

Annex 15

1. CALCULATION OF DIRECT AND INDIRECT BENEFICIARIES AND OF AREAS OF ECOSYSTEMS UNDER IMPROVED MANAGEMENT

INTRODUCTION

The Climate Adaptation and Resilience in TT Hue project (CARE Hue) aims to enhance the resilience of livelihoods and ecosystems in the province against climate related hazards (mainly floods, droughts, and sea level rise). While a few activities (under outputs 1 and 2) are implemented at the province level, most activities focus its implementation on 44 target communes in 4 districts. This document shows the approach used for estimating the direct and indirect beneficiaries under the project as well as the project's anticipated impact on ecosystems. Table 1 shows the definition and estimation approach utilised for calculating direct and indirect beneficiaries for each of the project outputs.

Table 2 shows the contribution of project outputs toward enhancing the resilience of ecosystems and ecosystem services. Section 2 provides more detail on the assumptions used for calculating beneficiaries under an enhanced EWS; section 3 shows the assumptions used for estimating beneficiaries for EbA interventions; and section 4 shows the assumptions used for estimating beneficiaries from activities focused on climate-resilient agriculture.

Table 1. Summary of direct and indirect beneficiaries linked to project outputs – ARA1

Outputs	Definition of direct and indirect beneficiaries	Direct beneficiaries (disaggregated by gender)	Indirect beneficiaries (disaggregated by gender)
Output 1. Enhanced EWS is in place allowing local people and governments at the provincial, district and commune level to better prepare for climate hazards and to respond to climate change impacts	<p>Direct beneficiaries: the populations of the all the 44 target communes in 4 districts that will benefit from improved CIEWS and critically that will be implementing a community-based Early Warning System</p> <p>Indirect beneficiaries: the population of the province that will have access to an improved EWS. The proportion of male/female has been estimated using the average distribution of the whole province.</p>	306,000 persons (male 151,500, female 154,500)	406,000 persons (approx. male 205,030 female 200,970)
Output 2. Climate adaptation considerations are mainstreamed into 44 SEDPs and an effective climate change adaptation impact-based M&E system is in place	<p>Direct beneficiaries: for this output, the direct beneficiaries are considered to be the populations of the communes that will benefit from improved climate change development planning (SEDPs) developed through LPPP.</p> <p>Indirect beneficiaries: no indirect beneficiaries were calculated for this output.</p>	306,000 persons (male 151,470, female 154,470)	
Output 3. EbA strengthens the resilience of livelihoods and ecosystems to climate change	<p>Direct beneficiaries: are those that will be involved first-hand in all of the restoration activities from site preparation, planting, re-planting, maintenance to protection and monitoring. Activities are usually split up in different tasks that are carried out by different persons. An estimate of labour inputs is provided through Decision 38/2005/QĐ-BNN dated 06.07.2005 and TTH Decision 3265 /QĐ-UBND dated 31.12.2022, whereas these values are very conservative and general in comparison to observed values.</p> <ul style="list-style-type: none"> ▪ Site-preparation & planting requires an estimated 8 persons/ha (one-off) ▪ Re-planting & maintenance requires an estimated 4 persons/ha (annually for the first 3 years, assumed to be the same persons) ▪ Protection and monitoring requires an estimated 2 persons/ha (annually, assumed to be the same persons) 	6,300 (3,780 female)	21,428 (10,764 female)

