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Content

Executive summary

As part of the GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit) and ISPONRE (Institute of Strategy and Policy on Natural Resources and Environment)-run project "Strategic Mainstreaming of Ecosystem-Based Adaptation (EbA) in Vietnam", a participatory identification of a site and EbA measures for piloting has been conducted by a professional team in Quang Binh province. This identification and its outcomes have been reviewed by the consulting firm UNIQUE forestry and land use GmbH (UNIQUE). The report at hand contains the synthesized results from both the original participatory identification and UIQUE's reviews. It is divided into three major sections, with the first one describing the Quang Binh team's process of selecting a site and potential EbA measures for piloting, the second part focusing on the particular EbA suggestions provided and the recommendations given by UNIQUE in regards to these, and the third part offering an overview over the implementation plans and status of the Quang Binh team's and UNIQUE's EbA recommendations.

Through the participatory identification process, the Quang Binh team identified **Hoa Binh village in Quang Hung commune, Quang Trach district** as highly vulnerable, and thus selected it as the pilot site. Multiple extreme weather phenomena, specifically floods, storms and droughts, were classified as constituting serious threats to the commune in focus. In order to respond to these threats, the overall measure of **plantation of acacia and casuarina for coastal protection forest (10 ha)**, including a variety of efforts and combined with the introduction of alternative livelihood activities, was chosen for piloting.

UNIQUE assessed most of the identified measures as promising or already successful. However, the expert team pointed out that the plantation of monocultural acacia and casuarina was a rather short-term investment, since these trees rarely develop forest-like structures on sandy soils due to low survival rates. It was therefore recommended to **adjust and diversify the plantation plan and planting design** for the pilot site. **Native species** such as melaleuca, myrsine or synzgium should be included in the planned casuarina plantation, to increase biodiversity and resilience of the coastal protection forest against extreme weather events. Furthermore, native timber species should also be integrated into the already planted acacia stand once the latter has reached a certain size. Finally, UNIQUE also suggested to **improve the seedling treatment** to enhance root development. The Quang Binh team took these recommendations into consideration, and adjusted the plantation plan.

Abbreviations

CBD	Convention on Biological Diversity
CC	Climate Change
CCA	Climate Change Adaptation
CCRAP	Climate Change Response Action Plan
DARD	Department of Agriculture and Rural Development
DCC	Department of Climate Change
DONRE	Department of Natural Resources and Environment
DPC	District People's Committee
DPI	Department of Planning and Investment
EbA	Ecosystem-based Adaptation
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
ICEM	International Centre for Environmental Management
IPCC	Intergovernmental Panel on Climate Change
ISPONRE	Institute of Strategy and Policy on Natural Resources and Environment
M&E	Monitoring and Evaluation
MONRE	Ministry of Natural Resources and Environment
NTFP	Non-Timber Forest Products
PaLA	Participatory Landscape Appraisal
PRA	Participatory Rural Appraisal
SES	Socio-Ecological System
SPRCC	Support Programme to Respond to Climate Change
SRI	System or Rice Intensification
SWOT	Strengths, Weaknesses, Opportunities and Threats
USAID	United States Agency for International Development
VA	Vulnerability Assessment
VASES	Vulnerability Assessment for Socio-Ecological Systems

Acknowledgements

This participatory vulnerability assessment and identification of ecosystem-based adaptation (EbA) was conducted by EbA technical staff in Quang Binh with involvement of the project provincial partner – Quang Binh DONRE (Mr Phan Dinh Hung and Ms. Ho Thi Nhi Min, sub-department of Sea and Island) from January 27th to January 30th, 2016 in Quang Phu commune and Quang Hung commune (Quang Trach District); Phuc Trach commune (Bo Trach District), and Tan Ninh commune (Quang Binh District). The study team highly appreciates the valuable contribution of leader representatives and technical officers from Quang Phu, Quang Hung, Phuc Tranh, Tan Ninh as well as representative leaders and farmers from Phu Loc, Hoa Binh, Quang Xa, Thanh Sen and Phuc Dong villages who attended the discussions, provided information and contributed comments for the study team.

Glossary

The definitions in this glossary are based on definitions provided by the IPCC in its Fifth Assessment Report (2014), with the exception of the terms *Ecosystem-based Adaptation* and *Sensitivity*.

Adaptation:

This concept refers to "the process of adjustment [of both human and natural systems] to actual or expected climate and its effects". In human systems, *adaptation* seeks to moderate or avoid harm - in this report caused by climate change - or to exploit beneficial opportunities. In the context of natural systems adaptation, human interventions may help to adapt to expected changes in the climate and its effects (IPCC 2014, p. 118).

Adaptive capacity:

"The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences" (IPCC 2014, p. 118).

Climate change:

Climate change is defined as "a change in the state of the climate that can be identified (for example by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer." Causes can be directly or indirectly attributed to human activity or to natural internal processes, altering the composition of the global atmosphere (IPCC 2014, p. 120).

Drought:

"A period of abnormally dry weather long enough to cause serious hydrological imbalance. Drought is a relative term; therefore any discussion in terms of precipitation deficit must refer to the particular precipitation-related activity that is under discussion." A meteorological drought is a period with an

abnormal precipitation deficit. A megadrought is a very lengthy and pervasive drought that lasts much longer than normal, usually a decade or more (IPCC 2014, p. 122).

Ecosystem:

An *ecosystem* is a functional unit that consists of "living organisms, their non-living environment and the interactions within and between them. The components included in a given ecosystem and its spatial boundaries depend on the purpose for which the ecosystem is defined: in some cases they are relatively sharp, while in others they are diffuse" (IPCC 2014, p. 122).

Ecosystem-based adaptation:

Ecosystem-based adaptation (EbA) is the "use of biodiversity and ecosystem services as part of an overall adaptation strategy to help people to adapt to the adverse effects of climate change" (CBD 2009, p. 41). This approach includes the sustainable management, conservation and restoration of ecosystems to supply benefits and create a favorable environment to help people adapt to adverse changes, including climate change (CBD 2017).

EbA helps humans adapt to climate change by actively and strategically managing and using ecosystems and their services. EbA supplements or replaces hard solutions or other technical adaptation measures, at the same time bringing in co-benefits such as biodiversity and livelihood conservation and diversification.

Ecosystem services*:*

"Ecological processes or functions having monetary or non-monetary value to individuals or society at large." *Ecosystem services* are categorized into "(1) supporting services such as productivity or biodiversity maintenance, (2) provisioning services such as food, fiber or fish, (3) regulating services such as climate regulation or carbon sequestration and (4) cultural services such as tourism or spiritual and aesthetic appreciation" (IPCC 2014, p. 122).

Exposure:

Exposure refers to "the presence of people, livelihoods, species or ecosystems, environmental functions, services, and resources, infrastructure, or economic, social, or cultural assets in places and settings" that are subject to being adversely affected (by either climate change or other causes) (IPCC 2014, p. 123).

Hazard:

This term is usually defined as "the potential occurrence of a natural or human-induced physical event or trend, or physical impact that may cause loss of life, injury, or other health impacts." Damage to and loss of property, infrastructure, livelihoods, service provision, ecosystems and environmental resources could also occur. In this report, *hazard* refers to climate-related events or climate-related impacts (IPCC 2014, p. 124).

Impacts:

In this report, the term *impacts* is defined as effects on natural and human systems and is used primarily to refer to the effects of extreme weather and climate events and of climate change on both natural and human systems. Climate change could impact lives, livelihoods, health, ecosystems, economies, societies, cultures, services and infrastructure. Physical impacts are a subset of impacts of climate change on geophysical systems, including flooding and droughts (IPCC 2014, p. 124).

Land use:

This term refers to "the total of arrangements, activities and inputs undertaken in a certain land cover type (a set of human actions). The term land use is also used in the sense of the social and economic purposes for which land is managed" such as grazing, conservation, and agriculture (IPCC 2014, p. 125).

Sensitivity:

The degree to which a system is affected – either adversely or beneficially – by climate change or -variability is referred to as *sensitivity*. The effects can be both direct, such as a change in crop yield due to a change in the temperature's mean, range or variability, or indirect, like damages caused by an increase in the frequency of coastal flooding due to sea-level rise (IPCC 2007, p. 881).

Vulnerability:

The IPCC (2014, p. 128) defines *vulnerability* as the propensity or predisposition to be adversely affected, with the term encompassing various concepts and elements, including sensitivity or susceptibility to harm and lack of capacity to cope and adapt (to climate change).

1. Background

Vietnam is considered as being among the countries that are most vulnerable to climate change. The impacts of climate change on several key socio-economic sectors in Vietnam such as water management, forestry, agriculture etc. have been increasingly serious (GGBP 2014, p. 1).

Ecosystem-based adaptation (EbA) is considered an effective climate change adaptation method which emphasizes the importance of biodiversity, conservation and the recovery of natural ecosystems for the creation of a buffer zone against the impacts of climate change, and for protecting people and their livelihoods against the negative effects of extreme weather events such as storms, floods or droughts.

The project "Strategic Mainstreaming of Ecosystem-Based Adaptation (EbA) in Vietnam", a joint project between GIZ and ISPONRE (MONRE), aims to strategically integrate the EbA approach into climate change adaptation policy, land use and development planning, as well as to implement these on the ground. A central part of the project is to integrate EbA into the national climate change adaptation policy in a systematic way, as well as implementing the policy continuously. The project is running from 2014 to 2018 in Ha Noi, and the pilot provinces Ha Tinh and Quang Binh.

2. The necessity of a participatory identification of EbA measures

As part of the project, a full Vulnerability Assessment for Socio-Ecological Systems (hereafter referred to as VA) in both Ha Tinh and Quang Binh has recently been concluded by GIZ and ISPONRE with the support of international and national consultants from the International Centre for Environmental Management (ICEM). The aim of the VA was to provide a more systematic analysis of climate-related issues for each province.

Simultaneously, a variety of experiences and proposals exist on the side of the provinces to identify potential EbA measures. Therefore, a participatory site- and EbA measure identification process was conducted simultaneously with the rather strategic VA mentioned above. This participatory identification from and with local authorities and communities serves the purpose of better understanding the climate change (CC) impacts that these communities are facing, and of identifying the communities' urgent needs for CC adaptation options, with an emphasis on EbA measures, which can then be implemented in the form of pilot activities.

The participatory identification of EbA measures fits well into the second component of the EbA project, which is to develop the necessary basis for further implementation (scaling up) of EbA through evaluation of existing experiences and a pilot measure.

The process and results of the participatory identification have been closely consulted and shared with the VA team: survey methods have been discussed, and findings presented as part of provincial consultation workshops in Quang Binh. In addition, other organizations that have practical experiences in climate change adaptation (CCA) and/or EbA such as the Department of Climate Change (DCC) (Adaptation Division, which was consulted during the initial phase and particularly for the methodology of the participatory identification process) have been consulted.

After useful EbA measures had been identified and an initial report as well as an implementation plan[1] including an implementation plan had been drafted by an expert team in Quang Binh (hereafter the Quang Binh team) based on afore mentioned participatory assessments, the consulting firm UNIQUE forestry and land use GmbH (UNIQUE) reviewed the selected and partly already initiated activities and provided concrete suggestions and improvements of the analysis and the implementation plan. Based on these recommendations and the through the Quang Binh team initially identified measures, pilot activities are now being implemented on the ground.

The work at hand constitutes the synthesis of the initial reports and UNIQUE's recommendations. It is divided into three major sections, with the first one describing the Quang Binh team's process of selecting a site and potential EbA measures for piloting, the second part focusing on the particular EbA suggestions provided and the recommendations given by UNIQUE in regards to these, and the third part offering an overview over the implementation plans and status of the Quang Binh team's and UNIQUE's EbA

[1] The implementation plan can be made available upon request.

recommendations. Findings from the VA report relating to the Socio-Ecological System of the finally selected commune have also been integrated into this report.

3. Objectives

Overall, this report follows three main objectives:

1. To describe the site selection and EbA measure identification process as conducted by the Quang Binh team for the implementation of EbA pilot activities.

2. To introduce an implementation plan by elaborating on the EbA measures identified by the Quang Binh team, and putting these in relation to UNIQUE's recommendations on suitable EbA measures.

3. To provide an overview over both the Quang Binh team's and UNIQUE's EbA recommendations and implementation status.

The named objectives demand that the Quang Binh team's and UNIQUE's works are put into logical relation to each other, providing the reader with concrete insights into EbA measures suggested and how these could potentially be and have been improved, made more sustainable or more effective. This way, the original value and information of each work remains visible and concrete learning steps can still be seen, followed and reproduced in other contexts.

An overview over the recommendations given and their status of implementation allows the reader to quickly view what has been suggested by whom and to which degree these suggestions have been realized, including explanations for implementation statuses and the non-integration of certain suggestions. Simultaneously, the overview constitutes a dynamic control tool for the GIZ and the implementation team in Quang Binh to review and retain an audit of the implementation status of the different measures selected. Certain recommendations can then be purposely left out without being forgotten or overlooked, as they will continue to exist in the overview, and can potentially be integrated later on.

4. Methods

4.1 The participatory identification method

In order to be able to deliver inputs to the above named objectives, the Quang Binh team developed a method consisting of clear steps that guided the identification study to desired results (see USAID 2015 for orientation). The method consists of six steps that have been followed throughout the study. At this point, the steps shall be introduced only briefly – they will be elaborated upon in more detail in **chapter 5**.

The first step of the study was to conduct a rapid screen survey that assessed already existing reports and documents on the various communes located in the province. Together with DONRE, vulnerable communes have been identified using a clear set of criteria (see **Annex 1 and 2** as well as **chapter 5.1.1**).

In step two, it was essential to perform a risk analysis on the selected vulnerable communes. The risk analysis was conducted through group discussions (involving questionnaires, see **Annex 3.1 and 3.2**) with commune staff and other representatives (see **Annex 3.3**). Based on the analysis, the most vulnerable village in each commune could be selected (see **chapter 5.1.2**).

Following step two, a risk analysis of the selected vulnerable villages was conducted in order to determine the risks faced by the village. This risk analysis was also performed as group discussions with the village heads, heads of mass organizations and with experienced farmers. Based on the results of the risk analysis, potential EbA measures were identified for the villages in this third step (see **chapter 5.1.3**).

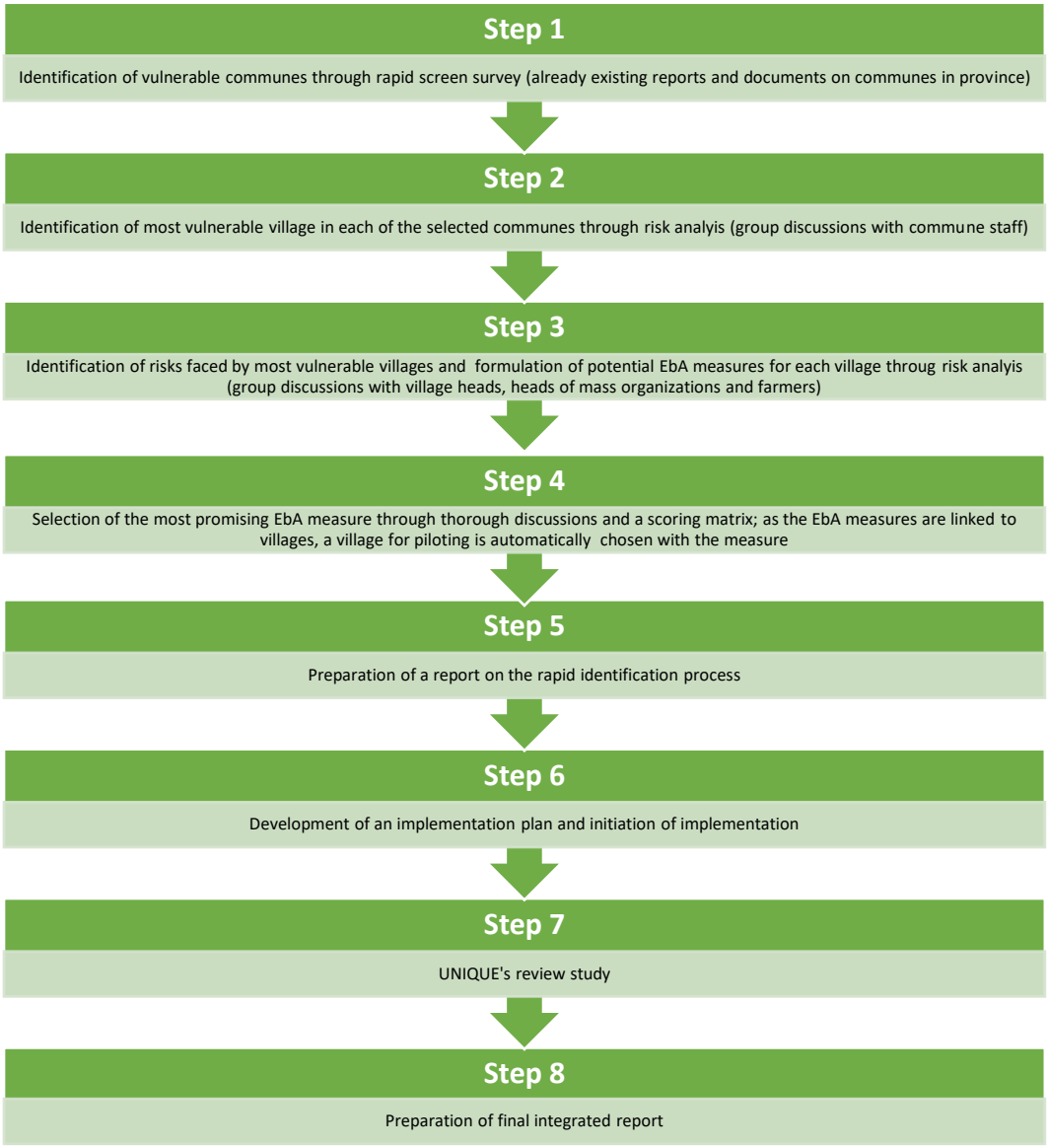
Step four - thorough discussions between DONRE and the EbA staff in Quang Binh - was to select promising EbA measures. Deciding which EbA measures would benefit the village most required developing and making use of a **scoring matrix** (see **chapter 5.1.4**). As the EbA measures are linked to villages, a village for piloting was automatically chosen with the measure.

After selecting the EbA measures, a report on the identification process and an implementation plan were prepared, and certain adaptation measures initiated (steps 5 and 6). The documents just mentioned were developed in close collaboration between DONRE and commune staff, and were then reviewed by DARD staff for additional inputs. The implementation plan presents details on how the suggested EbA measures should be implemented, and what steps are needed for successful implementation. The inputs from the reports have been integrated into the synthesis document at hand, yet the originals can be made available upon request.

A seventh and eighth step have been added to this methodology, consisting of UNIQUE's review study and the production of a final integrated report, which is the report at hand. In the results-section of this report, step one to four as conducted by the Quang Binh team will be elaborated upon in more detail, in order to thoroughly inform the reader about the site and EbA measure selection process. Since UNIQUE's recommendations specifically relate to the findings from the Quang Binh report, its methodological approach is only briefly described under **4.2**, and focus lies mainly on UNIQUE's findings and recommendations rather than the process through which these have been identified. Also in this report's results-section, the steps five, six and seven have been integrated into one sub-chapter to provide a comparative overview over the most important findings and recommendations of the participatory identification report and UNIQUE's review study.

