Direction 2: Adaptation results and development
National	- Integrating CC into the planning process; - Institutional coordination; - Budget and finance for integration and adaptation; - Institutional understanding of CC integration and adaptation; - Use of climate information; - Use appropriate information and methods in planning; - Stakeholder participation in the national planning process; - Stakeholders' awareness of CC, risks and responses.	- Synthesize local/regional data on the number of changes achieved in terms of vulnerability and status of development; - Changes related to economic loss and other CC impacts such as the number of people affected by natural disasters at national level combined with increased climate hazards (exposure).
Sector/Area	- Similar to national criteria but applicable within area/sector.	- Similar to criteria at the local level but applicable within sectors/areas

M&E level	Direction 1: Climate Risk Management (CRM)	Direction 2: Adaptation results and development
Provincial/Regional	- Similar to national criteria but applicable within Province/Region;	- Synthesize local data on the number of changes achieved in terms of vulnerability and status of development; - Changes related to economic loss and other CC impacts such as the number of people affected by natural disasters at the provincial/ regional level combined with increased climatic hazards (exposure).
Locality/project	- Similar to national criteria but applicable to the local scope; - Apply CRM measures; - Climate risk awareness, response options; - Availability, accessibility and use of climate information	- The number of people becoming less vulnerable–assessed by vulnerability criteria; - Changes in poverty rate and other development criteria related to climate hazards.

These criteria can be synthesized and selected from the criteria for assessing CCA' effectiveness in Viet Nam [13] and GIZ's Library of Adaptation Criteria [14].

4. Conclusions

Through the study, the authors have developed a framework for climate change adaptation actions' effectiveness evaluation for possible inclusion in the M&E system of CCA. The top–down approach was used to develop criteria for evaluating adaptation actions at national level and their effectiveness in enhancing adaptive capacity at provincial level. The bottom–up approach was used to develop criteria for evaluating the results of adaptation actions at provincial level and their effectiveness in achieving the national adaptation objectives. In order to evaluate of CCA actions, two set of criteria should be considered: (1) Effectiveness evaluation of CCA actions at a national level; and, (2) Effectiveness evaluation of CCA actions at a provincial level.

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