Outputs	Definition of direct and indirect beneficiaries	Direct beneficiaries (disaggregated by gender)	Indirect beneficiaries (disaggregated by gender)
	<p>Hence, it is assumed that there are up to 14 persons/ha of direct beneficiaries.</p> <p><i>The same approach has been applied for both 3.1.1 and 3.1.2</i></p> <p>Indirect beneficiaries:</p> <p><i>Percentage of population based on coastal dune forest area:</i> TT Hue Province holds 27,000 ha of CDS, of which 5,000ha are classified as forestland, partly used for other land uses (sand mining, exotic tree plantations, agriculture). again, out of which 1897ha are currently classified as coastal dune protection forests. With activity 3.1 contributing to the scaling of the CFR approach through integration into Hue Province Forestry Planning, indirect beneficiaries are considered the share of the population, the activity will have a potential impact on improved management on 5,000ha of classified coastal forests. Though, in order to have a conservative estimate on indirect beneficiaries, such impact is only assumed on the area currently classified as coastal dune protection forest (1,897 ha). With above assumptions of 300.000 persons over 27,000 ha of CDS, this would result in a factor of 14 for 1,897 ha, or 21,428 indirect beneficiaries.</p>		
Output 4.1 Producers, producer associations, women's organizations have the capacities, and access to finance and markets to transition to climate-resilient practices	<p>Direct beneficiaries: the persons in the 44 target communes that will receive support for transitioning to climate-resilient agricultural models, either through implementation of models or capacity building activities.</p> <p>Indirect beneficiaries are the household members which were calculated by subtracting the number of direct beneficiaries from the average household composition figures in TT hue.</p>	6,000 direct beneficiaries (3,600 male, 2,400 female) able to adopt improved climate resilient technologies and practices	16,140 indirect beneficiaries
Output 4.2 The capacities of local financial intermediaries are enhanced to effectively screen, finance and	The main impacts of this activities are on the enabling environment and the degree to which GCF investments contribute to market transformation.	NA	NA

Outputs	Definition of direct and indirect beneficiaries	Direct beneficiaries (disaggregated by gender)	Indirect beneficiaries (disaggregated by gender)
monitor climate-resilient investments			
Total		direct beneficiaries 306,000 people (male 151,500, female 154,500)	Indirect beneficiaries 406,000 people (approx. male 205,030; female 200,970)

Table 2. Contribution of project outputs to ecosystems and ecosystem services – ARA 4

Output	Contribution to improved resilience of Improved resilience of ecosystems and ecosystem services.
Output 1. Improved climate information and early warning system (CIEWS) is in place allowing local people and governments at the provincial, district and commune level to better prepare for climate hazards and to respond to climate change impacts	<ul style="list-style-type: none"> 29,000 hectares of forest under enhanced forest fire monitoring and warning as a result of an improved EWS at the province level (these are the areas of forests at risk in Phu Loc, A Luoi, Phong Dien under constant monitoring; areas under drone monitoring are not considered)
Output 2. Climate adaptation considerations are mainstreamed into SEDPs and an effective M&E system is in place to monitor adaptation action	<ul style="list-style-type: none"> 24,500 ha of agricultural and 90,000 ha of forest land under climate-informed development plans as a result of mainstreaming climate considerations into SEDPs¹
Output 3. EbA strengthens the resilience of livelihoods and ecosystems to climate change	<ul style="list-style-type: none"> 450 hectares of coastal and hilly forests under restoration 1,897 hectares of coastal dune forests under improved management
Output 4.1. Producers, producer associations, women's organizations have the capacities, and access to finance and markets to transition to climate-resilient practices	<ul style="list-style-type: none"> 1,400 ha of agricultural land under direct climate-resilient management as a result of the project interventions

¹ These are the areas recognized as agricultural land in TT Hue's statistical yearbook of 2021 (Phong Dien, 12,645 ha; Quang Dien 5,510; Huong Tra 6,516; to err on the side of conservativeness, the over 5,000 ha of agricultural land in Huong Thuy have not been considered as there is no disaggregated data at the commune level that would allow to segregate only the most vulnerable communes). Forest land includes: Phong Dien, 66,280 ha; Quang Dien 1,188 ha; Huong Tra 24,215; again to on conservativeness grounds the forested area of Huong Thuy has been omitted from the calculation.

2. ESTIMATION OF BENEFICIARIES FOR THE ENHANCED EWS

The project aims to strengthen the provincial EWS through support for consolidating its institutional arrangements; improving its monitoring and warning capacity through an improved monitoring database management system and the installation of 96 smart flood monitoring towers, 10 warning sirens, and 8 improved forest fires watch towers; and enhancing risk communication and response capacities in 44 communes through the implementation of Community-based Early Warning Systems.

For activities under output 1 the beneficiaries were estimated as follows:

Direct beneficiaries are the total population of the target districts (Phu Loc, Phong Dien, Huong Tra, Huong Thuy) that live in the communes classified as vulnerable or highly vulnerable (Table 3)² and that will be covered by an enhanced EWS, including CBEWS.

Indirect beneficiaries are the total population of TT Hue living in the communes classified as vulnerable or highly vulnerable benefiting from an enhanced EWS, minus the direct beneficiaries.