Figure 1 below shows a brief overview of the steps followed to achieve this final integrated report.

Figure 1: The underlying methodology for the integrated report



4.2 UNIQUE's method

The assessment of implemented EbA measures in Hoa Binh Village in Quang Binh was based on two core activities: i) a field based technical assessment of the 5 ha pilot plantation site of coastal protection forest and the adjacent livelihood models initiated by the project; and ii) interviews with key stakeholders who take part in the implementation and management of both the coastal protection forest plantation and the associated livelihood models.

The current state of the coastal sand-dune ecosystem was assessed together with a revision of the pilot projects proposed and currently implemented activities. Specifically, the consultants reviewed: the quality of seedlings, site selection, preparation and planting approaches (incl. spacing of seedlings), current growth performance, as well as maintenance and protection of the planting site, among other considerations. Furthermore, research was conducted on native plant species which are or were naturally occurring in this ecosystem, and recommendations were provided for a variety of native plant species suitable for rehabilitation and stabilization of coastal sand dunes based on site-species matching. A brief assessment of the projects livelihood models, implemented in areas adjacent to the pilot area, was also conducted to identify potential opportunities, challenges and key recommendations to help provide additional direct benefits to local communities. Relevant supporting information was collected from a variety of sources, including literature, expert interviews, as well as stakeholder and village meetings or focus group interviews.

THE IDENTIFICATION PROCESS

5. Results

5.1 Site and EbA measure selection – the identification process (Objective 1)

The selection of vulnerable areas through the Quang Binh team was based on multiple steps, which shall be further elaborated upon here.

5.1.1 Step 1: Rapid screen survey to identify the vulnerable areas in the province

In a first step, documents on climate change and its adverse impacts available at province level were assessed to get a general overview over natural hazards existing in the province (see inter alia **Table 1**), with a particular focus on their causes and impacts. The documents assessed (see **Annex 1**) were:

- Quang Binh DONRE. 2011. "Provincial action plan to respond to climate change 2011-2015." Dong Hoi: Department of Natural Resources and Environment.
- ISPONRE. 2009. "Quang Binh assessment report on climate change." Ha Noi: Institute of Strategy and Policy on Natural Resources and Environment.
- Communes and districts. 2015. Report from districts and communes on socio-economic developments.

The above-named documents revealed which ecosystems were impacted by different types of hazards.

Staff from DONRE and DARD, which is well experienced with climate change and climate change adaptation issues in Quang Binh, agreed in following discussions that a selection of four vulnerable communes should be paid further attention to. DONRE staff provided information on vulnerable areas which are severely affected by climate change every year, and DARD contributed information on the current situation of ecosystems and the services they provide. The five communes were selected based on criteria such as severe problems caused and exacerbated by extreme weather events (floods, storms, droughts etc.); abundance and availability of natural ecosystems and the availability of potential implementable and efficient EbA response mechanisms to hazards existing in the communes; degree of dependency of local people on natural resources for their livelihoods and accessibility for visitors (DONRE and DARD provided experience-based information on the last two criteria; see also **Annex 2**). The communes identified were located in three different districts, namely Bố Trạch, Quảng Ninh and Quảng Trạch.

Weather conditions in Quang Binh vary strongly, yet there dominate two distinctive seasons in the province: the dry season and the rainy season. The rainy season starts in September and lasts until March, whilst the dry season lasts from April to August. Annual average temperatures are estimated to lie between 24 and 25°C, with highest temperatures being reached in June, July and August, and lowest temperatures occurring between December and February.

Rainfall: Precipitation levels in Quang Binh are high, annually reaching 1,600 – 2,700mm. Distribution of rainfall is not equal in the province. About 80-90% of the annual rainfall occurs during the rainy season. September and October are peak months for rainfall and floods.

Drought: In the northern, southern and southwestern areas of Quang Binh, water shortages occur between January and May (two to five months). In the coastal areas, droughts can last for seven months or longer (often January to July). Although rainfall levels at the beginning of the season may go up to 100mm, dry hot west winds (also called Lao winds) create high levels of evaporation in coastal areas. The number of **dry-hot days** is a considerable factor when analyzing climate change. Dry-hot days are those days when maximum temperature during the day are equal to or exceed 35°C, and minimum relative humidity is lower than or equal to 65%. Research in Quang Binh found that there are 40-48 dry-hot days in the coastal areas of Quang Binh.

Storms: On average, Quang Binh encounters five to six storms and/or tropical depressions every year. From 1955 – 1984, there were 43 hurricanes directly landing in the province. August, September and October are frequent months for storms.

Floods: Floods occur in low areas and valleys of the province when the following three conditions are fulfilled at the same time: high rainfall levels, major water flows from upstream areas and high tides from the sea. Large floods result in tremendous damage for the communities.

Weather characteristics of typical areas in the province are summarized in **Table 1** below:

Table 1: Observation of main weather phenomena in three meteorological stations in Quang Binh

Type of climate	Tuyen Hoa station	Ba Don station	Dong Hoi station
Average annual temperature	23.8 °C	24.3°C	24.6°C
Lowest temperature	05.9°C (January)	07.6°C (December)	07.7°C (January)
Highest temperature	40.1°C	40.1°C	42.2°C
Average annual rainfall	2266.5mm	1932.4mm	2159.4mm
Annual number of rainy days	159 days	130 days	135 days
Highest daily precipitation	403mm	414mm	415mm
Annual number of low rainfall days	18 (January, February, March)	09.3 (November)	17 (December)
Average air humidity	84%	84%	83%
Average minimum humidity	66%	67%	68%
Foggy days	47 (July, August, September)	20 (September, October)	13.8 (September, October)

Water evaporation	1031mm	1035mm	1222mm
Coordination			
North latitude	17°50'	17°45'	17°-29’
West longitude	106°08'	106°25'	106°37'
Elevation above sea level	25m	8m	7m
Observed years	1961-2000	1960-1999	1900-2000

According to reports on the implementation of the Climate Change Response Action Plan (CCRAP) in Quang Binh in the period of 2000 – 2015, extreme weather phenomena have occurred more regularly. Predicted climate trends in Quang Binh can be found in **Table 2** below.

Table 2: Climate trends in Quang Binh province

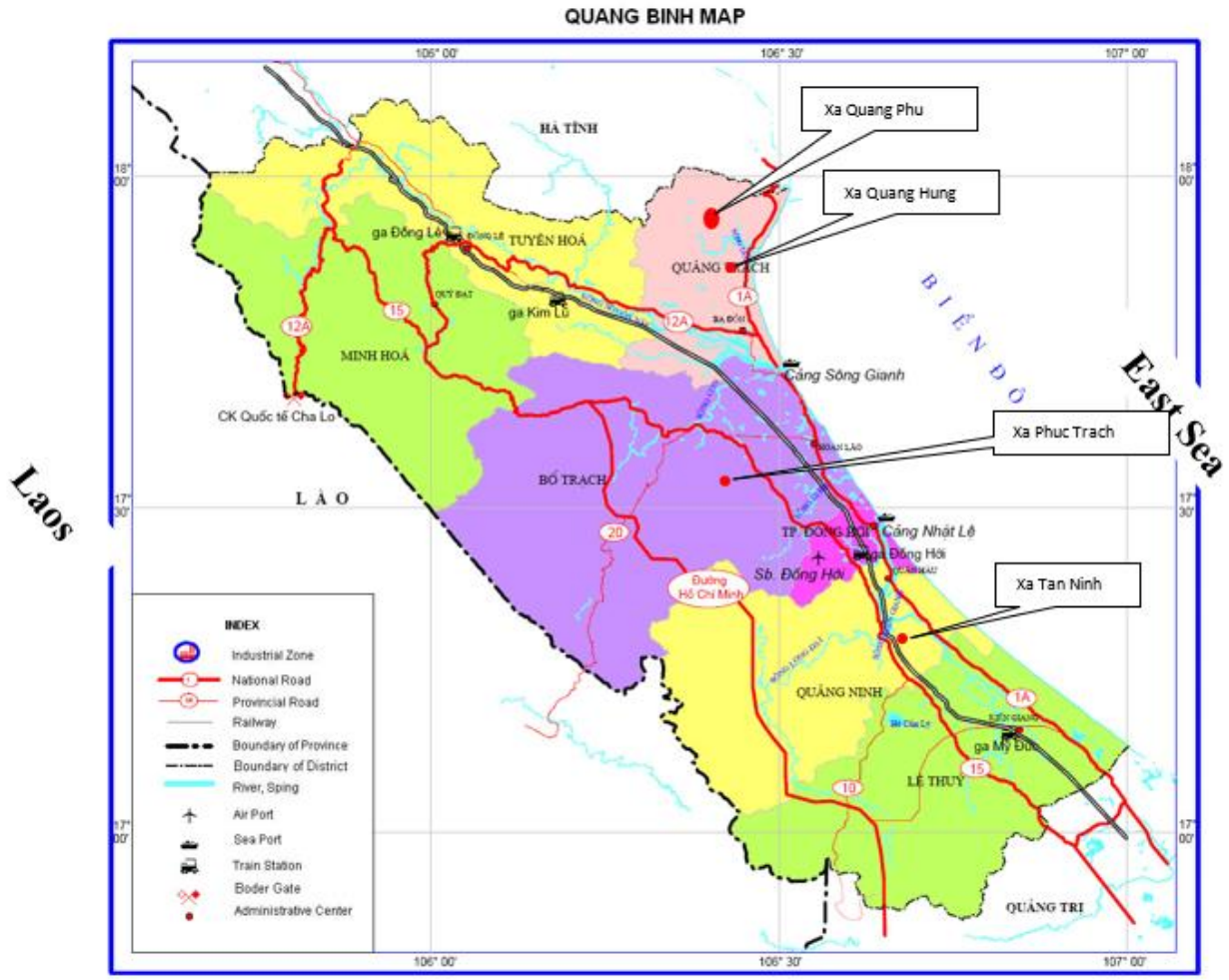
Climate trend	Trend
Upstream floods/ flash flood	↑
River bank erosion and landslides	↑
Irregular rainfall in rainy season	↗
Annual rainfall	↘
Sedimentation	↗
Average annual temperature	↗
Heat waves/ hot-dry days	↑
Droughts	↗
Forest fires caused by hot dry weather	↗
Cold spells	↗
Tropical hurricanes/ depressions	↗
Unusual strong wind (cyclone)	↗
Lightning	→

Legend:

↗ Increasing
↑ Highly increasing
↘ Decreasing
↓ Highly decreasing
→ Unchanged

Based on the above results of the rapid screen survey and further inputs from provincial staff members, DONRE and DARD together with the Quang Binh team selected the following four communes: Xa Phuc Trach commune in Bố Trạch district, Xa Tan Ninh commune in Quảng Ninh district, and Xa Quang Phu as well as Xa Quang Phu commune in Quảng Trạch district (see also **Figure 2**).

Figure 2: Provincial map of Quang Binh with the four studied communes



5.1.2 Step 2: Identification of most vulnerable villages

In a next step, focus group discussions with commune staff from the four communes (leader representatives, officer in charge of cadastral, agriculture, environment) (see **Annex 3.3**) were conducted, also using questionnaires (see **Annex 3.1 and 3.2**), to identify the most vulnerable village in each commune. This way, five villages could be identified and, in a next step, baseline data on these villages could be gathered. A summary of the most relevant baseline information for each commune and village is provided below.

Baseline on communes and villages

Quang Phu commune: This commune is located in a half-mountain half-plain area in the North of Quang Trach district. Its diverse topography holds the potential of functioning as an enabler for the development of diverse sectors. However, due to large terrain and frequent influence of disasters, local production and infrastructure stay behind their potentials. The commune has a diversity of ecosystems such as sand dune

and coastal sand dune ecosystems along the Eastern part of the commune, riparian ecosystems, plain ecosystems in the South and the West, mountainous ecosystems in the North, and mangrove ecosystems along Roon river estuaries. The commune's natural land area is 1,998.26 ha, of which agricultural land accounts for 1,403,26 ha (70%). People's main source of income stems from agricultural production.

Quang Phu lies in the plain area of Quang Binh, possesses typical features of tropical monsoon climate, namely dry cold winters and wet hot summers, with South-West wind blowing from April to July, which results in low humidity. Floods occur regularly during rainy season; droughts last months during dry season. Lao winds (South-West wind) often bring dry hot weather, which reduces water availability and thus negatively affects animals and crops as well as local people's lives.

Phu Loc village: This is one of the agricultural villages in the commune, with terrain stretching from the North Roon to the Thai river catchment. 872 households live in Phu Loc village. People's main income stems from the production of one rice species (100% households); salt production (62 ha, 2/3 households), brackish water aquaculture, animal raising and home gardening. Water resources for production come from a reservoir in the Thai river, whereas domestic water supply comes from wells and rainwater. Rice fields are subject to salinity; saline areas keep increasing every year. The village borders cover the whole area of mangrove forest along the Roon river. During wartime and due to economic development demand, most parts of the mangrove forest has been destroyed, leaving only a small area recovered by local people and Northern Quang Trach State Forest Enterprises. Because of the special topography, the village is susceptible to the impacts of increasingly severe weather phenomena each year.

Mangroves in Phu Loc commune

Quang Hung commune is a coastal agricultural commune in Quang Trach district. With approximately 210,000 ha of natural land, the main economic sector of the commune is agricultural production. The commune's typical ecosystems are agriculture land; coastal protection forest and plantation forest.

Local people's income mainly comes from two rice varieties (grown on approximately 350 ha) and vegetable crops (grown on about 120 ha). The commune's coastline is 6,3 km long, yet little income is generated through fisheries.

The commune is located in the lowland and in an estuary, which results in annual flooding. In addition, agricultural and property losses also occur due to the impacts of annual typhoons and droughts. At

present, four dykes exist in the commune. However, these were constructed a long time ago and are strongly degraded nowadays, not depicting effective flood prevention any longer.

Hoa Binh village is among those coastal villages that sustains agricultural production as its main economic sector. There are 705 households in the village (the most crowded village of the commune), with 90% of local people's income stemming from the farming of two rice varieties. The village's coastal area is 6.3km long. Protection forests (acacia and casuarina) shall help to protect the villagers and their fields from sand dispersal. So far, protection forest cover only reaches around 30%, since a lot of it has been destroyed during war times and through storms.

A coastal stretch of Hoa Binh village

Phuc Trach commune: Phuc Trach is a mountainous commune which is included in the 135 program of Bo Trach district. Being 36 km away from the district center, the commune is located in the buffer zone of Phong Nha Ke Bang National Park. The total natural land area is 6,022.35 ha. Typical ecosystems of the commune include: plantation forest, natural forest and agricultural land. The commune has 12 village with 2480 household in total. Their income depends mainly on agricultural production, forestry and commercial tourism.

Average temperatures in the communes are high (between 19.3 and 25^{o}C) yet the difference between night and day temperature is big. It is cold and rainy in the winter, where temperatures may drop to 7 to 8^{o}C. During summer, hot dry West winds cause long-lasting droughts; maximum temperature can reach up to 40.1^{o}C. In general, the area's climate is very severe and often the most inconstant compared to other regions. In addition, Phuc Trach commune is surrounded by the high limestone mountains of Phong Nha Ke Bang National Park. Therefore, the commune is also considered as flood prone during the rainy season.

Phuc Dong village and Thanh Sen village are two of the twelve agricultural villages of the commune. Local people's income stems from the production of rice, maize, peanuts, livestock, forest plantation and exploitation of forest products. Agricultural production in these villages relies heavily on the weather. Flash floods occur frequently during rainy season, creating erosion which in turn reduces agricultural land. In summer, scarce rain results in serious shortages of water for farmland, frequent droughts and high risks of forest fires. Located in the Son river catchment, the villages are also affected by flash floods, erosion and loss of production land during rainy seasons.

Due to their distinctive topography, the villages' agriculture land is most suitable for peanut and maize production. 65% of the households live off of their income generated from 300 ha of peanut plantation. However, due to changing climatic conditions, it is essential for local people to work with drought-resistant peanut plants. The demand for the production of peanuts is high, putting pressure on the farmers. Yet, local authorities are having problems finding drought-resistant peanut varieties, and the costs for buying seeds are high. Meanwhile, the commune has already planned a seed production area with proper infrastructure (electricity, roads) in order to respond to the high demands for peanuts, and established a 'production team' with the participation of 75 households.

Soil erosion in Thanh Sen village

Tan Ninh commune: is a purely agricultural commune in Quang Ninh district, 10km away from the district center. The North of the commune lies along the Kien Giang river (flowing from Le Thuy district). Typical ecosystems of the communes are agriculture land, mangrove forests along the river with an area of 20 ha (primeval forest) and some areas of plantation forest.

Local people's income mainly relies on two rice varieties (85%), which are grown on over 600 ha. Other production areas are vegetables, animals and aquaculture. River fishing in brackish water was once a remarkable source of income, however it has been decreased dramatically due to deforestation.

The commune is frequently affected by floods (seven to ten floods per year), storms and droughts. During the dry season, rice fields have been more and more affected by saline intrusion.

Mangrove forest along the river in Quang Xa village

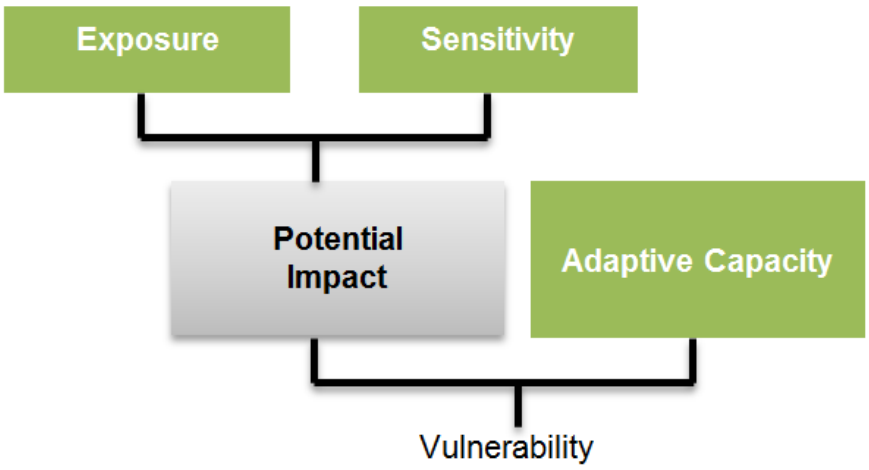
Quang Xa village is located in the northern area of the commune, along the Kien Giang river. Most income stems from rice and vegetable production and river fisheries. However, these income sources have become more and more unstable due to changing weather conditions. Thanks to the recovery of mangrove forest along the Kien Giang river, local people's income from natural fishery resources, such as shrimp, crabs and fish has been increasing again in recent years. In

addition, bird species begin to proliferate in this ecosystem. However, at present, the local district as well as communal authorities have not come up with specific policies and regulations to develop and protect the mangrove forest ecosystem. Most activities are conducted spontaneously and unmonitored by local people. Proper management mechanisms need to be established to avoid and reduce deforestation of the mangroves in other localities.