Assumptions on the calculation:

The TT Hue Statistical Yearbook reports at the household level. To obtain the number of beneficiaries, the household figure was multiplied by 3.69 that represents the average number of persons per household in the province.³

For estimating the gender disaggregation for both the direct and indirect beneficiaries, an extrapolation of the number of male to female proportion at the entire province was used. The total population of TT Hue as per Vietnam's Statistical Yearbook with women reported as 50.5% of the population.

Table 3. Vulnerable communes in the province

LIST OF VULNERABLE COMMUNES IN TT HUE PROVINCE				
District, City	Communes, Wards	Vulnerability levels	Population (Households)	Estimated number of people ⁴
A Lưới			13,719	50,623
1	TT. A Lưới	High	2,217	8,181
2	A Ngo	Very high	906	3,343
3	A Roàng	Very high	683	2,520
4	Đông Sơn	Very high	387	1,428
5	Hồng Bắc	Very high	562	2,074
6	Hồng Hạ	Very high	473	1,745
7	Hồng Kim	Very high	543	2,004

² Based on the rapid vulnerability assessment in Annex 2.

³ TT Hue Statistical Yearbook 2021

⁴ The average number of persons per household in TT Hue is 3.69 as per the TT Hue Statistical Yearbook. The number of households was multiplied by 3.69 to get an estimated number of beneficiaries.

LIST OF VULNERABLE COMMUNES IN TT HUE PROVINCE				
8	Hồng Thái	Very high	335	1,236
9	Hồng Thượng	Very high	775	2,860
10	Hồng Thủy	High	836	3,085
11	Hồng Vân	Very high	869	3,207
12	Hương Nguyên	Very high	354	1,306
13	Hương Phong	High	200	738
14	Lâm Đốt	Very high	1,233	4,550
15	Phú Vinh	High	375	1,384
16	Quảng Nhâm	Very high	1,226	4,524
17	Sơn Thủy	High	827	3,052
18	Trung Sơn	Very high	918	3,387
Hương Thủy			19,267	71,095
1	Phú Bài	High	3,566	13,159
3	Thủy Dương	High	3,011	11,111
4	Thủy Lương	High	2,190	8,081
5	Thủy Phương	High	3,928	14,494
6	Phú Sơn	High	473	1,745
7	Thủy Phù	High	3,398	12,539
8	Thủy Thanh	High	2,701	9,967
Hương Trà			16,123	59,494
1	Hương Chữ	High	2,513	9,273
3	Hương Vân	High	1,682	6,207
4	Hương Xuân	High	1,978	7,299
5	Tứ Hạ	Low	2,389	8,815
6	Bình Thành	High	1,107	4,085
7	Bình Tiến	High	1,453	5,362
8	Hương Toàn	High	3,023	11,155
9	Hương Xuân	High	1,978	7,299
Nam Đông			5,744	21,195

LIST OF VULNERABLE COMMUNES IN TT HUE PROVINCE				
1	Khe Tre	Very high	938	3,461
2	Hương Hữu	Very high	748	2,760
3	Hương Lộc	High	628	2,317
4	Hương Phú	High	893	3,295
5	Hương Sơn	Very high	358	1,321
6	Thượng Lộ	Very high	338	1,247
7	Thượng Long	Very high	704	2,598
8	Thượng Nhật	Very high	579	2,137
9	Thượng Quảng	High	558	2,059
Phong Điền			21,403	78,977
1	TT. Phong Điền	High	2,373	8,756
2	Điền Hòa	High	1,304	4,812
3	Điền Lộc	High	1,471	5,428
4	Điền Môn	High	906	3,343
5	Phong An	High	3,078	11,358
6	Phong Bình	High	2,033	7,502
7	Phong Hiền	High	2,157	7,959
8	Phong Sơn	High	2,506	9,247
9	Phong Hòa	High	2,204	8,133
10	Phong Mỹ	High	1,683	6,210
11	Phong Xuân	High	1,688	6,229
Phú Lộc			20,548	75,822
1	TT. Phú Lộc	High	2,916	10,760
2	Giang Hải	High	2,029	7,487
3	Lộc Bình	High	577	2,129
4	Lộc Bồn	High	3,400	12,546
5	Lộc Hòa	High	849	3,133
6	Lộc Sơn	High	2,349	8,668
7	Lộc Thủy	High	2,846	10,502

LIST OF VULNERABLE COMMUNES IN TT HUE PROVINCE				
8	Lộc Vĩnh	High	2,024	7,469
9	Vinh Hưng	High	2,056	7,587
10	Vinh Mỹ	High	1,502	5,542
Phú Vang			20,656	76,221
1	Phú Đa	High	2,989	11,029
2	Phú An	High	2,985	11,015
3	Phú Diên	High	3,294	12,155
4	Phú Gia	High	2,811	10,373
5	Phú Hải	High	1,859	6,860
6	Phú Xuân	High	2,408	8,886
7	Vinh Thanh	High	2,546	9,395
8	Vinh Xuân	High	1,764	6,509
Quảng Điền			26,236	96,811
1	Sịa	High	2,896	10,686
2	Quảng An	High	2,957	10,911
3	Quảng Công	High	1,768	6,524
4	Quảng Lợi	High	2,320	8,561
5	Quảng Ngạn	High	1,686	6,221
6	Quảng Phú	High	3,118	11,505
7	Quảng Phước	High	1,984	7,321
8	Quảng Thái	High	1,468	5,417
9	Quảng Thành	Very high	3,040	11,218
10	Quảng Thọ	High	1,965	7,251
11	Quảng Vinh	High	3,034	11,195
TP Huế			49,473	182,555
1	P. An Đông	High	3,999	14,756
2	P. An Tây	High	2,536	9,358
3	P. Hương An	High	1,633	6,026
4	P. Hương Hồ	High	2,410	8,893

LIST OF VULNERABLE COMMUNES IN TT HUE PROVINCE				
5	P. Hương Phong	High	2,776	10,243
6	P. Hương Sơ	High	2,776	10,243
7	P. Kim Long	High	3,855	14,225
8	P. Thuận An	High	5,054	18,649
9	P. Thuận Hòa	High	3,447	12,719
10	P. Thuận Lộc	High	3,725	13,745
11	P. Đông Ba	High	3,199	11,804
12	P. Thủy Biều	High	2,713	10,011
13	P. Thủy Vân	High	1,943	7,170
14	P. Vĩnh Ninh	High	1,740	6,421
15	X. Hải Dương	High	1,632	6,022
16	X. Hương Thọ	High	1,371	5,059
17	X. Phú Mậu	High	2,479	9,148
18	X. Thủy Bằng	High	2,185	8,063

3. ESTIMATION OF BENEFICIARIES FOR ECOSYSTEM-BASED ADAPTATION INTERVENTIONS

BACKGROUND

The coastal areas of North-Central Coast Vietnam (NCC-VN) are particularly vulnerable to the impacts of climate change, posing significant risks to the region's ecological, economic, and social systems. This vulnerability is primarily due to the increased frequency and intensity of extreme weather events such as typhoons, which are exacerbated by climate change. North-central Vietnam's coastline, characterized by low-lying areas, faces a heightened risk of severe flooding, erosion, typhoons, and salinity intrusion. These effects not only threaten the natural coastal habitats, such as mangroves and coastal dune systems (CDS), but also pose risks to agriculture, fisheries, and the livelihoods of local communities. The entire NCC-VN holds more than 120,000ha of CDS crucial for coastal communities, of which TT Hue alone is home to 43,962ha along 120km of coastal, being home to roughly 300,000 inhabitants⁵. Out of these 43,962 ha, an est. 5,000ha are currently classified as forests, many of which are highly degraded⁶.

Against this background, activity 3.1.1 is designed to strengthen the resilience of local communities in the coastal zone of TT Hue Province through the implementation of a specific EbA measure: the restoration of degraded coastal dune forests with site-adapted native tree species. Due to the various Ecosystem Services provided by CDS, the restoration of degraded coastal forests is considered the most appropriate solution that will be effective in the long term for livelihoods.