5.1.3 Step 3: Vulnerability assessment - risk analysis of the selected vulnerable villages to identify potential EbA measures

A focus group discussion (5-7 participants) was conducted at village level with village leaders, representatives of all mass organizations (women, farmers, youth, elderly, veterans), and farmers from each village for the vulnerability assessment. The results are displayed in **Table 3**. The table provides insights into values for the important constellation "Vulnerability: Exposure - Sensitivity - Adaptive capacity" from each site, based on the information provided by communities during the focus group discussions. **Vulnerability** is, as has been elaborated upon in the glossary, defined as the degree to which something (a species, an ecosystem, a group of people, a set of activities, built infrastructure, etc.) is susceptible to, or unable to cope with, the adverse effects of climate change, including climate variability and extremes. Vulnerability is further explained as a function of the character, magnitude, and rate of climate variation to which a system/species is exposed, the system/species' sensitivity, and the system/species' adaptive capacity (IPCC 2007, p. 21). **Figure 3** presents this relationship graphically. Vulnerabilities in this report are considered as High if they are subject to high exposure and sensitivity, but low adaptive capacity.

Figure 3: The components of vulnerability (from Marshall et al. 2009; Preston and Stafford-Smith 2009)



In this report, the levels of exposure and impact in percentages and areas were estimated based on farmers' perspectives on developments within the specified topical areas over the last ten years as presented during the focus group discussions. The farmers discussed among each other to clarify which plots were affected and how much their crops lost due to extreme weather events. Furthermore, they zoomed in on specific time frames when particularly extreme weather events occurred, and discussed these periods and their effects in more detail. Estimations in numbers, ha and percentages were provided by the expert farmers. Finally, as part of the group discussions, the farmers also identified potential EbA measures in response to the extreme weather events in focus (see **Table 3**).

Table 3: The main climate-related hazards, impacts and adaptation options

Hazard	Exposure	Sensitivity	Impact		Adaptive capacity	Vulnerability	EbA measures
			Bio-physic	Socioeconomic			
Quang Trach: Quang Phu commune – Phu Loc village							
Floods, tidal surges occur frequently every year from August to October; particularly large floods in 1983, 2011, 2013	- residents living on both sides of Roon river - Home gardens - Infrastructure - Salt fields - Floods occur every year causing larger area of flooding in longer time. - Bigger water flow; flood rising quickly - 30% of productive land is affected by saline intrusion	- Vegetables, watermelon, rice and salt fields are destroyed and lost during flooding - Properties of local people living in the low land or near the river are flooded and destroyed - Animals in low land areas drown - Severe erosion on both sides of the river	- around 60% of vegetables, watermelon, rice got destroyed during floods in 2013 -> reduced yields - salt fields are flooded => 50% reduced yield in 2011 - properties get flooded and destroyed - 60% animals died in 2011 - 20% infrastructure got damaged in 2013	- Lack of food after floods - Diseases increases - Income reduction due to yield reduction - huge cost to renovate infrastructure and invest in properties	+** Local knowledge: Be prepared before the floods (put products into bags, move the animals to higher locations, make an additional floor in the house, buy wooden boats) + Supports from the local authorities (boats, information, new crop varieties – fast growing ones) + the local people have changed crop planting structure from mangrove areas to salt fields (since 1993) -** Limited financial resources to build dykes, recover mangrove forest in order to limit riverbank erosion - farmland is affected by saline intrusion	**Medium-High**	Need to recover 6 ha of mangrove forests along both sides of river within the village to control erosion, reduce water flow during flood season, protect local people living inside and production land, salt areas, aquaculture.

* EbA measures were identified to cope with climate change phenomena with high risk/vulnerability only;
** Adaptive capacity contains positive aspects (+) and negative aspects (-)

Hazard	Exposure	Sensitivity	Impact		Adaptive capacity	Vulnerability	EbA measures
			Bio-physic	Socioeconomic			
Cold spells in 1975, 1988, 2008, 2016	- Agricultural land (50% rice, vegetable, watermelon) - Aquaculture - Cold periods last 5-10 days - Increase of extremely low temperatures	- Rice and peanut seedlings sensitive to cold spells - Animals cannot bear cold (600 animals died in 1988)	- Rice, vegetables, watermelon died in previous cold spells -> replanting-> low growth-> 50% reduced productivity in 2016 - Animals died in previous cold spells -> 60% reduced income in 2008 and 2016	- More money spent on buying seeds and animals - Income reduction due to yield reduction and cost increase	Local knowledge: + With animals, improve shelters, cover to protect from cold spells, feed adequately to limit death due to cold and diseases + update information about weather and actively adjust crops as well as farming methods to avoid dying of seedlings during cold season + Support from local authority: provide weather information and adjust farming time - limited finance for improving animal shelters and purchasing cold- resistant species	Medium	Change to cold resistant crop planting and adjust animal raising practices

Hazard	Exposure	Sensitivity	Impact		Adaptive capacity	Vulnerability	EbA measures
			Bio-physic	Socioeconomic			
Most severe drought in 1988 and 2003	- Home gardens - Agricultural land (30% rice, watermelon) - Aquaculture - Plantation forests - May to July (lunar calendar) - Long drought periods - Every year	- rice, vegetables and watermelon sensitive to drought - Animals don't grow well and get diseases under droughts - Forest fires - Ground water reduced	- Crops died of water shortages during drought -> 30% yield reduction in 2003 - Animals grew slowly - Shortages of water for domestic use and crops - salt water intrusion (30% production area) in 1988	- Income reduction due to yield reduction - Lack of clean water for people	Local knowledge: + Buy freshwater from other places for domestic use + Establish irrigation systems and take water from reservoirs and other places + Support from local authorities: encourage farmers to have drilled wells where possible - Limited financial resources to prepare irrigation work for crops and trees; to prepare water storage equipment for people - No drought-resistant species	**Medium**	Improve irrigation and water preservation system Use drought-resistant species

Hazard	Exposure	Sensitivity	Impact		Adaptive capacity	Vulnerability	EbA measures
			Bio-physic	Socioeconomic			
Strong storms in 1987, 2010, 2013	- 40% forest area affected - 50% of poor households live near the river and sea - Rural infrastructure (electricity, school. etc.)	- Forest trees collapsed because of strong winds - House roofs were damaged or destroyed - electricity, school: easy to get damaged during strong storms	- Trees collapsed => 40% reduced yields in 2013; need to buy new species to replant - Houses, infrastructure damaged => investments to rebuild needed	- Income reduces due to decreasing productivity and increasing cost - Financial cost to reinvest in infrastructure, houses, etc.	Local knowledge: + Strengthen houses before storms come + organize evacuation from dangerous places to the safer ones	**Medium**	No EbA solutions could be identified
Quang Trach District: Quang Hung commune, Hoa Binh village							
Floods (flashfloods) in 1989, 2010, 2013	- Home gardens - 70% agricultural lands for rice production affected - 70% aquacultural area affected - Lunar months of August to October - Floods occur every year in low lands	- Rice, peanut, sweet potatoes and fruit trees were damaged by floods - Animals were washed away and got diseases	- Crops died from floods -> 70% yield reduction in 2010 - 50% of animals lost in 2013 - Low lands flooded	- Income reduction due to crop destruction - Had to spend money to buy animals	+ Support from district: Update weather information; establish storms and floods protection board to support evacuation to higher places. + Increase plantation of protection forest in the watershed - Lack of financial resources to buy boats for evacuation, design storm-protection houses	**Medium high**	Recover coastal protection forest to: Prevent sand dispersal that affects agricultural land Protect against coastal erosion Limit impacts of storms, floods and sea level rise Regulate temperature

Hazard	Exposure	Sensitivity	Impact		Adaptive capacity	Vulnerability	EbA measures
			Bio-physic	Socioeconomic			
Storms (+ sea level rise and strong sand dispersal in 1965, 1987, 2007, 2013	- 80% vegetables, rice growing area affected - 85% of trees broken in coastal protection forests - 70% houses affected - Coastal beach - Infrastructure - Highly frequent in September – October - Increasing intensity	- Vegetables and rice is damaged and buried in sand during strong wind - Forest trees collapsed - House roof were blown away due to strong wave and sea level rise - Infrastructure was destroyed during strong storms	- Rice and vegetables were affected by storms -> 80% reduced yield in 1987 - Forest trees collapsed -> 85% decrease in protection function, which prevents sand from invading houses and agricultural land in 2013 - 70% house collapsed in 2013 -> had to renovate/ rebuild - Coastal erosion (10m beach loss during 2013 storms) - 30% of the rice paddy fields suffer from saline intrusion every year	- Income reduced due to low yields - Cost to renovate/rebuild houses after storms - Cost to reinvest in infrastructure (in 2013, storms resulted in 1.7 billion VND damage) - Cost for replantation of protection forest against sand dispersal and sea intrusion	+ Local people take active solutions: migrate to safer places, strengthen houses, etc. + Local authorities support evacuation process, provide information, support partial budget to improve post-storms infrastructure (electricity, water, transportation) - Lack of budget to build modern strong houses, especially among the poor - Lack of budget to replant protection forests to prevent sand flying, coastal erosion, sea intrusion.	**High**	Recover coastal protection forest to: + Protect against sand dispersal and filling up of agricultural land + prevent coastal erosion + Limit impacts of storms, floods, and sea level rise + Regulate temperature + provide fuel materials
Droughts in 1993, 1997	- 40% of paddy rice and agricultural land affected - Forestry land - water channels	- lack of water for rice, vegetables - Natural and plantation protection forests in high risk of fires	- 40% of the second rice crop area could not be cultivated due to lack of water in 1997 - 30% of fruit trees, crops did not grow well and died in 1993	- Crop yield reduced -> Income reduction - Animals died/ got diseases -> income reduction	+ Local knowledge: Stored water from ponds for animals; use drilled well for domestic water use + Support from district: Changed crop schedule to avoid peak drought	**medium**	Upgrade the natural ponds/lakes to store water by earth dykes with tree planting

Hazard	Exposure	Sensitivity	Impact		Adaptive capacity	Vulnerability	EbA measures
			Bio-physic	Socioeconomic			
	- no frequent occurrence - April to June	- reservoirs, water channels, wells dried - Lack of water for animals	- Shortage of 30% water for domestic use and raising animals in 1997		+ Support from district: Forest fire prevention - Limited financial resources to have irrigation system		
Cold spells in 1976.1987, 1989, 2010 (long lasting cold spells) and 2016	- Agricultural land (40% of rice, fruit trees and crop seedlings) - Animals died and/or got diseases - November to January - Last 5-10 days each - Gradually increasing cold level	- Newly planted vegetables, rice, peanut died because of cold spells - Animal got diseases/ died of long lasting cold	- 40% of rice, crops, watermelon died -> replant -> grow slowly -> yield reduction in 2010 - 45% of animals died, got diseases -> income reduction in 2016	- Invest a lot to buy new species - Income reduced due to decreasing yield and increasing cost	Local knowledge: + improve shelters for animals, cover animals from cold, feed adequately to prevent cold and disease + update weather information, actively adjust crop schedule and cultivation methods to prevent cultivating during cold weather + Support from authorities: provide weather information and adjust crop schedule - Limited financing available to improve shelters and buy cold-resistant species	Medium	- Change to cold-resistant species

Hazard	Exposure	Sensitivity	Impact		Adaptive capacity	Vulnerability	EbA measures
			Bio-physic	Socioeconomic			
Quang Ninh district: Tan Ninh commune, Quang Xa village							
Floods in 1979, 1985, 2008, 2010, 2013	- 45% of agricultural land (paddy rice, fruit trees and crops) - highly frequent occurrence during lunar months of August to October - Occur every year, 5-7 floods/ year, due to bordering with Kien Giang river and Nhat Le river - Stronger intensity and longer flooding periods - River estuary erosion (accumulation on the right side, erosion on the left side)	- flooded right at the cultivation time of the 2nd rice crop in 2008 - crops are flooded - aquacultural areas flooded, animals were washed away - houses were flooded	- 55% of second rice crop, maize and green bean were washed away ->yield reduction in 1985 - aquaculture, animals were washed away and got diseases -> 45% income reduction in 2013 - Houses were flooded -> increased cost of renovation - Agricultural land is intruded by saline waters (70 ha) in 2010	- Income reduction due to loss of crop and property	+ Local knowledge and support from commune: Humans and animals were evacuated - Limited financial resources to recover mangrove forest along the rivers to limit impacts of floods	**Medium**	Recover mangrove forest along rivers to prevent erosion, limit impacts of floods to agricultural land

Hazard	Exposure	Sensitivity	Impact		Adaptive capacity	Vulnerability	EbA measures
			Bio-physic	Socioeconomic			
Storms in 1983, 1985, 1989, 1985, 1997, 2007, 2013	- Rice, and crops - 6ha of mangrove forest - Houses - Infrastructure - September – October - Increasingly in intensity	- Rice and crops were destroyed - Mangroves collapsed - House rooves were blown away - Riverbank erosion - Infrastructure was damaged during storms	- 55% of rice and crops were affected by storms -> yield reduction in 2013 - 70% of mangroves collapsed in 2013 -> reduced protection function and affected mangrove ecosystem - 30% of houses collapsed and need renovating in 1985 - Eroded riverbanks need strengthening - Salinity intruded rice paddy fields increase by 10% every year	- Income reduced due to low productivity - Cost to renovate/rebuild houses after storms - Cost to reinvest in infrastructure - Cost to replant mangrove forests	+ Local people take active action: evacuate to safer places, strengthen houses, etc. + Local authorities support evacuation process, provide information, support partial budget to improve post-storm infrastructure (electricity, water, transportation, etc.) - Lack of budget to build modern strong house, especially the poor	**Medium**	Recover mangrove forest to limit impacts of storms (prevent wind), floods (water flow intensity); recover mangrove ecosystem (habitat of birds, storks, aquatic species) Support community-based ecosystem management

Hazard	Exposure	Sensitivity	Impact		Adaptive capacity	Vulnerability	EbA measures
			Bio-physic	Socioeconomic			
Bo Trach district: Phuc Trach commune, Phuc Dong village							
Floods (Flash floods) in 1985, 2010, 2013	- 75% of agricultural land (crops and rice) - Lunar months of August to September - Floods rise fast with strong intensity	- Crops and rice were flooded and washed away - Farmlands were eroded - Houses, properties damaged - Animals died or got diseases	- Loss of crops -> 70% income reduction in 2010 - Soil erosion (due to steep terrain, water flows from higher mountains to lower places) -> loss of 30% of farmland (2010 and 2013) - Houses got washed away - 40% of animals got washed away/ got diseases in 2013	- Income loss - Lack of agricultural land - Lack of employment - Severe drinking water shortages	+ Experience: evacuate local people and animals to higher mountain areas + support from local authority: support evacuation process, buy lifeboats (2007) + Sometimes water rose so quickly that people were not evacuated in time, which resulted in even more loss of property and crops (2010) - Farmlands were seriously eroded - No alternative farmland	**Medium high**	- Adjust proper crop schedule - Recover watershed forest to limit impact of floods
Droughts in 2014-2015	- 45% of the aquacultural area affected (fish ponds, fish cages on rivers) - 50% agricultural area affected - Local people and animals	- lack of irrigation water for rice, peanut, maize, cassava - Lack of water for domestic use and for animal raising - High risk of forest fires (with increasing intensity)	- Lack of irrigation water for rice and crops (45% of the 2nd crops and partially the 1st crop) in 2015 - Lack of domestic water supply (70%) in 2015 - Increase in intensity of forest fires	- Income reduction - Land becomes fallow	+ Local knowledge: search for water sources and take water from higher mountain areas, buy domestic water from other places + Support from local authorities: renovate Khe Ngang reservoir - Water from reservoir does not provide enough for production - Lack of domestic water supply	**Medium**	- Plant homogeneous forest around natural reservoirs - Replace drought-resistant maize species

Hazard	Exposure	Sensitivity	Impact		Adaptive capacity	Vulnerability	EbA measures
			Bio-physic	Socioeconomic			
	- Natural and plantation forest - May to July every year				- Limited financial resources to invest in water channels, and to buy drought-resistant species		
Bo Trach district: Phuc Trach Commune, Thanh Sen village							
Floods (flashfloods) in 1985, 2010. 2013	- 50% of agricultural land affected - Crops and rice - Lunar moths of August to September - Floods rose fast, with high intensity	- Rice and crop fields were flooded and destroyed - Farmlands were eroded - Houses, properties - Animals damaged or destroyed	- 45% crop loss -> income reduction in 2010 - Soil erosion (due to steep terrain, water flows from high mountains to lower places with strong intensity) -> loss of 20% of farmlands in 2013) - Houses were washed away - 40% animals were washed away/ got diseases after floods in 2010	- Income reduction - Lack of farmland - Lack of employment	+ Experience: evacuate local people and animals to higher mountain areas + support from local authority: support evacuation process, buy lifeboats (2007) - Sometimes water rose so quickly that people were not evacuated in time, which resulted in even higher loss of properties and crops (2010) - Farmlands were seriously eroded - No alternative farmland	**Medium**	- Recover and preserve watershed forest to limit impacts of floods and soil erosion

Hazard	Exposure	Sensitivity	Impact		Adaptive capacity	Vulnerability	EbA measures
			Bio-physic	Socioeconomic			
Droughts in 2007, 2014-2015	- 65% of maize, peanut, and rice areas affected - Natural and plantation forests - May to July every year	- The 2nd rice crop; peanut and maize crops are destroyed - Domestic water at lakes, dams, wells reduced - Lack of water for animal raising	- Reduction of crop yield and productivity -> 60% income reduction in 2014 - Lack of domestic water because reserved water resources dried out (70%) in 2015 - Lack of water for animal raising - High risk of forest fires	- Income reduction	+ Experience: Use drilled wells for domestic use and for animal raising; buy water from other places - No options for production water - Limited financial resources to renovate reservation reservoirs/dams - No better land for cultivation	**Medium high**	Recover watershed forest and improve reservoirs/ dams Replace drought-resistant species
Storms (Cyclones) in 2010, 2013	- Rice and crops - Plantation forest - Houses - Infrastructure - September – October - Increasing extreme weather phenomenon	- Rice and maize were damaged by strong winds - Forest collapsed - Houses and infrastructure were damaged	- 60% of rice and maize were destroyed in 2010 - 50% of forest trees collapsed in 2010 - 30% of house rooves were blown away, houses collapsed in 2013	- Productivity reduction -> income reduction	+ Experience: actively evacuate to safer places + Lack of financial resources to build storm prevention houses	**Medium**	No EbA solution could be identified

5.1.4 Step 4: Identification of the EbA measures for implementation

In a next step, the final EbA measures were chosen for implementation by using a scoring scale. The results of this scoring exercise can be found in the **scoring matrix** below. The matrix shows six potential EbA activities which were identified during the focus group discussions (recovery of 6 ha mangrove forest; plantation of coastal protection forest; recovery of mangrove forest and support of community based forest management; improvement of natural reservoirs; plantation of drought-resistant peanut species and recovery of watershed forest) for the five selected villages, and how these scored in relation to six different parameters (affected by climate change; cost effectiveness; upscaling potential; suitability for local conditions; capacity to benefit humans and usage of ecosystem services) on a scoring scale from one to five, with five constituting the best possible, and one the least favourable value.