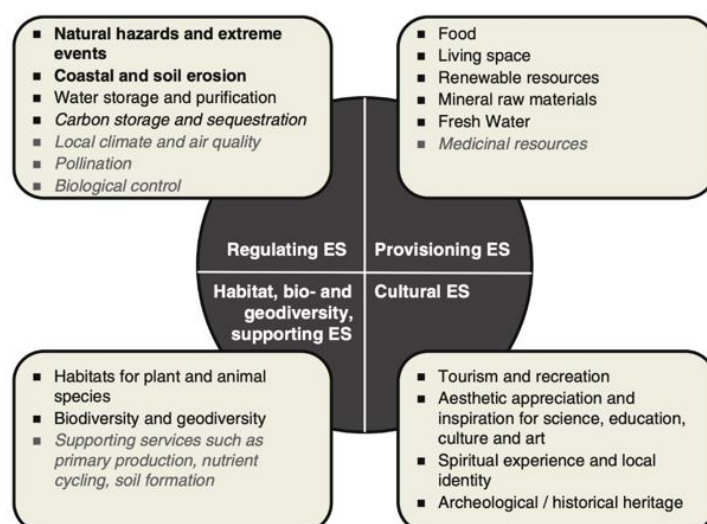


Figure 1: Overview of Ecosystem Services (ES) provided by forested Coastal Dune Systems (CDS) (Nehren et.al. 2016⁷)

Direct beneficiaries are those that will be involved first-hand in all of the restoration activities from site preparation, planting, re-planting, maintenance to protection and monitoring. Activities are usually split up in different tasks that carried out by different persons. An estimate of labor inputs is provided through Decision 38/2005/QĐ-BNN dated 06.07.2005 and TTH Decision 3265 /QĐ-UBND dated 31.12.2022 whereas these values are very conservative in comparison to observed values.

- Site-preparation & planting requires an estimated 8 persons/ha
- Re-planting & maintenance requires an estimated 4 persons/ha
- Protection and monitoring requires an estimated 2 persons/ha

⁵ UNIQUE, 2020. Ecosystem-based adaptation on the northern central coast of Vietnam: restoration and co-management of degraded dunes and mangroves

⁶ Based on forestry statistics data obtained during GCF FP Development – FPD Hue, 2023 & FRMS. 2023

⁷ Nehren, U. et al. (2016). Ecosystem Services of Coastal Dune Systems for Hazard Mitigation: Case Studies from Vietnam, Indonesia, and Chile. In: Renaud, F., Sudmeier-Rieux, K., Estrella, M., Nehren, U. (eds) Ecosystem-Based Disaster Risk Reduction and Adaptation in Practice. Advances in Natural and Technological Hazards Research, vol 42. Springer, Cham. https://doi.org/10.1007/978-3-319-43633-3_18

Hence, it is assumed that there are up to 14 persons/ha of direct beneficiaries. Assuming a planted area of 350ha, this would result in direct beneficiaries of 4,900 persons, of which 65% are women. The large proportion of women is expected due to the fact, that planting labor is of seasonal nature, whereas most males are committed to full-time employment of fisheries.

Indirect beneficiaries are estimated based on the Percentage of population based on coastal dune forest area: TT Hue Province holds 27,000 ha of CDS, of which 5,000ha are classified as forestland, partly used for other land uses (sand mining, exotic tree plantations, agriculture). again, out of which 1897ha are currently classified as coastal dune protection forests. With activity 3.1 contributing to the scaling of the CFR approach through integration into Hue Province Forestry Planning, indirect beneficiaries are considered the share of the population, the activity will have a potential impact on improved management on 5,000ha of classified coastal forests. Though, in order to have a conservative estimate on indirect beneficiaries, such impact is only assumed on the area currently classified as coastal dune protection forest (1,897 ha). With above assumptions of 300.000 persons over 27,000 ha of CDS, this would result in a factor of 14 for 1,897 ha, or 21,428 indirect beneficiaries.

The table below shows the main expected adaptation benefits of the EbA interventions.