The six different parameters were evaluated according to the following guidelines:

Parameter 1: Affected by climate change. This parameter assesses how severely affected the place in focus is by climate change. The scores were distributed based on the information provided on exposure and impact during the local focus group discussions as presented in **Table 3**. The more severely affected a commune and village, the higher a score was attributed to it. In cases where 70% or more households, agriculture lands, home gardens and animals were affected, a score of five was allocated. Were 30%-40% affected, a score of three was given. In cases of under 20% % being affected, a score of one was allocated.

Parameter 2: Cost effectiveness. The second parameter was scored according to the estimated financial resources it would demand to implement a particular measure – the higher the estimated costs were, the lower a score was given. Here, making use of and working with already existing resources and assets (such as already existing forest being enriched) was generally assessed as being more cost effective than introducing an entirely new and thus resource-intensive measure (such as establishing a new plantation).

Parameter 3: Upscaling potential. The higher an upscaling potential for a specific EbA measure was expected to be, the higher a score was allocated to it. The upscaling potential was estimated by taking into account how easy or complex the (planting) techniques to be applied were, if and how many ecosystems were available, how much support and commitment was visible among local stakeholders during group discussions, and to which degree a measure was already in line with local policies. The just named criteria were debated and agreed upon in group discussions between DONRE, DARD and the village inhabitants. In order to define the scores, literature as well as local knowledge on the just named different criteria were consulted.

Parameter 4: Suitability for local conditions. This parameter evaluates how suitable a suggested measure is for the existing local conditions: The more suitable an activity is, the higher the score it received. Criteria for assessing the suitability were for instance to which degree native species could be used that suit local soil conditions, or how much experience the local stakeholders had with implementing the measure. The criteria were defined based on thorough discussions between DONRE, DARD, commune staff and villagers, and with a focus on applicability of measures for farmers.

Parameter 5: Capacity to benefit humans. This parameter assesses to which degree a measure provides direct benefits for people to cope with climate change impacts on the ground. The benefits each measure can bring about were agreed upon in collaborative processes involving DONRE and the local populations. The more benefits a measure can provide in addition to the 'natural' direct and indirect benefits an ecosystem is already providing, the higher its score.

Parameter 6: Usage of ecosystem services. The final parameter describes how many ecosystem services (provisioning services, regulating services, cultural services and supporting services) are made available for humans through the implementation of a measure. The more services made available, the higher the allocated score. The content and amount of ecosystem services made available were defined and assessed through discussions with local stakeholders.

After all measures had been scored according to the five-scale system, the measures with the highest scores were identified as the ones focus for implementation should lie on. As the EbA measures are linked to villages, a village for piloting was automatically chosen with the measure, and no comparison or trade-off between the most vulnerable village and the EbA measure that scored the highest needed to be made.

Scoring matrix

The EbA options suggested in this scoring matrix are based on the principle of using existing ecosystem services to support farmers in addressing the impacts of extreme weather events in each site. Numbers have been allocated by applying the guidelines for the six different scoring parameters described above.

No.	EbA measures identified	Description	Location	Criteria						
				Affected by CC	Cost effectiveness	Scaling up possibility	Suitable to local conditions	Support people	Ecosystem service usage	Total
1	Recovery of 6 ha mangrove forest	Plantation of 6 ha mangrove forest along the river to limit erosion and strengthen dykes to protect area against salinity intrusion	Phu Loc, Quang Phu	4	3	4	4	4	4	23
2	**Plantation of coastal protection forest**	**Plantation of acacia and casuarina for coastal protection forest (10 ha)**	**Hoa Binh, Quang Hung**	**5**	**3**	**4**	**5**	**5**	**4**	**26**
3	Recovery of mangrove forest + support of community based forest management	Plantation (8 ha) and protection of mangrove forest to prevent erosion and protect ecosystems	Quang Xa, Tan Ninh	3	3	3	3	3	3	18
4	Improvement of natural reservoirs	Plant homogeneous timber species, fruit trees surrounding reservoirs/ dams; improve reservoir quality	Phuc Dong, Phuc Trach	4	2	2	3	4	4	19
5	Plantation of drought-resistant peanut species	Pilot plantation of approximately 3 ha of drought-resistant species	Phuc Dong, Phuc Trach	4	4	4	4	4	2	22
6	Recovery of watershed forest	Plantation of homogeneous timber species, forest regeneration	Thanh Sen, Phuc Trach	4	2	3	4	3	4	20

Together with DONRE and DARD Quang Binh and commune staff, and based on the scoring matrix above, the Quang Binh team therefore selected the measure of ***plantation of acacia and casuarina for coastal protection forest (10 ha)*** in Hoa Binh village, Quang Hung commune, Quang Trach district as the most promising one for piloting.

The report will now move on to describe the by the Quang Binh team recommended EbA measures for Hoa Binh village in Quang Hung commune in more depth, thus zooming in on a very limited scale for the implementation of EbA measures. It will furthermore provide UNIQUE's recommendations as supplementing or new/additional ideas for implementation. The recommendations generated from the original participatory identification reports and those provided by UNIQUE have been kept separate and identifiable as coming from different sources, but have been placed together based on similar content.

EBA MEASURE RECOMMENDATIONS

5.2 Step 6 and 7: The Quang Binh team's implementation plan of EbA measures for Hoa Binh village, Quang Hung commune and UNIQUE's review report (Objective 2)

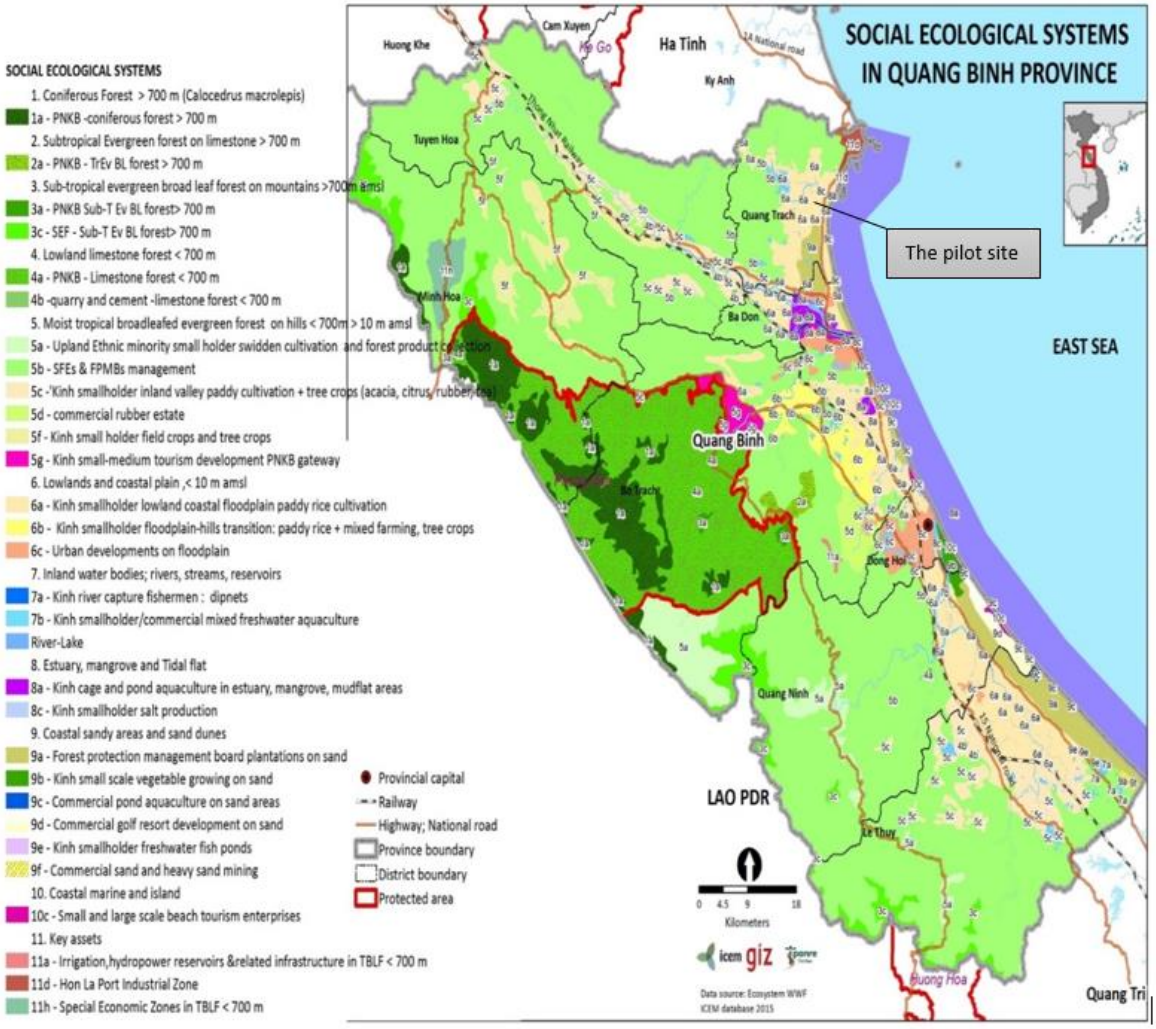
5.2.1 The socio-ecological system around Quang Hung commune

In line with the descriptions given by the Quang Binh team (see **5.1.2**), UNIQUE depicted the area in and around Quang Hung commune, and more specifically around Hoa Binh village, in the following manner: "Hoa Binh Village is located within Quang Hung Commune, a coastal commune in the Northern part of Quang Binh Province. Quang Hung Commune has a total area of 210,000 ha and a population of 7,537 people (with a population density of approx. 359 people/km²) (Quang Trach DPC. 2014). Hoa Binh Village has approximately 710 households (key informant interview, June 2017) and is responsible for overseeing the management of 123ha of sandy areas along a 3km coastal stretch. The climatic conditions of the area differ based on two main seasons: a dry season from March to August, characterized by hot and dry winds from the southwest monsoon, and a rainy season from September to February, characterized by cool and humid winds from the northeast monsoon. The annual mean temperature is around 24.5 °C and the annual rainfall is 2,200 mm, mainly occurring during October to December. The landscape is characterized by relatively bare sand dune areas with some natural shrubs and grasses, as well as two forested areas: a 25 year old well-established Casuarina plantation near the village, and a 7 year old poorly-managed plantation containing mostly acacia species. […] Soils of this area most importantly characterized through their moving sand surface. […] In Quang Hung Commune, majority of livelihoods are sustained by agricultural activities, including the production of agricultural crops, paddy rice, home garden cultivation (for subsistence), animal raising and small fresh water fish ponds. Within Hoa Binh village, the main source of income primarily comes from paddy rice production, where inhabitants practice an irrigation-based rice cropping system with two harvests per year. While fishing with small boats was considered one of the main income activities until recently, massive fish deaths due to toxic spills of a further north located steel production plant in 2016 have forced many locals to work in factories or migrate to other areas in order to find labour. Hence, fishing activities are currently not considered a major economic activity within the village and commune" (UNIQUE 2017, p. 6).

Moving away from the narrow focus on Hoa Binh village, the report now provides some elaborations on the socio-ecological system in and around Quang Hung commune as identified in the Vulnerability Assessment (VA) report. This is done to show linkages between and emphasize the integrated character of the Quang Binh team's assessments and the VA results. In the VA, the area around Quang Hung commune is defined as ***Kinh smallholder lowland coastal floodplain irrigated paddy rice cultivation*** (ISPONRE, GIZ and ICEM 2016, p. 87; see **Figure 4** below). This socio-ecological system is described as being "[…] ultimately dependent on upstream forest ecosystems for water supply for rice growing, although this is provided through a system of reservoirs and irrigation canals. The rice fields themselves may still supply some natural foods in the form of wild fish, crabs and frogs etc. that can live in the rice fields (although increasing use of chemicals in rice-growing will reduce this wild food supply)" (ISPONRE, GIZ and ICEM 2016, p. 215). The system has been identified as the most important socio-ecological system in Quang Binh province[2], and was thus subject to a provincial level VA (ISPONRE, GIZ and ICEM 2016, p. 87; see **Table 4** below).

[2] The ranking was done "[…] based on 12 criteria […], assigning scores to each SESs by considering its importance in relation to social, economic, environmental and climate change issues, including its contribution to provincial GDP, contribution to

Figure 4: Socio-ecological systems of Quang Binh and the pilot site



employment, spatial extent, provision of and dependence on ecosystem services, etc. The process largely used the professional judgement of the consultants." (ISPONRE, GIZ, and ICEM 2016, p. 86).

Table 4: Top 10 priority socio-ecological systems in Quang Binh

Rank	SES Code	Name of SES
1	6a	Kinh smallholder coastal floodplain irrigated paddy rice cultivation
2	5b	Kinh smallholder inland valley or transition paddy cultivation + tree crops (acacia, citrus, rubber, tea)
3	PNKB 1-5	Phong Nha-Ke Bang National Park (World Heritage Site)
4	SFE 5	State Forest Enterprise management of production forest in lowland (<700m) moist evergreen broadleaf forest areas
5	9c	Kinh small-holder/commercial shrimp aquaculture on sand dunes
6	FPMB 9	Forest Protection Management Board management of coastal protection forest on sand dunes and sandy areas
7	10a	Kinh inshore capture fishermen (estuary to 6 km offshore)
8	5a	Upland Ethnic minority swidden cultivation
9	5c	Hilly forest commercial rubber estates
10	11a	Irrigation and hydropower reservoirs and related infrastructure

5.2.2 The phenomenon in focus

The participatory identification

Different from Ha Tinh province, where droughts were identified as having the most severe adverse impacts on the inhabitants of the commune in focus, the Quang Binh team listed multiple phenomena as being strongly influential in this regard in Quang Binh's Quang Hung commune. The four main threats brought forward here are:

1. Soil erosion through floods and storms, threatening agricultural land, properties, protection forests as well as residential areas in Quang Hung commune.
2. Sand dispersal due to strong winds, strongly affecting the agricultural and aquacultural sector of the commune.
3. Flooding, sea level rise and salinization causing loss of agriculturally usable soils, thus reducing productivity.
4. Serious shortages of water through droughts for consumption and production threaten people's livelihoods.

UNIQUE

UNIQUE provided a similar assessment, going more into depth with the reasons for the particular vulnerabilities of the area which have already been mentioned under **5.1.2** and **5.2.1**:

While historic information on indigenous tree species in the coastal dunes of Hoa Binh Village is not available, previous coastal protection forests were at least recognized by villagers as an important wind-break and protective barrier that helped protect the village from storms and coastal erosion in the past (key informant interview, June 2017). However, the coastline around Hoa Binh village experienced extensive deforestation and degradation due to the local community over-harvesting trees for firewood, making the community more vulnerable to climate change and extreme weather impacts. Due to extensive clearing of coastal forests and the resulting degradation, natural regeneration has been limited as the soils have become increasingly degraded and do not provide the

growth-conditions necessary for many native tree species to return. […] While coastal protection forests have the potential to provide alternative livelihood opportunities for local communities, the dunes in Hoa Binh Village are too degraded and in their current form and thus only have minimal benefits for the community. To a small extent, these areas are used for uncontrolled cattle grazing, however in general they are often unused lands. Hoa Binh village, in particular, was selected as pilot area as it has one of the lowest incomes of the province. In addition, Hoa Binh village is directly affected by negative climate change impacts such as: coastal erosion (estimated 150m of beach losses along a 2km coastal stretch over the last 10 years), typhoons and droughts" (UNIQUE 2017, p. 6).

From the above paragraph, it becomes clear that UNIQUE also identified droughts leading to water scarcity, typhoons resulting in floods and sand dispersal, coastal erosion and moving sand due to degraded coastal stretches as key climate change issues for the area. The Quang Binh team's assessment can thus be confirmed up to this point.

The VA report

Also the ***VA report*** described major climatic threats for the socio-ecological system around Quang Hung commune. It identified multiple climate change threats as existing in regard to the socio-ecological system ***Kinh smallholder lowland coastal floodplain irrigated paddy rice cultivation****:*

"Paddy rice is vulnerable to drought, […] in Quang Binh in some years the drought is so intense that there is not enough water in the reservoirs to meet all of the irrigation needs. Paddy rice is also vulnerable to storm damage and flooding when it is ripe and about to be harvested. Rice productivity also declines as temperature increases. In Quang Binh in particular, paddy rice growing land in coastal floodplains is also at risk of increasing salinization as saline intrusion penetrates further upstream from river mouths, and seeps under dykes into agricultural fields" (ISPONRE, GIZ and ICEM 2016, p. 215). The following table provides an overview over the focused-upon socio-ecological system's exposure and sensitivity as assessed in the VA report (ISPONRE, GIZ and ICEM 2016, p. 229f.):

Table 5: Vulnerability analysis for the socio-ecological system *Kinh smallholder lowland coastal floodplain irrigated paddy rice cultivation*[3]

CLIMATE CHANGE RISKS (2050 & 2100)	Exposure	Explanation (E)	Sensiti -vity	Explanation (S)	Impa- ct	Adaptive Capacity	Explanation (AC)	Vulner- ability
TEMPERATURE								
Hot season will be hotter and longer; Summer average maximum temperature will increase 1.9 degree C in 2050, 3.6 degree C in 2100	4	*Low land - low altitude, high temperature, flat, large area of the same land-use ;* *More evaporation and evapotranspiration; More exposure in Spring Summer crops, less in Autumn Winter;*	4	*Temperature increase cause shorten crop duration, shorten of hydrate carbon synthesis, reduce crop yield* *More disease and new diseases Impact on flowering, pollen, evapotranspiration and hydrate accumulation process crops require more water, strongly impacts on metabolically processes* *Crops facing with drought more frequency* *Change micro climate and change crop grow rate and crop distribution*	4	3	*Farmer can use suitable crop varieties from hot regions* *Agriculture extensions* *SRI rice* *RATOON rice* *Change to other crops*	4
Number of Dry days increase 15 days in 2050, 12 days in 2100, Number of hot days > 35°C also increase 37 - 40 days in 2050, 50 - 54 days in 2100	4	*Low land - low altitude, high temperature, flat, large area of the same land-use ; More evaporation and evapotranspiration; More exposure in Spring Summer crops, less in Autumn Winter;*	4	*Drought will be more often damaging crop; Some crop will be not suitable* *High risk for crop tolerate with short dry time; Soil moisture go down below wilting point, plant die* *Reduce crop yield when drought period coincide with tellering and flowering period*	4	3	*Improve irrigated system to adapt this situation* *Existing irrigation system can supply 80% water resource* *There are some drought tolerable varieties to adapt drought but at certain level*	4

[3] The values for exposure, sensitivity, impact etc. range from 1-5, with 1 being the lowest, and 5 constituting the highest degree.

CLIMATE CHANGE RISKS (2050 & 2100)	Exposure	Explanation (E)	Sensiti -vity	Explanation (S)	Impa-ct	Adaptive Capacity	Explanation (AC)	Vulner-ability
							Need pay more for irrigation	
Temperature will increase faster and earlier in Spring	4	*Some negative impacts of return warm spring (reduce rice yield strongly)* *Earlier appear diseases and pest*	3	*Some crop have to change season earlier* *Damaging crops*	4	2	*Also hard to adapt this condition because it is hard to change crop immediate fast weather changes* *Few experiences to control crop growing and seasoning when weather changed* *Redistribution of land use*	4
PRECIPITATION (RAINFALL)								
Higher rainfall in rainy season; Rainfall in Summer will increase 4-6% in 2050; 9 - 12% in 2100;	1	*Higher rainfall is good for crop production* *Flood risk is very high for summer -autumn crop (harvest). Winter-spring (planting)*	2	*Crop grow better* *More rainfall during flowering time may rotten pollen of some vegetables* *More rainfall during rainy season may cause nutrient leaching*	2	5	*Use high yield and quality crop varieties to optimal crop production in higher rainfall condition*	2
Dry season will be drier, Rainfall of Spring will decrease 5% in 2050, 9% in 2100	4	*Drier dry season has strong impact* *May lead to saline intrusion and salinity*	4	*Soil will be degraded, lower productivity* *Some crop may not suitable and farmer have to change crop and crop calendar* *May cause some delay growing during very low soil moisture content*	4	2	*Need to re-design or construct new irrigation system and look for more water resource* *Need to change to higher drought tolerable rice varieties* *Apply new method to save water, need increase more fertilizer*	4

CLIMATE CHANGE RISKS (2050 & 2100)	Exposure	Explanation (E)	Sensiti -vity	Explanation (S)	Impa- ct	Adaptive Capacity	Explanation (AC)	Vulner- ability
							because drought lower fertilizer use efficiency; *Need more irrigation, increase cos*	
STORM/ WIND/ TYPHOON Higher speed (intensity)/ stronger Difficult to forecast the storm frequency Storm season will come later	2	*July - November (storm)* *Crop harvest (April & July)* *1/2 frequency direct storm but high frequency if indirect storm& low tropical pressure*	4	*Later storm season may impact on summer rice at mature period* *High risk due to high uncertainty forecast* *Strong typhoon associated with heavy rainfall cause flooding and loosing harvest*	3	3	*Need to setup optimal crop calendar to avoid risk from typhoon* *Need to have smart action on harvesting to rescue rice from falling*	3
SEA LEVEL RISE Increased 3mm/year in last 20 years Would be increase 1m in 2100	4	*Near the coast, low land, risk of saline intrusion and make drought because of saline river water, no fresh water for irrigation* *Widespread of saline soil*	4	*Degrading soil quality, reducing rice production • Many rice varieties will not be suitable to soil and need to change to higher saline tolerable varieties* *Salt intrusion make river and irrigation system water salty, difficult for irrigation, especially saline soil and acid sulphate soils* *Kill some rice when salt content higher than 4 ppm*	4	4	*Have barrier to prevent salt water intrusion* *Good dykes to protect cropping from high sea level* *Have Saline tolerable rice varieties with high yield and quality*	3
	3.3		3.6		3.6	3.1		3.4

Overall, there thus exist a variety of overlaps between the VA report findings on climatic threats and vulnerabilities, and the risks identified as part of the participatory identification process. The latter adds sand dispersal through strong winds and soil erosion to the list of highly important climate change vulnerabilities, whilst the former also emphasizes the influence of increasing temperatures on the ecosystem.

The most striking difference between the VA report and the results from the participatory identification lies in the fact that the VA team put a lot of emphasis on paddy rice cultivation as the focal part of the identified socio-ecological system. This also becomes clear when looking at the EbA recommendations provided by the VA team, which include the restoration of environmental flows to reduce saline intrusion, the introduction of System of Rice Intensification rice growing techniques, shifting the crop calendar or using other rice varieties (ISPONRE, GIZ and ICEM 2016, p. 215). All these measures are focused on rice cultivation.

The Quang Bing team on the other hand worked with a slightly different, less narrow definition of the system, including other economic parameters such as other forms of agri- and aquaculture as well as additional elements of the system that are not related to production, for example residential areas. Simultaneously, the Quang Binh team put a lot of effort into assessing vulnerabilities of those areas of the system that are extremely close to the sea, thereby again moving away from a sole emphasis on paddy rice (which often lies slightly further away from the coast). This coastal orientation explains why the Quang Binh team identified sand dispersal and erosion as two highly important climate change threats, whilst they might have been of slightly less importance to the VA team in a context where focus was mainly on paddy rice cultivation. As a result, the EbA measure of planting ***casuarina and acacia as coastal protection forest*** (see **5.2.3** below) as recommended by the Quang Binh team varies from what has been suggested by the VA team.

5.2.3 Specific EbA recommendations

Findings from the participatory identification

Based on the participatory identification process described above, the EbA measure ***plantation of casuarina and acacia as coastal protection forest*** has been selected for piloting in Hoa Binh village, Quang Hung commune, Quang Trach district in Quang Binh province. As part of this, a group of 30 households participates in the afforestation and protection of about 10 ha casuarina and acacia coastal protection forest in the village. Once having grown to a certain height, the coastal protection forest shall help reduce erosion as well as sand dispersal, and function as flood control and natural water storage. The rehabilitation of protection forest will help strengthen ecosystem services such as provisioning services (groundwater supply; firewood; animal fodder from undervegetation etc.), regulating and supporting services (climate regulation; water storage and water quality improvement, soil erosion control, improvement of air quality, reduction of impacts of flooding, storms, sand dispersal and salinization). Moreover, the implementation of the pilot will also help to change people's knowledge and understanding, habits and behaviors regarding environmental protection and adaptation to climate change. The improved ecosystem services in combination with an increased degree of knowledge on climate change and climate change adaptation in turn will sustainably help to enhance the adaptive capacity of local communities in the pilot area.

In addition to the coastal protection measures, three types of alternative livelihood activities were introduced to groups of each ten households. These are an adaptation measure in themselves, as they

constitute additional and alternative sources of income that can either function throughout extreme weather events, can be re-established if damaged or reduce dependency on just one livelihood activity. Furthermore, they constitute an incentive for the villagers to keep the forest protection going, which otherwise simply constitutes additional unpaid work for them. In sum, the following activities have been selected and initiated:

Awareness raising and formation of community forest protection groups

- awareness raising activities related to climate change and ecosystem-based adaptation for more than 150 villagers and selected households
- formation of 10 community forest protection groups among 30 selected households
- support in development of community forest protection regulations and an intensive forest protection plan through technical consultants

Coastal protection forest plantation (acacia and casuarina species)

- definition and agreement upon an area of 10 ha for afforestation through a mapping exercise and forest planning
- technical training on forest plantation in coastal forests for 30 selected farmers
- provisioning of acacia seedlings as well as microbial fertilizer to farmers for utilization on an area of 5 ha
- plantation of 5 ha of acacia
- Provisioning of seedlings and plantation of another 5 ha of casuarina forest
- periodical monitoring and advice through experts

Alternative livelihood activities

- baseline data surveys at household level for at least 30 selected households; discussion and advice on production plans, types of livelihoods as well as business-suitable seedlings and breeds
- implementation of three types of alternative livelihood activities for the 30 selected households; these alternative livelihood activities are cow breeding and grass cultivation, fish farming and vegetable gardening
- technical training courses and advice on cow breeding and grass planting techniques, freshwater fish raising and vegetable cultivation for selected households (10 households per livelihood)
- seedlings, breeds and production inputs for the new livelihood activities (including fertilizer, grass seedlings, fish breeds, vegetable cultivation essentials, production tools, essentials for the building of stalls and ponds; cow breeds etc.)

UNIQUE's recommendations

As already pointed out in **chapter 2**, UNIQUE reviewed the partly already initiated activities identified by the Quang Binh team, and made specific suggestions as to how to make the measures more effective and sustainable. In regard to the **plantation of acacia and casuarina**, the experts concluded that the survival rate of seedlings until summer 2017 was relatively high (approximately 90%), and that this success could be traced back to sound maintenance, protection and management practices in the plantation area (UNIQUE 2017, p. 12). However, they also warned that "[…] the plantation is still young and fluctuations in seedling mortality can still take place over the next years. During the field visit, it was evident that the roots of many seedlings were deformed and held back through a compacted block

of hardened soil around the roots. In severe cases this can lead to premature death of the seedlings (as observed on site), as they are not able to receive enough nutrients to support the seedlings growth […] In general, the inappropriate preparation and handling of seedlings harms the initial seedling development of the first years and in particular along the coast it can have negative impacts on the stand stability as trees with poor root development are likely to be uprooted during extreme weather events. Based on this observation, it is possible that during the next rainy season the seedling survival rate could further decline" (UNIQUE 2017, p. 12f.).

According to UNIQUE, the success of the plantation activities thus still remains to be seen. The main point of critique brought forward by the expert team however was related to the suitability of the species selection for plantation: "As previously stated, while acacia is considered a suitable tree species in many regions of the country, acacia in general is not able to create forest-like structures in the long-term due to decreasing survival rates. Acacia has a rather poor timber quality when grown in sand dunes […], which limits long-term livelihoods opportunities for coastal communities" (UNIQUE 2017, p. 13). UNIQUE hence identified the monocultural plantation of acacia trees as a short- to midterm adaptation solution, which can only provide benefits to the local population to a limited extend. Similar perspectives were given on casuarina (UNIQUE 2017, p. 7f.). Whilst a central goal of EbA is to provide long-term, sustainable adaptation solutions, and the plantation of acacia and casuarina therefore cannot be perceived as a sufficient measure in itself, the expert team also pointed out why and how the plantation of these species still remains highly useful: "While *Acacia auriculiformis* is considered inappropriate for the long-term, it is important to keep the initial state of the ecosystem in mind when identifying species to support rehabilitation and restoration efforts. *Acacia auriculformis* plays a key role as a nurse crop that is able to provide a microclimate while also improving soil conditions, making the site more suitable for future forest stand development (Shono et al. 2007) while at the same time providing protective functions for wind inflicted erosion of sand dunes. Thus, considering the long-term restoration goal to support the reestablishment of native tree species in coastal sand dune forests, acacia plays an important role as a nurse crop which can help to establish the conditions for future restoration activities using more appropriate native species, which would currently be limited by the marginal site conditions" (UNIQUE 2017, p. 13f.). UNIQUE furthermore emphasized the strong support and commitment of the local community to the ongoing activities, and evaluated these two factors as strong contributors to the measures' future success rate (UNIQUE 2017, p. 14).

To make the already initiated activities of coastal protection forest plantation more sustainable, UNIQUE recommended to plant additional species as part of the plantation cycle planned for casuarina seedlings in September 2017. Here, it was recommended to conduct further research on and make use of native species, even though less knowledge on their utilization in forest restoration and reforestation is available. A pre-identification of potentially suitable species as done by the expert team can be found below (UNIQUE 2017, p. 15; see **Table 6** below).

Table 6: Selected native species identified as having suitable characteristics for EbA pilot site

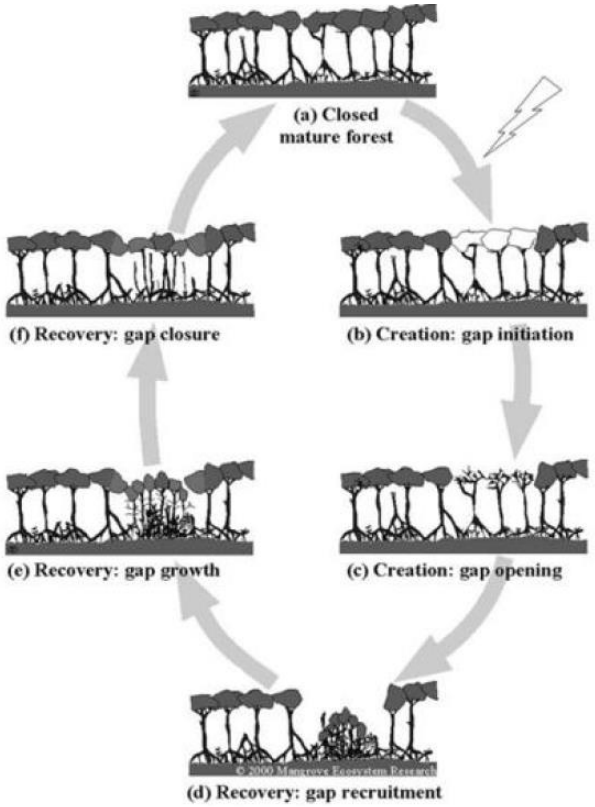
Species	Description of species and growing characteristics
Melaleuca cajuputi	▪ small, hard leaved and light demanding evergreen wood species which serves as an intermediate between microclimate provision, wind erosion protection and party also to reduce strong winds ▪ grows to a max. height of 7m, and can reach an average DBH of up to 25cm ▪ naturally found in the sandy areas of Quang Dong Commune
Myrsine linearis	▪ small woody species frequently found in sandy areas, in a multi-layered stand it is considered a shrub that is able to create an appropriate microclimate for other here listed tree species ▪ Contributes mainly to microclimate generation and wind inflicted erosion limited potential to protect from storms ▪ grows to a max. height of 5m with DBH of max. 15 cm ▪ native to Quang Xuan Commune, often found in communities with *Syzygium corticosum* and *Lithocarpus concentricus*
Lithocarpus concentricus	▪ small tree species that was previously a popular tree species in sandy areas due to its potential to produce both NTFPs (nuts) and firewood ▪ Once established, protects well against storms. ▪ grows to an average height within the range of 7 – 15 m and DBH between 15 – 25 cm ▪ distributed along the coastal areas of central Vietnam
Syzygium corticosum	▪ a species which was well received during interviews with local communities to its potential to contribute to the protection of sandy areas from wind-inflicted erosion, yet limited potential to protect from storms ▪ naturally found in Quang Xuan commune

In a next step, a more detailed plantation strategy, supplementing and adjusting the already designed plantation of casuarina, was developed: "In addition, it is recommended to overlay a mixed species planting approach consisting of 20% *Lithocarpus concentricus* and 80% of a variety of melaleuca, myrsine or synzgium native tree species resembling natural plant communities in the area is recommended. This overlaid grid is proposed with 10m x 10m planting distance between natural plant communities, with each plant community consisting of 5 trees […]. In this planting approach casuarina can function as a nurse species, providing a suitable microclimate and enhanced protection for the slower growing native tree species, while at the same time contributing to enhanced biodiversity in coastal forest stands. Eventually a multi layered stand will be created which is able to serve as a well-established bioshield against extreme climate change events, mainly storms. To operationalize this recommendation, the timely identification of suitable seed/mother trees[4] will be important to ensure that there is enough time to develop seedlings before the planned planting, season which is starting in September 2017. Given that this will imply a change in the plan to plant 100% casuarina in the remaining 5 ha, the local community and key stakeholders should be consulted to discuss the change and to further discuss the suitability of the aforementioned native species" (UNIQUE 2017, p. 16).

[4] "Seed/mother trees are to supply seedlings for natural regeneration in the seed-which out to be used for replanting the same species. As such, selected seed trees should be the best phenotypes, generally healthy, of good growth form and provide large amounts of seedlings (Adams et al. 1994)" (UNIQUE 2017, p. 16).

Additionally, UNIQUE recommended to introduce native timber species into the acacia stand in about three to five years' time, when the stand is established. For this, the expert team pointed out a method of creating artificial gaps in the already existing stands that functions similarly to natural regeneration[5] (UNIQUE 2017, p. 17; see **Figure 5**). By partly replacing the acacia forest cover, a more balanced forest composition and greater ecosystem resilience could be achieved. As part of the replacement process, too large gaps should be avoided, as they might endanger the protective function that the acacia forest will have taken on at that point in time. Yet, a small canopy gap "[…] will provide the growth conditions necessary for the establishment of native species ([for example] sunlight) and help mirror natural regeneration patterns" (UNIQUE 2017, p. 17).

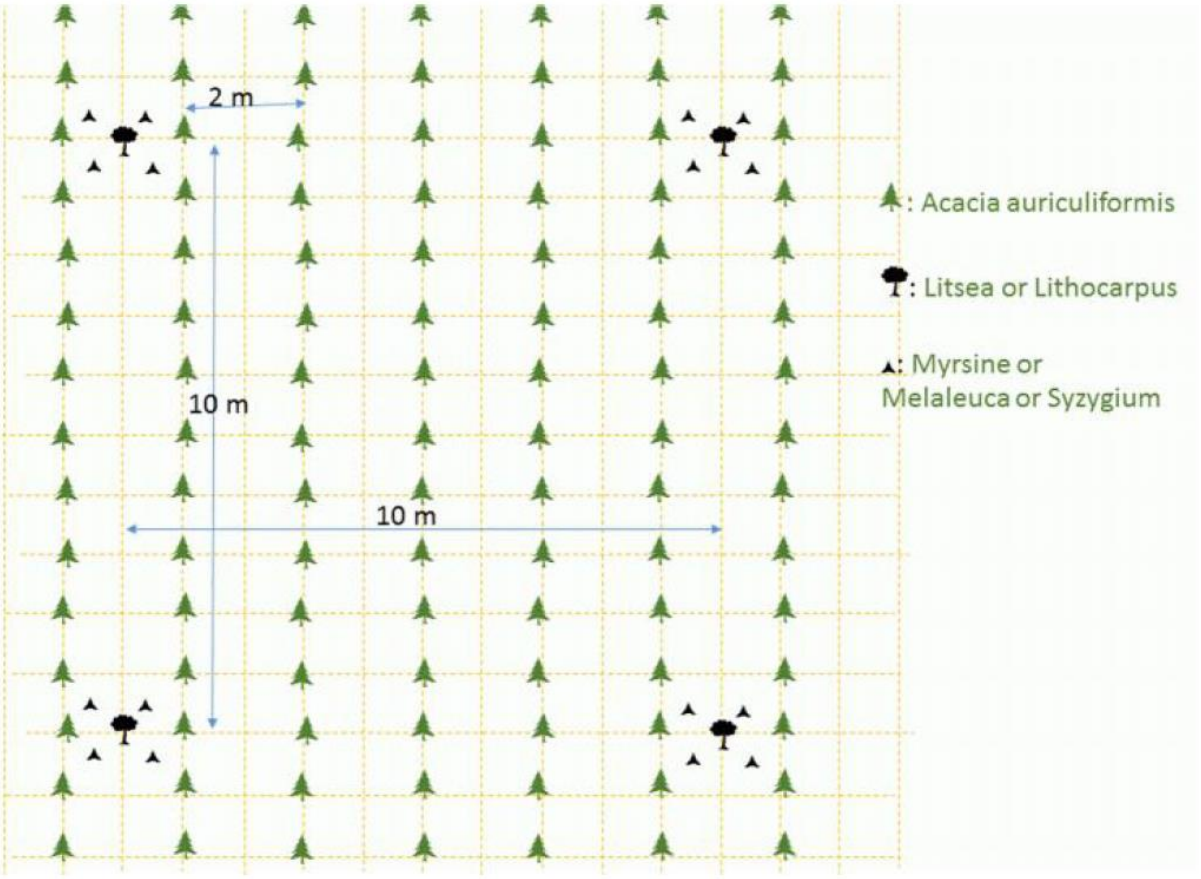
Figure 5: The process of gap creation and introduction of natural regeneration (Schmitt 2013 and Duke 2001)



In its assessments, UNIQUE critically pointed out that the planting design applied for the acacia plantations was based on industrial plantation patterns, whose main purpose was timber production rather than protective purposes. Besides these completely different plantation objectives, such industrial plantations were furthermore usually located in mountainous areas, making use of nutrient-rich soils and functioning under entirely different site characteristics and conditions (UNIQUE 2017, p. 17f.). Since the planting of acacia had already been initiated and plantation designs for the casuarina plantations developed, adjustments rather than completely new designs were suggested by the UNIQUE expert team: "In order to mimic such a natural stand structure and natural regeneration patterns, it is recommended that in-between the 2m x 1m spaced acacia and casuarina plantings a 10m x 10m planting grid with native tree species is added. Each plot should consist of 20% *Lithocarpus concentricus* casuarina and 80% of a variety of melaleuca, myrsine or synzgium native tree species resembling natural plant communities" (UNIQUE 2017, p. 18, see **Figure 6** below).