Table 4. Summary of adaptation benefits of EbA interventions

Climate related hazard	Impact	Intervention	Adaptation benefit
Tropical cyclones; storms	coastal erosion and sand movement	Restoration of coastal sand dune forests with site-adapted native tree species	<ul style="list-style-type: none"> • Can reduce direct storm impacts on neighbouring communities • Can reduce sand-movement and erosion, increase community and ecosystem resilience against typhoons⁸ • Protection of livelihoods (aquaculture & agriculture) of coastal communities against “sand drift” • Groundwater provision and retention increasing resilience of agricultural systems <p>Co-benefits:</p> <ul style="list-style-type: none"> • Improved carbon storage and sequestration • Increased biodiversity: planting of various native species instead of single species plantations with exotic trees (casuarina/acacia). • Commercial value NTFP provision (such as Melaleuca cajuputi – essential oils) and cooking oil (extraction of the camellia sasanqua fruits)
Increased heat and drought	Damages to and increased vulnerability of local ecosystems	Restoration of coastal sand dune forests with site-adapted native tree species	<ul style="list-style-type: none"> • Provision of improved microclimate • Groundwater provision and retention increasing resilience of local ecosystems and thus reducing desertification/wildfire risks <p>Co Benefits: see above</p>
Increase in extreme precipitation events; potential	Contribution to landslides in areas where slopes have been cleared/deforested	Restoration of natural forests in upland areas – with site- adapted tree species	<ul style="list-style-type: none"> • Contributes to reducing risk of landslides through slope stabilization.⁹ • Strengthening community resilience through more diverse livelihood options <p>Co-benefits:</p>

⁸ Nehren U., Ho Dac Thai H., Trung N.D., Raedig C., Alfonso S. 2017. Sand Dunes and Mangroves for Disaster Risk Reduction and Climate Change Adaptation in the Coastal Zone of Quang Nam Province, Vietnam. In: Nauditt A., Ribbe L. (eds) Land Use and Climate Change Interactions in Central Vietnam. Water Resources Development and Management. Springer, Singapore

⁹ UNEP-WCMC and UNEP (2019) EbA in different ecosystems: placing measures in context

Climate related hazard	Impact	Intervention	Adaptation benefit
			<ul style="list-style-type: none"> Improved carbon storage and sequestration Increased biodiversity: planting of various native species instead of single species plantations with exotic trees (casuarina/acacia). Commercial value NTFP provision (such as Melaleuca cajuputi – essential oils) and cooking oil (extraction of the camellia sasanqua fruits)

4. ESTIMATION OF BENEFICIARIES FOR CLIMATE-RESILIENT AGRICULTURAL ACTIVITIES

Under outcome 4, the project will support producers, producer associations, and women's organizations transition to climate-resilient agricultural practices with a focus on rice, pomelo, and lotus. The expected adaptation benefits are shown in Table 5. Beneficiaries were defined as follows:

Direct beneficiaries: the persons in the 44 target communes that will receive support for transitioning to climate-resilient agricultural models in rice, pomelo, or lotus, either through implementation of models or capacity building activities.

Indirect beneficiaries are the household members which were calculated by subtracting the number of direct beneficiaries from the average household composition figures in TT Hue.

Table 5. Adaptation benefits of direct interventions in the agricultural sector

Commodity	Threat / Climate risk	Climate Change impacts and proposed interventions	Adaptation benefits
Rice (≈4,250 beneficiaries and 1,060 ha)	<p><u>Intensification of precipitation</u> – flooding and waterlogging/inundation.</p> <p><u>Increase in extreme weather events</u> e.g. typhoons – compounds flooding, destruction of flood defences (e.g. dykes).</p> <p><u>Frequent droughts and high temperatures</u> – soil degradation.</p> <p><u>Increasing number of cold days</u> across the province for the previous decade –rice crop damage.</p>	<p><u>Climate change impacts:</u></p> <p>Rice fields in TT Hue province fall predominantly in low-lying areas vulnerable to flooding. Rice crop damage has been a major impact of intensified precipitation and more frequent extreme weather events, such as typhoons and tropical storms. In 2017 alone, 5,181 hectares of rice fields across TT Hue province suffered heavy damages due to floods¹⁰. In January 2019, 2,250 hectares of newly planted rice were also flooded due to heavy precipitation and high tides. Average annual precipitation is expected to increase under RCP 4.5 and RCP 8.5 scenarios¹¹, with rainfall projected at a 5-15% increase in the North and Central regions of Vietnam, where the project area lies.</p>	<p><u>Benefit:</u></p> <p>Adopting climate-resilient rice varieties is an important measure for climate change adaptation and food security in North-central Vietnam¹⁴. Rice that is more resilient to waterlogging and salinisation will support quality and quantity of continued productivity. This will allow farmers to become more resilient to the impacts of flooding caused by intensified precipitation, extreme weather, and degraded soils due to drought and temperature increases.</p> <p>Rice production can also bring relevant mitigation co-benefits. Where</p>

¹⁰ CCCSC (2022) 'Technical Report - Assessment of Climate Change Impacts in Thua Thien Hue Province', Centre for Climate Change Study in Central Vietnam (CCCSC).