[5] "In both Quang Dong and Quang Xuan commune it was observed that native tree species regenerated under a canopy of initially monoculture Acacia and Casuarina plantations. Displaying good growth characteristics it is assumed that the native tree species were enabled through a beneficial macroclimate provided by Acacia and Casuarina" (UNIQUE 2017, p. 16).

Figure 6: Proposed planting design of native tree species within acacia/casuarina plantations



Finally, UNIQUE also recommended to pay further attention to seedling treatment, as wrong practices in this context could have "[…] a negative impact on seedling survival, growth rates and the future overall stability of the stand. Improved seedling treatments should be adopted to encourage healthy root development in seedlings. It is recommended that differently sized seedling containers are used during different stages of nursing and seedling preparation in tree nurseries. In addition, these seedling containers should be open at the bottom, to make sure that there are no physical restrictions that limit root development. Special attention should be given to assessing the quality and characteristics of the soils used when placing the seedlings in containers, ensuring that soft nutrient-rich soils are utilized to support root growth. Soil compaction must be avoided when placing the seedling in containers" (UNIQUE 2017, p. 18f.). The expert team advised to make use of the so-called 'bareroot' nursery practice, as part of which seedling containers are omitted entirely to allow for more root development. This method however also requires more maintenance (Riley and Steinfeld 2005 in UNIQUE 2017, p. 19). Alternatively, the punctuation of seedling containers on the sides as well as open button containers is brought forward in UNIQUE's report. In case the implementation of the above recommendations should turn out to be challenging, "[…] direct contact with a certified nursery is recommended in order to discuss about the potential of treating seedlings based on above recommendations; or to develop community nurseries with own standards. In the specific case of native tree species, as described above, is important to identify mother trees which show positive growth characteristics in similar environments. Once these trees are identified, it will be necessary to collect seedlings from such trees, and prepare them in a community nursery before planting them. The preparation of the seedlings in a community nursery allows for the application of the proposed adjustments to improve seedling treatment, as conventional nurseries are required to follow specific

government regulations on seedling treatment and it is unlikely that they would be able to implement such adjustments" (UNIQUE 2017, p. 19).

Regarding the chosen **livelihood activities**, UNIQUE evaluated these as not being equally promising regarding their returns, yet as all of them receiving very positive feedback from the involved households. The most direct benefits became visible in vegetable gardening, where first harvests could already be sold, and where climate-smart agriculture crop cultivation "[…] is rotating throughout the year, always cultivating certain crops based on specific seasons […] As mentioned by the interviewees the demand for organic vegetables was very high so far, with the marketing so far only coming through word-of-mouth as the information on project involvement in organic production techniques has spread throughout the commune" (UNIQUE 2017, p. 14). Slightly less positive was the assessment of the livelihood models related to cattle raising and fish aquaculture, as in this area, more and longer initial investments are needed before returns will come about (UNIQUE 2017, p. 14).

Integration and additional activities

The Quang Binh team took UNIQUE's recommendations thoroughly into consideration, and adjusted the plantation plans and design for fall 2017 accordingly. The suggested native species are being included in the casuarina and acacia plantation to increase diversity and resilience of the newly evolving ecosystem at the pilot site.

Based on the proposal from Quang Binh DONRE, the project furthermore supported the implementation of ten additional training courses on CC/CCA/EbA for about 500 local people in ten villages of five coastal communes (Quảng Phú, Quảng Hưng, Quang Phú, Ngư thủy Trung, Ngư Thủy Nam) in the three districts Quảng Trạch, Đồng Hới and Lệ Thủy. The trainings were conducted between July and September 2017, and were highly appreciated by local people and local authorities. Of particular benefit was the information shared on climate change impacts in Quang Binh and nationwide, as well as the transferred practical knowledge on climate change adaptation measures. Group discussions provided good opportunities for local people to sit together and discuss impacts and potential adaptation measures. In addition, awareness raising activities were also conducted for about 300 pupils and teachers in primary and secondary schools in Ngu Thuy Nam commune. The pupils had the chance to join a picture drawing contest run under the title "Climate change in your home-village." 30 beautiful pictures were selected, presenting the pupils' thorough understanding and good ideas on the impacts of climate change. The participants evaluated the activity as interesting and highly useful.

The school drawing contest

Additional training activities for adults in Quang Binh

Due to the good results of the additional training activities and high demand from local communities, another ten training courses are carried out in five coastal communes in the four districts Quang Trach, Ba Don, Bo Trach and Quang Ninh in October and November 2017.

6. Overview over recommendations and implementation status (Objective 3)

Overall, UNIQUE emphasized in its report how important it is to adjust and diversify the plantation plan and design for the pilot site. The expert team recommended to include native species such as melaleuca, myrsine or synzgium in the planned casuarina plantation, to increase biodiversity and resilience of the coastal protection forest against extreme weather events. Furthermore, native timber species should also be integrated into the already planted acacia stand once the latter has reached a certain size. This is needed, as acacia and casuarina constitute suitable nurse crops to be grown on coastal sandy soils for a limited period of time, but cannot function as permanent coastal protection forest due to their limited survival rate resulting in a lack of forest-like structures in the long term. The Quang Binh team took these recommendations into consideration, and adjusted the plantation plan. An overview over both the originally suggested EbA measures, UNIQUE's most important recommendations and implementation plans and status as well as remarks is provided below. Finally, the additional measures as identified in summer 2017 have also been included at the end of the overview table.

Recommendations Participatory Identification	Recommendations UNIQUE	Activities planned and conducted	Implementation Status	Remarks
Awareness raising and formation of community forest protection groups				
- awareness raising activities related to climate change and ecosystem-based adaptation for more than 150 villagers and selected households		3 training courses on CC/CCA awareness raising for communities in Hoa Binh village were provided.	The trainings were carried out from November 2016 – January 2017.	
- formation of 10 community forest protection groups among 30 selected households		To support the plantation and protection of the forest, 10 community protection groups were formed and received	Conducted November – December 2016	

Recommendations Participatory Identification	Recommendations UNIQUE	Activities planned and conducted	Implementation Status	Remarks
- support in development of community forest protection regulations and an intensive forest protection plan through technical consultants		support in their group operations/activities. Technical trainings on forest plantation, and advice on development of protection guidelines were provided to the 10 community protection groups. The agreement on forest protection was signed by all group members.	Conducted January 2017	
Coastal protection forest plantation				
- definition and agreement upon an area of 10 ha for afforestation through a mapping exercise and forest planning		With the support of the Center for Natural Resource Planning, a participatory exercise on mapping and forest planning was conducted in Hoa Binh village with the involvement of local authorities and communities. The exercise aimed to work on	Conducted November – December 2016	

Recommendations Participatory Identification	Recommendations UNIQUE	Activities planned and conducted	Implementation Status	Remarks
		measuring the total area, forest status, bordering, GIS mapping of the coastal protection forest as well as the selected area for piloting (10 ha). The pilot site was divided into 10 plots to be allocated to 10 groups for protection and management.		
- technical training on forest plantation in coastal forests for 30 selected farmers		A three-day technical training course on acacia forest plantation was conducted for 30 selected households. The participants had the chance to learn about plantation techniques and seedling preparation, and could practice their newly gained knowledge in the field.	Conducted December 2016	

Recommendations Participatory Identification	Recommendations UNIQUE	Activities planned and conducted	Implementation Status	Remarks
- provisioning of acacia seedlings as well as microbial fertilizer to farmers for utilization on an area of 5 ha		After the site check-up and preparation, acacia seedlings and fertilizer were provided to farmers to serve the 5 ha plantation on the field.	Conducted Jan 2017	
- plantation of 5 ha of acacia	Introduce native timber species into the acacia stand in about three to five years' time. Recommendation to use method of creating artificial gaps in the already existing stands that functions similarly to natural regeneration.	5 ha acacia were planted in the field with a high survival rate of approximately 90% up to now, with good growth conditions.	The planting was done in January 2017. The diversification with native species in the existing acacia forest is expected to be carried out in November 2017.	The mix-plantation of native species into the newly set up acacia forest is supposed to be implemented at the same time as the casuarina plantation. A later implementation was hard to realize due to the project's limited time frame.
- Provisioning of seedlings and plantation of another 5 ha of casuarina forest	Mixed species planting approach consisting of 20% *Lithocarpus concentricus* and 80% of a variety of melaleuca, myrsine or synzgium native tree species resembling natural plant communities in the area (proposed grid with 10m x 10m	After the site check-up and preparation, casuarina seedlings and fertilizer shall be provided to farmers to serve the 5 ha plantation on the field. Native species shall be inter-cropped into the	The activity is planned for November 2017 – January 2018.	The inter-plantation of native species into the acacia forest shall take place at the same time.

Recommendations Participatory Identification	Recommendations UNIQUE	Activities planned and conducted	Implementation Status	Remarks
	planting distance between natural plant communities, with each plant community consisting of 5 trees)	casuarina plantation as part of this process.		
- periodical monitoring and advice through experts		The periodical monitoring (weekly and monthly) is done by technical consultants and partner staff with focus on the planted forest and livelihood activities in Hoa Binh village. The data is collected by the villagers during the monitoring and consolidated by the consultants.	December 2016 - now	
Additional livelihood activities - baseline data surveys at household level for at least 30 selected households; discussion and advice on production plans, types of livelihoods as well as business-suitable seedlings and breeds		The baseline data surveys were conducted at household level by DONRE, GIZ, district and commune staff.	Conducted in October 2016	

Recommendations Participatory Identification	Recommendations UNIQUE	Activities planned and conducted	Implementation Status	Remarks
- implementation of three types of alternative livelihood activities for the 30 selected households; these alternative livelihood activities are cow breeding and grass cultivation, fish farming and vegetable gardening		Before the implementation, discussions and consultation meetings were conducted with selected households for selection of suitable livelihood activities, capacity and conditions of households, and to work out a plan for implementation.	Initiated in November 2016	
- technical training courses and advice on cow breeding and grass planting techniques, freshwater fish raising and vegetable cultivation for selected households (10 households per livelihood)		Four types of training courses were conducted for 30 households on the selected livelihoods to support them in obtaining the technical knowledge and skills for implementation and production.	December 2016 – January 2017	
- provide seedlings, breeds and production inputs for the new livelihood activities (including fertilizer, grass seedlings, fish breeds,		Required seedlings (vegetable, grass), breeds (fish, cow) and production inputs (fertilizer, nets etc.)	January 2017	

Recommendations Participatory Identification	Recommendations UNIQUE	Activities planned and conducted	Implementation Status	Remarks
vegetable cultivation essentials, production tools, essentials for the building of stalls and ponds; cow breeds etc.)		were provided to farmers as agreed.		
	Improved seedling treatment Make use of differently sized seedling containers during different stages of nursing and seedling preparation in tree nurseries. Seedling containers should be open at the bottom, to make sure that there are no physical restrictions that limit root development. Assess quality and characteristics of the soils used when placing the seedlings in containers, ensuring that soft nutrient-rich soils are utilized to support root growth. Avoid soil compaction.	The project did send the feedback to the service provider to improve the quality of the seedling production process.	The project did send the feedback to the service provider to improve the quality of the seedling production process. Seedlings will also be provided for re-planting to replace dead trees in November 2017.	With only about 10% dead seedlings, there do not seem to occur major problems in the forest development process; the acceptable death rate for forest plantation is 25-30%, especially on sandy soil.

Recommendations Participatory Identification	Recommendations UNIQUE	Activities planned and conducted	Implementation Status	Remarks
		Additional Activities Implementation of ten additional training courses on CC/CCA/EbA for about 500 local people in ten villages of five coastal communes in Quang Binh.	Conducted July – September 2017	
		Awareness raising activities, including a drawing competition, were conducted for about 300 pupils and teachers in primary and secondary schools in Ngu Thuy Nam commune.	Conducted September 2017	
		Another ten training courses are carried out in five coastal communes in Quang Binh.	Planned for October and November 2017	Due to the good results of the additional training activities and high demand from local communities, more training courses were planned.

7. Challenges in participatory identification

A major challenge that became visible as part of the participatory identification process is that EbA constitutes a concept which remains relatively unknown among local people; its basic functions and principles as well as potentials are not well established in a Vietnamese local context. That means that before on the ground EbA-related assessments could take place, thorough elaborations on EbA as an adaptation approach were key. Further in-depth clarification will be needed before and during the implementation of (particularly participatory) EbA measures. The fact that EbA does not yet constitute a well-known approach on the ground makes clear once again that more work on knowledge- and experience sharing as well as concrete EbA implementation is urgently needed.

Related to this point is the issue of other climate change adaptation options such as Climate Smart Agriculture or Climate Smart Villages being implemented in the province. The lack of a clear understanding on what EbA entails leads to confusion among local people and authorities as to what can be defined as EbA, and how it relates to other concepts and approaches as named above. Again, further knowledge sharing and explanation of linkages as well as differentiations between different adaptation options will be needed here in the future.

Other challenges experienced by the Quang Binh team were related to a lack of scientific data on climate change in the vulnerable areas, which partly hindered the establishment of long-term and scientifically based assessments. Furthermore, it sometimes occurred that farmers had problems identifying qualitative losses and impacts which are difficult to quantify, which means that certain qualitative impacts might not have been registered as part of the participatory assessment.

Also, it became clear that the increasing trend of clearing natural forests for the planting of commercially more valuable species will constitute a challenge for future climate change adaptation measures in the province. Introducing principles such as the Remuneration of Positive Externalities might constitute a way to establish alternative and more sustainable perspectives on value in nature.

Finally, the implementation planning for the suggested measures is time consuming and might affect local cultivation calendars. Sufficient resources in terms of time and manpower need to be set aside for this step, and the benefits of adjusting or interfering with local cultivation calendars made clear.

MONITORING AND EVALUATION

8. Monitoring and evaluation in Quang Binh province

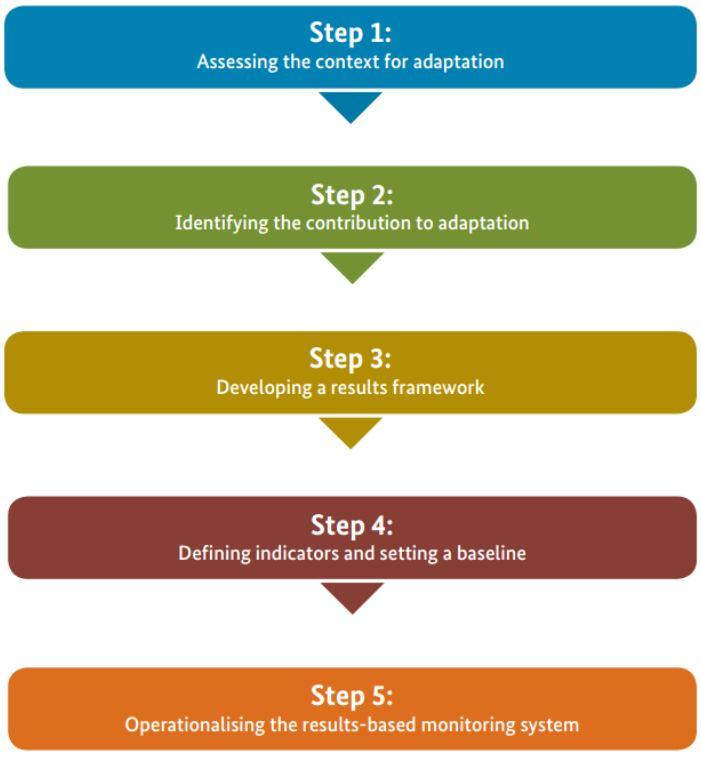
Effective monitoring and evaluation (M&E) of ecosystem-based adaptation activities is critical for building a strong, global evidence base around the approach and for assessing the wide, diverse range of interventions being implemented under the umbrella of EbA. At the global level, monitoring and evaluation is a tool for identifying and documenting successful projects and approaches and tracking progress toward common indicators. At the project level, the purpose is to track implementation and outputs systematically, and to measure the effectiveness of projects, while strengthening understanding around the many multi-layered factors underlying EbA. By doing so, M&E can also prevent future implementation problems in EbA such as mal-adaptation (GIZ 2016, p. 1).

In order to systematically understand and control the developments of the pilot activities in Quang Binh as identified and described above, the EbA project team developed a monitoring and evaluation approach for these specific EbA measures. Its methodology and specific implications shall be elaborated upon in this chapter.

8.1 Methodology

The M&E methodology developed for the pilot activities of the project 'Strategic Mainstreaming of Ecosystem-based Adaptation in Viet Nam' rests in its main features on recommendations given in a 2016 concept note on monitoring and evaluation for EbA that was prepared as part of the project (GIZ 2016). These recommendations were then further developed and tailored into a context-specific system of indicators (see **8.1.4**). The afore mentioned concept note builds on a comprehensive, GIZ-developed framework of M&E for climate change adaptation whose core documents are training slides with the title 'Integrating climate change adaptation into development planning - Additional Modules on Monitoring and Evaluation' (2013b), and the guidebook 'Adaptation made to measure - A guidebook to the design and results-based monitoring of climate change adaptation projects' (2013a). In 'Adaptation made to measure', GIZ suggests a five-step approach to monitoring and evaluating adaptation activities (see **Figure 7**). This step-by-step guide has been developed to support practitioners in the strategic build-up of a framework to monitor and evaluate the implementation of their adaptation activities (GIZ 2016, p. 2). To be able to effectively measure the outputs, outcomes and impact of adaptation actions, the guide

Figure 7: Five step model of GIZ's 'Adaptation made to measure' framework (GIZ, 2013a)



furthermore provides support for the development of SMART (Specific, Measurable, Attainable, Relevant and Time bound) indicators (GIZ 2013a; 2013b). When applying this five-step methodology to an EbA context, where an underlying understanding is that economy, society and ecosystems are intrinsically linked in their functioning, the environmental, economic and social impact of climate change needs to be taken into account each step of the model (GIZ 2016, p. 2).

8.1.1 Step 1: Assessing the context for adaptation

The standard procedure for assessing context in EbA is a vulnerability assessment. This tool is used to measure the vulnerability and resilience of a specific ecosystem (and its services), as well as the vulnerability, resilience and adaptive capacity of human communities. It forms the basis for outlining options and barriers to EbA measures (GIZ 2016, p. 3).

In the identification process of the pilot sites and activities in Quang Binh as described above, steps 1-4 (see **Chapter 4.1**) depict a vulnerability assessment process that, due to its holistic approach, took ecological, economic and social factors equally into account. This participatory assessment and the resulting activities were then furthermore streamlined with the extensive vulnerability assessment for socio-ecological systems (VASES) that was conducted as part of the EbA project in Ha Tinh and Quang Binh province (see **Chapter 2**). Here, coherent systems were identified based on social, economic and ecological factors. Thereby, the above described understanding of society, ecology and economy being strongly interlinked was acknowledged. Vulnerabilities to climate change on all three levels were considered; based on these, a ranking of both the most important and the most vulnerable socio-ecological systems in the provinces as well as response mechanisms could be determined.

8.1.2 Step 2: Identifying the contribution to adaptation

To identify the contribution of a measure to adaptation, 'Adaptation made to measure' suggests working with the three dimensions *Building adaptive capacity; Measure for reducing identified risks/vulnerabilities* and *Successful development despite climate change (sustained development)*, and singling out an adaptation contribution for each of these (see **Table 7** as an example below). Since the contribution to adaptation was already majorly defined as part of the participatory identification process described above, developing an additional table for this point was optional. For Quang Binh province, it was decided to refrain from the additional development of this table, as sufficient information for the afterwards following steps was available.

Table 7: Contribution to adaptation as suggested in the 2016 concept note

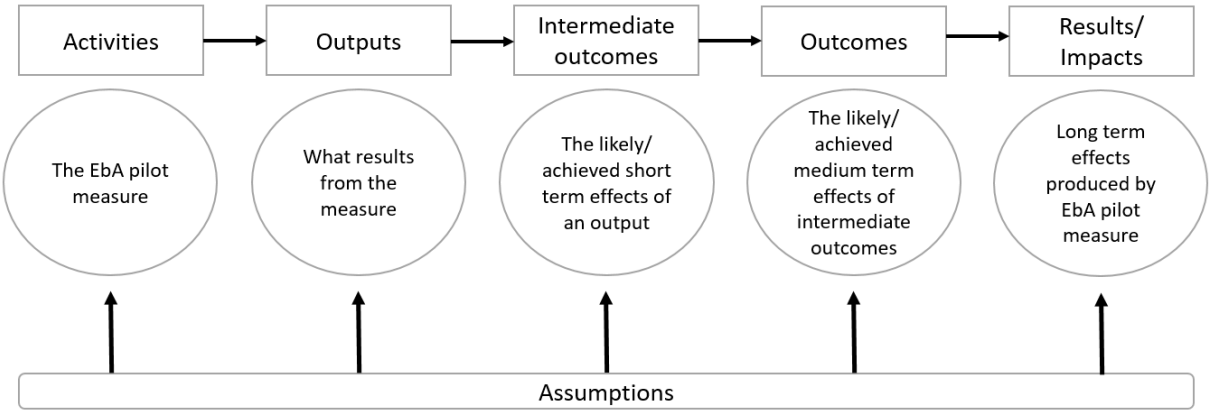
Dimension	EbA pilot measure	Examples	Contribution to adaptation
1. Building adaptive capacity	Enabling capacity development activities within the context of the EbA pilot measure [such as] dealing with floods.	• Training local community on how to use mangroves for flood protection. • Workshop with target group on climate change adaptation through forest enrichment. • Training on usefulness of intercropping within the context of climate change.	Development of local community's adaptive capacity to deal with floods.

2. Measure for reducing identified risks/ vulnerabilities (adaptation actions)	Implementing EbA measures within the project. Targeted at the use of ecosystems (and its services) for adaptation.	• Building resilience of ecosystems to changing climatic conditions such as i.e. the use of seeds or crops that are better adjusted to a changing climate, • EbA measures reflecting ecological engineering.	Key ecosystem services ([such as] water regulation) needed for dealing with changing climatic conditions enhanced.
3. Successful development despite climate change (sustained development)	Targeting structures within the context of the EbA pilot (which are potentially compromised due to climate change).	• District development objectives or plans are adjusted to future climate change impacts.	Overarching structures such as development plans are adapted to climate change.

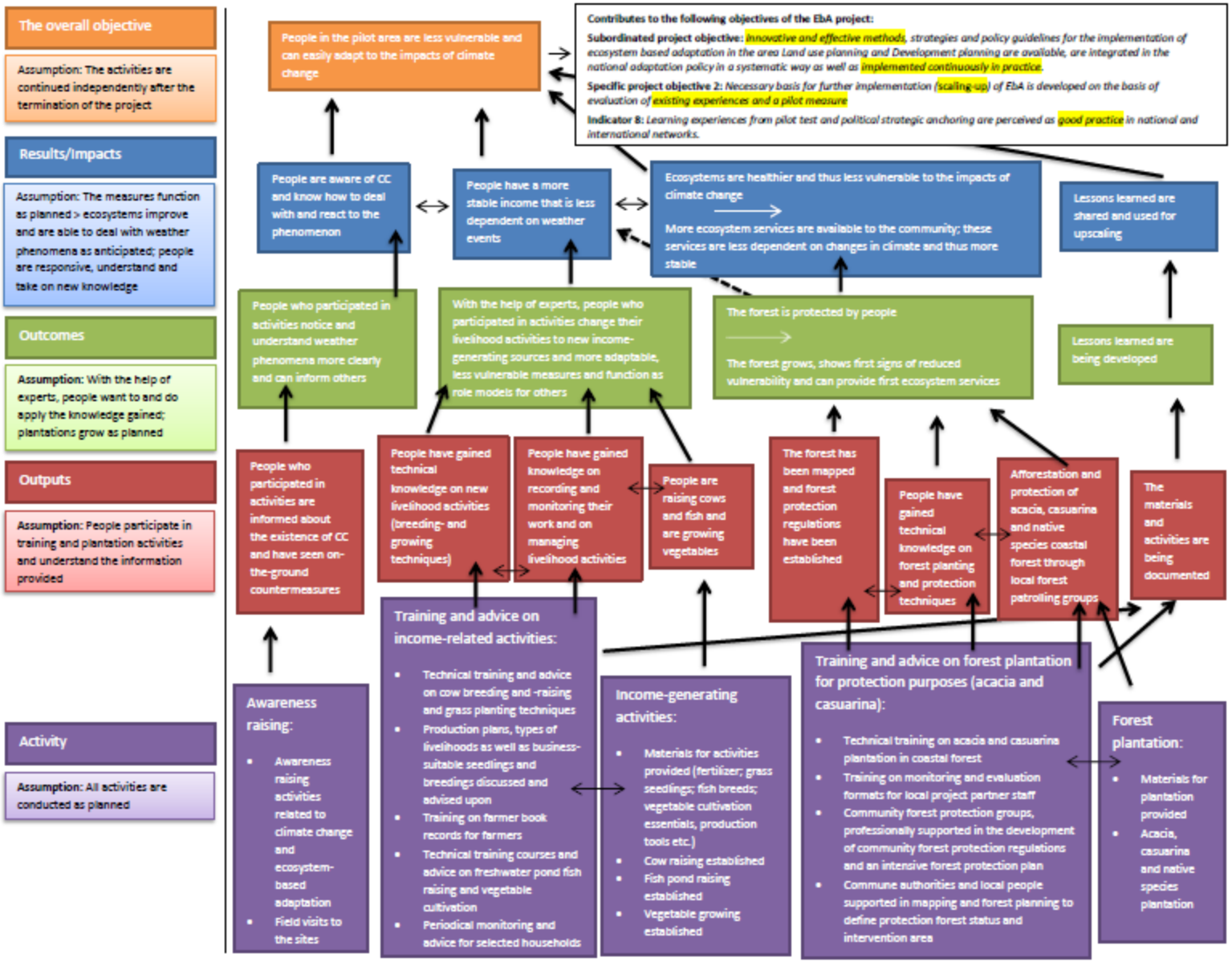
8.1.3 Step 3: Developing a results framework

To monitor the successful contribution to adaptation, a results framework, also known as a 'logframe' with outputs, outcomes and impacts as well as underlying assumptions needs to be defined. For this process, the 2016 concept note suggested a structure as shown below (GIZ 2016, p. 4).

Figure 8: Suggested results framework



However, EbA with its integrated and holistic approach requires an iterative, flexible and adaptive process to prevent mal-adaptation (GIZ 2016, p. 4). Due to the complexity and dynamic character of EbA measures, it was decided to take the results framework further and work with a Theory of Change methodology to develop outputs, outcomes and impacts. This model allows for more intermediate re-evaluation based on monitoring, which is key for every adaptation project, as conditions and circumstances, and thus results and activities may change along the way. For the pilot activities in Quang Binh province, the following results framework based on a Theory of Change was developed:


The overall objective
Assumption: The activities are continued independently after the termination of the project
Results/Impacts
Assumption: The measures function as planned > ecosystems improve and are able to deal with weather phenomena as anticipated; people are responsive, understand and take on new knowledge
Outcomes
Assumption: With the help of experts, people want to and do apply the knowledge gained; plantations grow as planned
Outputs
Assumption: People participate in training and plantation activities and understand the information provided
Activity
Assumption: All activities are conducted as planned
People in the pilot area are less vulnerable and can easily adapt to the impacts of climate change
Contributes to the following objectives of the EbA project:
Subordinated project objective: Innovative and effective methods, strategies and policy guidelines for the implementation of ecosystem based adaptation in the area Land use planning and Development planning are available, are integrated in the national adaptation policy in a systematic way as well as implemented continuously in practice.
Specific project objective 2: Necessary basis for further implementation (scaling-up) of EbA is developed on the basis of evaluation of existing experiences and a pilot measure
Indicator 8: Learning experiences from pilot test and political strategic anchoring are perceived as good practice in national and international networks.
People are aware of CC and know how to deal with and react to the phenomenon
People have a more stable income that is less dependent on weather events
Ecosystems are healthier and thus less vulnerable to the impacts of climate change
More ecosystem services are available to the community; these services are less dependent on changes in climate and thus more stable
Lessons learned are shared and used for upscaling
People who participated in activities notice and understand weather phenomena more clearly and can inform others
With the help of experts, people who participated in activities change their livelihood activities to new income-generating sources and more adaptable, less vulnerable measures and function as role models for others
The forest is protected by people
The forest grows, shows first signs of reduced vulnerability and can provide first ecosystem services
Lessons learned are being developed
People who participated in activities are informed about the existence of CC and have seen on-the-ground countermeasures
People have gained technical knowledge on new livelihood activities (breeding- and growing techniques)
People have gained knowledge on recording and monitoring their work and on managing livelihood activities
People are raising cows and fish and are growing vegetables
The forest has been mapped and forest protection regulations have been established
People have gained technical knowledge on forest planting and protection techniques
Afforestation and protection of acacia, casuarina and native species coastal forest through local forest patrolling groups
The materials and activities are being documented
Awareness raising:
Awareness raising activities related to climate change and ecosystem-based adaptation
Field visits to the sites
Training and advice on income-related activities:
Technical training and advice on cow breeding and -raising and grass planting techniques
Production plans, types of livelihoods as well as business-suitable seedlings and breedings discussed and advised upon
Training on farmer book records for farmers
Technical training courses and advice on freshwater pond fish raising and vegetable cultivation
Periodical monitoring and advice for selected households
Income-generating activities:
Materials for activities provided (fertilizer; grass seedlings; fish breeds; vegetable cultivation essentials, production tools etc.)
Cow raising established
Fish pond raising established
Vegetable growing established
Training and advice on forest plantation for protection purposes (acacia and casuarina):
Technical training on acacia and casuarina plantation in coastal forest
Training on monitoring and evaluation formats for local project partner staff
Community forest protection groups, professionally supported in the development of community forest protection regulations and an intensive forest protection plan
Commune authorities and local people supported in mapping and forest planning to define protection forest status and intervention area
Forest plantation:
Materials for plantation provided
Acacia, casuarina and native species plantation

The results framework for Quang Binh takes a starting point in the activity categories *Awareness raising; Training and advice on income-related activities; Income-generating activities; Training and advice on forest plantation for protection purposes* and *Forest plantation*. This structure is different from how the results framework was set up in Ha Tinh province, where all training and advice activities were grouped together into one initial category. Material provisioning and on the ground measures then constituted two additional categories in the Ha Tinh results framework, whilst for Quang Binh, it was decided to integrate material provisioning and on the ground activities into a common category which in turn is linked to the content of the measures (see results framework). After thorough consultation with local experts from Quang Binh, the division as shown above was selected as the most suitable one for the pilot activities in the province.

The framework shows how different activities are planned to lead to specific short-term outputs, mid-term outcomes and long-term impacts. Multiple activities complement each other or are interlinked, indicated by the double arrows in the results framework. Eventually, all activities aim at contributing to the overall objective of the pilot, namely that people in the pilot area are less vulnerable and can easily adapt to the impacts of climate change. This objective in turn synchronizes well with explicit objectives of the EbA project as identified in the project document. These are:

- **Subordinated project objective:** Innovative and effective methods, strategies and policy guidelines for the implementation of ecosystem based adaptation in the area Land use planning and Development planning are available, are integrated in the national adaptation policy in a systematic way as well as implemented continuously in practice
- **Specific project objective 2:** Necessary basis for further implementation (scaling-up) of EbA is developed on the basis of evaluation of existing experiences and a pilot measure
- **Indicator 8:** Learning experiences from pilot test and political strategic anchoring are perceived as good practice in national and international networks

All activities, outputs, outcomes and impacts, and even the overall objective of the pilots are based on certain assumptions, which can be found on the left side of the results framework. These are highly important, as they explain underlying expectations and planned circumstances which are needed for activities to evolve the way they are supposed to, and thus for them to create the intended impact. When developments within a project take unexpected turns, this might be due to wrong or too optimistic assumptions. In such case, it is then possible to go into the Theory of Change framework, adjust assumptions and, based hereon, change outputs, outcomes and impacts of activities, and eventually re-work the indicators identified. Alternatively, if assumptions prove to be entirely wrong, they constitute a useful starting point for the re-assessment of the project and its goals, and potentially the adjustment of activities.

The generation of a results framework is thus extremely crucial for the M&E indicator development process. This point gains even more validity when taking into consideration that the final definition of indicators as conducted below heavily rests on what has been identified on output-, outcome- and impact level of the results framework.

8.1.4 Step 4: Defining indicators and setting a baseline

In a next step, context specific indicators which directly relate to short-term outputs, medium-term outcomes and long-term impacts as defined in the results framework could now be identified (GIZ 2016, p. 5). Here, it was important to include both qualitative and quantitative indicators, and to define all of these according to 'SMART' criteria (Specific, Measurable, Attainable, Relevant and Time bound). This can be achieved by first, defining the subject (taken from the afore developed results framework); second, specifying the quantity of change; third, defining the quality of change; fourth, defining a time horizon; fifth, specifying disaggregation (for instance by gender, geographical reference) if applicable; and finally, combining all five steps into one subject-specific indicator for short, medium- and long-term time frames. This procedure is repeated for each theme as defined in the results framework.

For the identification of the indicators' change parameters, baselines need to be set as starting points in comparison to which changes can then be measured. In Quang Binh province, baseline data was gathered in cooperation with the Department of Natural Resources and Environment and GIZ project staff both in the initial phase of the pilot implementation and specifically for the identification of indicators later on.

The definition of indicators is crucial for the M&E process and was thus done extremely thoroughly. An example of an indicator table for Quang Binh province can be found below.

Table 8: Indicator identification table

Steps	Process Indicator	Outcome Indicator	Impact Indicator
1. Define subject	***Climate change awareness raising***	Climate change awareness raising > in-depth understanding and knowledge sharing	People are aware of climate change and know how to deal with and react to the phenomenon
2. Specify quantity of change	13 trainings for a total of 650 participants in Hoa Binh village and four other villages in other communes (3 trainings were conducted in 2016, 10 trainings planned for 2017)	50% of the households in the selected commune and 30% of the households in the additionally selected communes, particularly women, youth union and farmer association members	70% of the households in the selected commune, and 50% of the households in the additionally selected communes
3. Specify quality of change	Gained knowledge and awareness on climate change (what are the phenomena, how do they affect people) and how to practically react to it	Gained knowledge and awareness on CC, and have seen its implications in practice; are sharing their knowledge with others	Internalized knowledge on CC, have seen its implications in practice and have experience in responding to the phenomenon based on techniques they learned as part of the awareness raising
4. Define time horizon	2016 – 2017 (1 year)	2016 – 2018 (2 years)	2016 – 2024 (8 years)

5. If applicable, specify disaggregation (i.e. by gender, geographical reference)	1. Men and women in Hoa Binh village, Quang Trach district, who have been selected for the pilot (30 households) 2. Men and women in Hoa Binh village, Quang Trach district 3. Women, youth union- and farmer association members in four different communes in Quang Binh province (440 participants)	1. Men and women in Hoa Binh village, Quang Trach district 2. Men and women in four other communes in Quang Binh province, particularly women, youth union and farmer association members	1. Men and women in Hoa Binh village, Quang Trach district 2. Men and women in four other communes in Quang Binh province, at least 50% of them being women
Combine 5 steps into 1 indicator (specific to subject)	13 trainings on climate change and how to react to it are provided for a total of 650 participants in Hoa Binh village, Quang Trach district and four other communes in Quang Binh province within one year (2016 – 2017). For Hoa Binh village, men and women receive the training equally. For the other four communes, women, youth union- and farmer association members are prioritized.	Over two years (2016 – 2018), 50% of the households in Hoa Binh village and 30% of the households in the additionally selected communes in Quang Binh province, particularly women, youth union- and farmer association members, have gained knowledge and awareness on CC, have seen its implications in practice and are sharing their knowledge with others.	Over 8 years (2016 – 2024), 70% of the households in Hoa Binh village (men and women alike), and 50% of the households in the additionally selected communes in Quang Binh province (with at least 50% of the people informed being women) have internalized knowledge on CC, have seen its implications in practice and have experience in responding to the phenomenon based on techniques they learned as part of the awareness raising courses.

Since indicators are highly context dependent, the tables developed for Quang Binh vary from the ones identified for Ha Tinh not only in terms of content, but also style. For Quang Binh for instance, separate tables were developed for capacity building elements in relation to topic, and for on the ground activities linked to a topic or content, thereby being precisely in line with the results framework. For Ha Tinh on the other hand, indicator subjects were sub-divided into capacity building and material provisioning as well as on the ground activity elements, whilst still running under one overall subject headline and thus being dealt with in one table. This alternative setup derives from the different structure utilized in the results framework (see elaboration under **8.1.3** above). Tables in Ha Tinh furthermore contain a lot more detailed information than in Quang Binh, which allows for much more thorough monitoring, yet also makes the process more challenging, as highly detailed and disaggregated data needs to be gathered.

8.1.5 Step 5: Operationalizing the results-based monitoring system

For useful operationalization of the M&E system, it is important to systematically monitor the change process. For this, data needs, data sources, the data collection method, data analysis method and responsibilities need to be identified. This was done in the final step of the indicator development process. An example of one operationalized indicator table for Quang Binh can be found below.