¹¹ MONRE (2019) The Third National Communication of Vietnam to the United Nations framework Convention on Climate Change.

¹⁴ Dam, T. H. T et al. (2021) 'Incremental and transformative adaptation preferences of rice farmers against increasing soil salinity – Evidence from choice experiments in north central Vietnam', Agricultural systems, 190, available at: <https://doi.org/10.1016/j.agsy.2021.103090> (Accessed: 19/05/2023).

Commodity	Threat / Climate risk	Climate Change impacts and proposed interventions	Adaptation benefits
		<p>Much of TT Hue's 5,033km² land area and 1.13 million inhabitants reside in low-lying areas that are particularly vulnerable to this: including the target districts of Phong Dien, Huong Tra and Quang Dien.</p> <p>Frequent droughts and high temperatures have caused saline intrusion of soil. 4,864 hectares of rice land in coastal and lagoon communities across the province have become saline and alum¹², with some farmers consulted reported to have lost entire crops. The average annual temperature is projected to increase in Vietnam by 1.3-1.7 °C by 2050 under RCP 4.5. Error! Bookmark not defined.. RCP 8.5 projects a 1.9 °C increase by 2050 and a 3.5-3.6 °C increase by the end of the century. This will intensify the frequency and length of droughts and further impact rice production¹³.</p> <p>There were delays for summer-autumn rice crops in 2022 across TT Hue as a result of these impacts. Pests and diseases in rice fields are also rising along with a number of cold days, which damages rice crops. Total yields last year fell to 50.5 quintals/ha, a 13 quintals/ha decrease compared to 2021.</p> <p><u>Interventions:</u></p> <p>Support the adoption and scaling of climate-resilient rice varieties by local farmers, cooperatives, farmer groups and women's groups.</p> <p>Support the introduction and adoption of post-harvest technologies.</p>	<p>possible, the project will support practices that enhance the sustainability of rice production and aim to reduce GHG emissions (methane) (e.g. alternate wetting-drying; and avoidance of burning residues, which while illegal, remains a common practice).</p>
Lotus (≈ 550 beneficiaries, ≈ 180 ha)	<p><u>Intensification of precipitation</u> – flooding and waterlogging/inundation.</p> <p><u>Extreme weather events</u> e.g. typhoons – compound flooding, destruction of flood defences (e.g. dykes).</p>	<p><u>Climate change impacts:</u></p> <p>Over the last few years, many of the heavily damaged 5,000 hectares of rice across TT Hue province have been abandoned due to compromised cultivability following intensified precipitation and extreme weather events. Farmer incomes in vulnerable</p>	<p><u>Benefit:</u></p> <p>Lotus farming offers diversification of farmer incomes where the impacts of climate change have compromised rice production. This is a lower-risk alternative to reliance on rice for income.</p>

¹² TT Hue PPC (2023) The plan to improve alum and salinity rice soil in coastal areas and lagoons of Thua Thien Hue Province in the period of 2023 – 2025.

¹³ World Bank and Asian Development Bank (2021) Climate Risk and Country Profile, available at: [15077-Vietnam Country Profile-WEB.pdf \(worldbank.org\)](#) (Accessed: 15/05/2023).