Table 9: Operationalization table

Indicator	Data need (how do you intend to quantify the indicator?)	Data source (where will the data come from?)	Data collection method (which methods will be used, frequency)	Data analysis method (how will the data be analysed?)	Responsibility (who will be responsible for collection, analysis, storage?)	Costs (what are the estimated costs?)
Over 8 years (2016 – 2024), 70% of the households in Hoa Binh village (men and women alike), and 50% of the households in the additionally selected communes in Quang Binh province (with at least 50% of the people informed being women) have internalized knowledge on CC, have seen its implications in practice and have experience in responding to the phenomenon based on techniques they learned as part of the awareness raising courses.	- %/number of households who have internalized knowledge and understanding on CC and what it means in practice in Hoa Binh and other communes - number/% of households that have changed their behaviour and response/adaptation mechanisms towards climate change due to the awareness raising measures conducted (including word of mouth from participants) and/or started to have specific response/adaptation mechanisms to climate change that stem from the awareness raising measures - distribution male and female (in absolute numbers or percentages) for changes in knowledge and behavior	- primary data (fieldwork)	- interviews - observations - annual natural disaster reports of Quảng Phú, Quảng Hưng, Quang Phú, Ngư Thủy Trung, Ngư Thủy Nam communes - once every other year	Description in text form and visualization (graphs and tables) for numbers and percentages per year and development over eight years as well as distributions	- district DONRE and Quảng Phú, Quảng Hưng, Quang Phú, Ngư Thủy Trung, Ngư Thủy Nam communes are responsible for collecting data - DONRE is responsible for analysing, storing and reporting	This category needs to be filled in by the monitoring institution

8.2 Challenges and Recommendations

The development of indicators and an operational plan for their usage were developed over roughly six months in 2017. In a next step, the application of the M&E system needs to be commenced and a routine for strategic M&E established. As part of this, it is already foreseeable that multiple challenges will arise:

First, EbA is often also related to changes in people's awareness and capacity in terms of knowledge. Measuring this is only possible to a limited degree, as assessments can solely be done through qualitative interviews and observations, which still will only reveal people's actual knowledge on EbA-related topics (or lack of it) to a certain extend. This means that quantifications and definite statements on people's awareness and knowledge on EbA might remain hard to make. Second, EbA measures often only prove effective after many years, and regularly in a time frame that lies outside of a project scope. This is also the case for the pilot measures in Quang Binh province. It is thus highly important to prepare thoroughly described indicators, and to ensure a timely and all-encompassing handover to stakeholders who can monitor the activities over a longer time period and who will work with the results of the M&E. In the case of the project 'Strategic Mainstreaming of Ecosystem-based Adaptation', this task will be taken on by the provincial Departments of Natural Resources and Environment (DONREs). As part of the handover procedure, an M&E plan with and for partners at different levels as well as training for partner staff needs to be developed to ensure the sustainability of the pilot measures and their effects when the project is phased out. This step has already been initiated by developing a manual for the implementation and usage of the M&E tables for Ha Tinh and Quang Binh. Specific on-the-ground training on doing M&E for and with the partners is however still needed and will be initiated soon.

Furthermore, unexpected changes and divergences from planned developments are normal and inevitable when working with a complex approach like ecosystem-based adaptation, where elements of vulnerability and resilience of nature, economy and society all need to be taken into consideration. This point was factored in when developing the results framework in style of a Theory of Change which allows for changes in planned outputs, outcomes and impacts. Here, it is core to be open and pay attention to such changes, and to understand their origins. In case of unexpected alternative developments, the following questions should be kept in mind:

- What is the different outcome? Is it better, worse, or just different from what was planned and expected?
- What created the different outcome? A results framework usually makes use of very specific assumptions. As pointed out above, these assumptions were potentially wrong, or were not exhaustive enough in terms of the factors they included. Alternatively, other external changes occurred which could not be planned for.
- Can positive (or negative) changes be attributed to one's project/work, or were changes based on other factor or actors, and the project actually did not manage to contribute to this change? This point might be very hard to prove, as ideally, one would also do surveys and interviews with a control community which did not get project support, generating comparable data. This, however, is very time consuming. It is often simpler to retrospectively ask the project community about

people‘s opinion on how different factors and actors (project- and not project-related) have influenced their situation since the project has started (University of Oxford 2014, p. 15).

In more general terms, there clearly exists a need for the development of practical EbA-specific M&E guidance for practitioners that builds on existing M&E frameworks. The manual on implementing M&E for EbA that has been developed as part of the EbA project contributes to filling this gap. At national level, it is necessary to include EbA M&E in legal frameworks and to link it to other M&E concepts that have been developed as part of country-specific guidelines such as Viet Nam’s National Adaptation Plan.

9. Appendices

9.1 Annexes Quang Binh

9.1.1 Annex 1: The list of documents screened

- Communes and districts. 2015. Report from districts and communes on socio-economic developments.
- PPC. 2012. "Climate Proofing Report for Phong Nha Ke Bang National Park Region." Dong Hoi: Quang Binh Provincial People's Committee.
- ISPONRE. 2009. "Quang Binh assessment report on climate change." Ha Noi: Institute of Strategy and Policy on Natural Resources and Environment.
- ISPONRE. 2013. "Development and implementation of EbA measures." Technical guideline. Ha Noi: Institute of Strategy and Policy on Natural Resources and Environment.
- ISPONRE, GIZ. 2015. "Integrating EbA in development planning." Training materials. Ha Noi: Institute of Strategy and Policy on Natural Resources and Environment and Gesellschaft für international Zusammenarbeit.
- Quang Binh DONRE. 2011. "Provincial action plan to respond to climate change 2011-2015." Dong Hoi: Department of Natural Resources and Environment.

9.1.2 Annex 2: Criteria to select vulnerable areas and EbA measures

For selection of vulnerable areas:

- Observed most adverse impacts of the severe problems caused and enforced by CC
- Healthy ecosystems are available in the area
- Strong dependence of local livelihood on natural resources and ecosystem services
- Good/best practices/existing or past experiences in natural resource management of local communities
- Strong commitment of local authorities (communes and villages)
- Communities have experience on the implementation of some CCA measures
- Visitors and policy makers at both national and provincial levels can easily access the area

For selection of EbA measures:

- The measure supports people to tackle the negative impacts of CC
- The measure is simple in implementation
- The measure constitutes an inexpensive option
- The measure optimizes the use of local resources including labor force, ecosystem services and traditional knowledge
- The measure holds upscaling potential (suitable for local conditions, feasible and matches certain local legal documents, possibility to get funding from other relevant national funding programs)

- The measure is sustainable, including economic, social and environmental aspects - reduction of CH_4 emission and/or increase of CO_2 sequestration

9.1.3 Annex 3: Forms for field work

Methods used to conduct the identification of promising EbA measures in Quang Binh with references to the following documents:

1. Technical guideline: Development and implementation of EbA measures (ISPONRE 2013)
2. Participatory Rural Appraisal toolkits

The approach:

1. Discuss with commune staff (leader representative, cadastral officer and agroforestry officer) on steps 1-9. However, it is not expected that all results are available from the commune meeting
2. Select a village which has healthy ecosystems and which is affected by CC
3. Conduct a group discussion with key informants on all steps
4. The final output of working at each commune and village is a list of potential EbA with ranking (5 lists maximum)
5. Meeting with DONRE to discuss and select **one project** (with consultation with DPI and DARD where possible)

Table 10: The approach

Steps	**Results**	**Methods/Tools**
1. Identification of the adaptation objectives	EbA	Consultation with provincial staff (DONRE), communes and villages
2. Overview of commune/villages (socio-economic, population, livelihood options, dependence on natural resources)	- Socio-economic conditions: livelihood options and natural resources	- Secondary data (commune report) - Group discussions (with communes and villages) - Natural resource map or/and land use map
3. Identification of natural resources (ecosystems), their benefits (services)	- Maps of major ecosystems/services - Identification of beneficiaries of ecosystem services	- Group discussions (with communes and villages) - Natural resource map or/and land use map - Participatory Landscape Appraisal (PaLA)

4. Identification of the past/current CC hazards/threats to communities	- Hazard map - Crop calendar and the changes due to CC - Hazard history - List of the current CCA measures	- Group discussions (with communes and villages) - Crop calendar - Hazard history - Hazard map
5. Identification of the potential impacts of future CC hazards and opportunities from socio-economic development for communities	- The predictions from CC hazards and impacts to communities - Impacts of socio-economic development on communities	- Secondary data (from the report/plan of commune) - Group discussions (with communes and villages)
6. Analysis of the CC threats and socio-economic development impacts on ecosystems and services	- Impacts of CC - Impacts of socio-economic development	- Secondary data (commune report) - Group discussions (with communes and villages) - Consultation with experts
7. Analysis of the changes in the dependence of livelihood options on ecosystem services by CC hazards	The matrix on risks of livelihood options is developed	- Group discussions (with communes and villages) - Consultation with experts
8. Evaluate and rank the vulnerabilities of livelihood options by CC hazards	The matrix of vulnerabilities is developed	- Group discussions (with communes and villages) - Consultation with experts - Power Point
9. Propose EbA measures	- A list of the CCA measures applied - A list of EbA measures for planning	- Group discussions (with communes and villages)
10. Multi-criteria analysis for selection of the most promising EbA measures	- The set of criteria for analysis (economic, social, environment, technical, policies)	- Group discussions (with communes and villages) - Consultation with experts

Annex 3.1: Tables providing an overview of communes and villages

The following tables highlight the perceived dependence of people on surrounding ecosystems at both the commune and village level

Step 2

Table 11: Terrestrial ecosystems (ecosystem service inventory)

	Villages							Notes
Provisioning services								
Food (e.g. game, fruit)								
Raw materials (e.g. fiber, timber, fuel wood, fodder, fertilizer, other NTFP)								
Water (i.e. drinking, irrigation, cooling)								
Regulating Services								
Moderation of extreme events (e.g. storm protection, flood protection)								
Regulation of water flows (e.g. natural drainage, irrigation, drought prevention)								
Waste treatment (e.g. water purification)								
Erosion prevention								
Maintenance of soil fertility								
Habitat Services								

Villages								Notes
Provisioning services								
Life cycle maintenance (e.g. nursery services)								
Cultural & Amenity services								
Cultural significance (aesthetics, arts and culture inspiration, spiritual importance, cognitive development)								
Tourism and recreation								

Table 12: Aquatic ecosystem - ecosystem service inventory

Villages								Notes
Provisioning services								
Food (e.g. fish, sea foods, sea plants, fruits)								
Raw materials (e.g. fiber, fuel, fodder, fertilizer)								
Water (i.e. drinking, irrigation, cooling)								
Regulating Services								
Moderation of extreme events (e.g. storm protection, flood protection)								
Regulation of water flows (e.g. natural drainage, irrigation, drought prevention)								
Waste treatment (e.g. water purification)								
Erosion prevention								

Villages								Notes
Provisioning services								
Maintenance of soil fertility								
Habitat Services								
Life cycle maintenance (e.g. nursery services)								
Cultural & Amenity services								
Cultural significance (aesthetics, arts and culture inspiration, spiritual importance, cognitive development)								
Tourism and recreation								

Table 13: The dependence of people on the natural resources managed by other stakeholders for their livelihood (ask *both* commune and village)

Main natural resources	Villages									Notes
Terrestrial ecosystems										
Timber										
Firewood										
NTFPs										
Aquatic ecosystems										
Fishing										

Step 3

Table 14: Land use types (ask *both* commune and village)

Main LU types	Villages									Notes/Services
Natural forests										
Plantation forests										
Paddy rice (1-2 crops)										
Annual crops (maize, peanut, bean, …)										
Grazing lands										

Step 4

Table 15: Past climate-related issues (ask *both* commune and village)

Main issues	Villages									Notes
LU changed										
Floods										
Droughts										
Colds										
Soil erosion										
Land degradation										
Landslides										
Pest and disease										
Heat waves										

Table 16: Crop calendar and other changes due to CC - ask *village*

		1	2	3	4	5	6	7	8	9	10	11	12	Notes (any differences among villages)
Events														
	Drought													
	Rains													
	Storms													
	Cyclones													
	Colds													
	Landslides													
	Pest and disease													
	Heat waves													
Fisheries	Capture													
	Aquaculture													
Agriculture	Forest plantation													

		1	2	3	4	5	6	7	8	9	10	11	12	Notes (any differences among villages)
	Forest protection													
	Rice													
	Peanut													
	Green bean													
	Maize													
	Fruit trees													
	Chicken raising													
	Cattle raising													

Table 17: Hazard history (ask *both* commune and village)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Impacts
Floods											
Droughts											
Colds											
Storms											
Heat waves											

Table 18: List of past/current CCA measures (ask *both* commune and village)

	CCA measures	Effectiveness	Sustainability	Who supported	Notes
Floods					
Droughts					
Colds					
Storms					
Heat waves					

Step 5-6

Table 19: Potential impacts of future CC hazards and socio-economic development (ask *both* commune and village)

	Impacts	Responses	Notes
Future CC hazards			
Floods			
Droughts			
Colds			
Storms			
Heat waves			
Socio-economic development			

Step 7

Table 20: Matrix on risks of livelihood options (ask *both* commune and village)

Livelihood options	Ecosystems	Predictions of the risks on the ecosystems	Ranking the risks of the livelihood options	Cumulative risks
Fish capture				
Aquaculture				
Forest plantation				
Forest protection				
Rice				
Peanut				
Green bean				
Maize				
Fruit trees				
Chicken raising				
Cattle raising				

Step 8

Table 21: Matrix of vulnerabilities (ask *both* commune and village)

Ecosystems (from the above table)	The importance to community (services provided)	The current risks	The future risks	Risk ranking	Adaptive capacity	Vulnerabilities

Step 9-10

Table 22: List of EbA measures proposed (ask *both* commune and village)

Measures	Ecosystems and services	Scale (area, participants...)	Priority (by villagers/commune) based on criteria	Notes

Criteria: 1) Healthy ecosystems 2) Affected or reinforced by CC 3) Inexpensive 4) Scaling up 5) Simple 6) Internal resources

Annex 3.2: Questions for group discussions with commune and village leaders:

1. Please provide general information on natural and geographical conditions of the commune/village.

2. Please provide information on socio-economic developments (overview-style) of the commune/village.

3. Please give an overview over the ecosystems of the commune/village (past 5-10 years and current status). What benefits/services do local people get from theses ecosystems?

4. How does the demand for economic development affect the status of available ecosystems in the commune/village?

5. How does climate change impact the commune/village (current situation and past 5-10 years)? What were the losses?

6. What are adaptation measures/solutions that local authorities and people have used so far? What are challenges?

7. What support is needed to strengthen available ecosystems? What are the proposed measures?

Annex 3.3 List of participants for identifications of most vulnerable village

No.	**Full name**	**Gender**	**Position**	**Address**
1	Phạm Văn Dũng	M	Chairman	Quảng Phú Commune, Quảng Trạch district
2	Trương Ngọc Cảnh	M	Vice-chairman, Farmer's Association	"
3	Nguyễn Như Cương	M	Land-administration and Environment staff	"
4	Trương Thị Dung	F	Admin office staff	"
5	Lê Văn Viên	M	Village head	Phu Loc village, Quang Phu commune
6	Lê Hoàng Hạc	M	Village Party Secretary	"
7	Nguyễn Văn Thởi	M	Farmer	"
8	Lê Ngọc Thạch	M	Farmer	"
9	Phạm Thị Bền	F	Farmer	"
10	Trần Văn Phú	M	Farmer	"
11	Nguyễn Thanh Chúc	M	Vice-chairman	Quảng Hưng Commune, Quảng Trạch district
12	Phan Văn Trung	M	Land-administration and Environment staff	"
13	Lê Thị Giang	F	Admin office staff	"
14	Nguyễn Đức Quang	M	Village head	Hòa Bình Village, Quảng Hưng commune
15	Lê Thị Hiếu	F	Village Party Secretary	"
16	Võ Thị Thuyền	F	Village Women's Union	"
17	Nguyễn Văn Tài	M	Farmer's Association	"
18	Lê Thị Tiếu	F	Farmer	"
19	Ngô Văn Bình	M	Farmer	"
20	Trần Văn Cát	M	Vice-chairman	Tân Ninh commune, Quang Ninh district
21	Trần Văn Thăng	M	Land-administration and Environment staff	"
22	Hoàng Thị Dự	F	Admin office staff	"
23	Đào Văn Lang	M	Village head	Quảng Xá village, Tân Ninh commune

24	Trần Thế Lộc	M	Village Party Secretary	"
25	Phạm Thị Lan	F	Village Women's Union	"
26	Ngô Đức Học	M	Farmer's Association	"
27	Hồ Thị Vân	F	Farmer	"
28	Lê Thị Lựu	F	Farmer	"
29	Phan Thế Anh	M	Vice-chairman	Phúc Trạch commune, Bố Trạch district
30	Nguyễn Văn Lợi	M	Land-administration and Environment staff	"
31	Hoàng Thị Thanh	F	Admin office staff	"
32	Lê Minh Khánh	M	Village head	Thanh Sen 2 village, Phúc Trạch commune
33	Hoàng Ngọc Tấn	M	Village Party Secretary	"
34	Lê Thị Đào	F	Village Women's Union	"
35	Hà Công Thạch	M	Farmer's Association	"
36	Trần Thị Thúy	F	Farmer	"
37	Lê Văn Hải	M	Farmer	"

9.2: Annex UNIQUE: Guiding questions for fieldwork

Technical Questions:

- From your point of view, what are the objectives and targets of the pilot activity?
- How are available capacities concerning the successful implementation of the pilot activity?
- Can you provide a prioritization of capacity building needs?
- What are the investments/resources required to enhance the effectiveness and/or scale of the pilot activities?
- Which of the pilot activities have the highest impacts on local communities' livelihoods?

Aims of the discussion:

- According to your opinion: could the plantings be implemented in a 'better' way?
- Did all the implementation go according to their expectations? If yes: OK. If no: explain what you would have expected in a different way.
- In your opinion on whether they think this model makes sense. Would you upscale it to other areas? If so, which areas?
- For upscaling, what would you need? (Money, trainings etc.) and what are the crucial points to make upscaling successful?

Financial Questions:

What is the financial/economic impact of this intervention? (costs & benefits)

Aims of the discussion:

- Besides what GIZ pays, how much would it cost the government to implement this model?
- Is finance to implement the models independently available? Is there willingness to implement the models independently?
- If finance is available, how much (commune/district/provincial level)?
- If you were to implement it themselves. What activities would you prioritize/adapt?

Implementation-related questions:

- Who are the target groups/ main actors involved in implementation and management?
- How are the pilot activities being implemented (institutional structures, capacities, etc.)?
- What are your key lessons learned so far?
- What are the main institutional barriers and risks for pilot activity?
- How would you describe the degree of engagement with the local population? What are their impressions of the project?
- May you please discuss some of the opportunities, achievements and challenges with the project?
- Are there synergies with other projects or initiatives (e.g. from the government, private companies, donor organizations, etc.)?
- Who is/would be responsible to implement those activities?
- What kind of policies and measures would be required to ensure/guide implementation? And what are the main policies and measures which the current activities are implemented?

Aims of the discussion:

- Do you think the model as applied by GIZ makes sense/is useful? If yes: OK, if no: why?
- What is your contribution to the pilot? Do you regularly support it? How?
- Which parts of the activities were the easiest for you, which one the most difficult?
- What went well so far, what didn't? How could this be improved in your opinion?
- What will you do after GIZ leaves? Will you keep supporting it by yourself? How?
- How this model could be integrated in policies and implementation for the VN government?
- What needs to be done/needs to happen that this will actually be done?

Social and environmental benefits related questions:

- What are potential opportunities/barriers to enhance engagement with local communities?
- What are the social benefits? What are the additional environmental benefits of this proposed intervention option? What are the potential negative social impacts / risks?
- From your point of view, what are the environmental benefits? What are the potential negative impacts or risks?

Aims of the discussion:

- In how far were you working with local communities? What went well? What didn't? Why?
- Do you see any visible positive benefits of the pilot activities? Of yes, what kind?

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