Commodity	Threat / Climate risk	Climate Change impacts and proposed interventions	Adaptation benefits
		<p>low-lying target areas are threatened by reduced productivity, where large portions of land are becoming incompatible with rice production¹⁵.</p> <p>Vietnam is ranked first globally for exposure to flood risks¹⁶. The percentage of the population exposed to floods is expected to increase by 13% and 27% under RCP 2.6 and RCP 8.5, respectively¹⁷ and RCP 8.5 would see 2.85% of the entire TT Hue province at risk of permanent inundation¹⁸.</p> <p>Lotus is a speciality crop in TT Hue that is more resilient to waterlogging and inundation than currently available rice breeds. In light of current and projected flood risks, lotus farming has therefore been increasingly adopted as a flood-adaptive livelihood practice by farmers in other areas of Vietnam¹⁹. TT Hue has an opportunity to convert abandoned rice fields to lotus fields in low-lying areas susceptible to flooding.</p> <p><u>Interventions:</u></p> <ul style="list-style-type: none"> (i) Conversion of inundated low-lying rice fields to lotus planting. (ii) Improve access to high-quality lotus seedlings. (iii) Strengthen women's groups in supporting inputs, finance and technical support to lotus production. 	<p>The flower offers diverse products, including wrapping, edible food or lotus wine/tea. This also offers resilience to fluctuating market prices, where various market-entry options exist.</p> <p>Lotus can also be combined with aquaculture, providing an additional revenue stream to producers and contributing to food security.</p>
Thanh Tra pomelo (≈ 1,200 beneficiaries, 180 ha)	<p>Intensification of precipitation – flooding and waterlogging/inundation.</p> <p><u>Extreme weather events</u> - e.g. typhoons – compound flooding,</p>	<p><u>Climate change impacts:</u></p> <p>Thanh Tra pomelo is a speciality fruit of high economic potential in TT Hue province²⁰. It is currently planted in alluvial soil in low-lying areas adjacent to rivers.</p>	<p><u>Benefit:</u></p> <p>Shifting Thanh Tra pomelo planting to higher areas along the rivers will avoid low-lying areas</p>

¹⁵ Tran, P. T. et al. (2022) ,Climate change and livelihood vulnerability of the rice farmers in the North Central Region of Vietnam: A case study in Nghe An province, Vietnam', Environmental Challenges, 7, available at: <https://doi.org/10.1016/j.envc.2022.100460> (Accessed: 15/05/2023).

¹⁶ Inter-Agency Standing Committee and the European Commission, INFORM REPORT 2021; Shared evidence for managing crises and disasters, EUR 30754 EN, Publications Office of the European Union, Luxembourg 2021, ISBN 978-92-76-39355-9, DOI: <https://dx.doi.org/10.2760/238523> (Accessed: 15/05/2023).

¹⁷ Bangalore, M. et al. (2019) 'Exposure to Floods, Climate Change, and Poverty in Vietnam', Economics of Disasters and Climate Change, 3, pp.79-99, available at: <https://doi.org/10.1007/s41885-018-0035-4> (Accessed: 15/05/2023).

¹⁸ TT HUE Department of Natural Resources and Environment (2020), 'Developing and Updating Action Plan to Respond to Climate Change in Thau Thien Province in the Period 2021-2030, And Vision to 2050'.

¹⁹ Thi Minh Ho et al. (2021) ,The Emergence of Lotus Farming as an Innovation for Adapting to Climate Change in the Upper Vietnamese Mekong Delta', Land, 10, 350, <https://doi.org/10.3390/land10040350> (Accessed: 11/05/2023).

²⁰ Son N. H. (2018). Analysing the VietGAP Rice and Thanh Tra Pomelo value chains in Phong Dien district, TT Hue province

Commodity	Threat / Climate risk	Climate Change impacts and proposed interventions	Adaptation benefits
	<p>destruction of flood defences (e.g. dykes).</p> <p><u>Frequent droughts</u> – soil degradation.</p>	<p>However, flooding has led to waterlogging and inundation of plantations. For Huong Tra and Phong Dien, flooding in 2020 cost 300 out of a total of 900 hectares of Thanh Tra pomelo production area. Flooding would also be heightened by an expected increase in frequency and intensity of severe storms and tropical cyclones in Vietnam over the coming yearsError! Bookmark not defined.. This is already a significant impact of climate change, with 5 tropical storms and 2 typhoons hitting TT Hue province in 2020 alone, with low-lying areas particularly exposed.</p> <p>Furthermore, droughts can compromise ground water supply for alluvial soil²¹ where irrigation is lacking.</p> <p><u>Interventions:</u></p> <ul style="list-style-type: none"> (i) Support the planting of Thanh Tra pomelo in higher areas of alluvial soil along the rivers. (ii) Improve access to high-yield and quality seedlings. (iii) Support farmer groups and cooperatives to improve production practices and access to inputs, finance and marketing. (iv) Support the installation of irrigation equipment to address drought issues. 	<p>vulnerable to flooding, inundation and waterlogging.</p> <p>Quality seedlings will also improve the yield for the volume planted.</p>

²¹ Dimkic et al., 2021 'Drought and alluvial groundwater resources', ch. In: Alluvial Aquifer Processes, pp. 573-665, Available at: http://dx.doi.org/10.2166/9781789060904_0573 (Accessed: 11/05/2023).