ADAPTATION FUND

PROJECT/PROGRAMME PROPOSAL TO THE ADAPTATION FUND

Project/Programme Category:	Regular Project
Country/ies:	Cabo Verde
Title of Project:	Increasing the resilience of local communities to climate change through improved watershed management and land restoration
Type of Implementing Entity:	Multilateral Implementing Entity
Implementing Entity:	Food and Agriculture Organization of United Nations (FAO)
Executing Entity/ies:	Cabo Verde Ministry of Agriculture and Environment (Ministério de Agricultura e Ambiente)
Amount of Financing Requested:	9,998,228 (in U.S Dollars Equivalent)

PART I: PROJECT INFORMATION

Background and context

Geography

1. The Republic of Cabo Verde (CV) is an archipelago of ten islands and nine islets located around 620 km off the western coast of Africa, facing Senegal, The Gambia and Mauritania. The overall land area sums up to 4,033 km^2, spread along the Equator and the Tropic of Cancer. The main islands are commonly divided into 2 groups, based on the prevailing winds: the Barlavento (windward) group includes Santo Antao, São Vicente, Santa Luzia, São Nicolau, Sal and Boa Vista, while the Sotavento (leeward) one comprises Maio, Santiago, Fogo and Brava. The volcanic origin of the islands results in a mountainous and rocky landscape, with steep and medium to coarse textured soils, poor in organic matter and in major part shallow. Across the archipelago, islands are generally covered by sparse and diverse shrubs, aloes and drought-tolerant vegetation. Around 19.6% of the total country area is represented by agricultural land (about 79,000 ha), while around 84,000 ha is covered by forests[1]. Due to the relatively poor river network and lack of high-discharge flows/flows with stable and reliable discharge, the resilience to water scarcity and/or drought is low. Although heavier rainfalls allow the development of several of small temporary streams, only four islands have perennial streams, carrying modest quantities of water: Boa Vista, Santiago, Santo Antao, and São Vicente. Islands show a variable topography, although generally characterized by vast flat and hilly areas/rugged terrain, volcanic cones configured as mountains, ramified valleys and slopes. The most evident difference in the topographical characteristics of the islands is due to their age of formation, whereby the younger islands (Fogo, Santiago, Santo Antao, and São Nicolau) are generally hilly, while the older ones (Sal, Boa Vista, and Maio) tend to be relatively flat strewn with very high peaks (from 1,340 to 2,829 m)[2].

Figure 1: Map of Cabo Verde

Socio-economic Context

2. A rather young country of around 563,198 inhabitants[3], Cabo Verde is undergoing an evident demographic transition, started in 2000, that is having significant effects on the labour market and the overall development capacities of the country[4]. Currently, inhabitants are mostly concentrated in the 25-64 and 0-14 cohorts (45.2% and 29.4%, respectively), while the 15-24 group accounts for 20% and the over-65 for 5.4% of the total population[5]. The average age indicated in 2016 by the national office of statistics was 28.3, with the municipality of Santa Cruz having the lowest record (26.2) and Santo Antao the highest (32.9). Gender-wise, figures are rather balanced between male and female population. According to UNDP Human Development Report 2020[6], Cabo Verde recorded a HDI value of 0.665, with an increase from 0.569 since 2000 under all

[1] FAO. 2018. FAOSTAT Database. Available at: https://www.fao.org/faostat/en/#data/QV
[2] Cabo Verde Third National Communication to UNFCCC: https://unfccc.int/documents/183071
[3] The country's population is projected to rise to 621,141 inhabitants by 2030, according to Cabo Verde Sustainable Development Plan (PEDS) 2017-2021: https://caboverde.un.org/pt/33731-plano-estrategico-de-desenvolvimento-sustentavel
[4] World Bank (2018). Adjusting the development model to revive growth and strengthen social inclusion: https://openknowledge.worldbank.org/bitstream/handle/10986/30550/130289.pdf?sequence=9&isAllowed=y
[5] Cabo Verde 2015 Statistical Yearbook: http://ine.cv/wp-content/uploads/2017/02/statistical-yearbook-cv-2015_en.pdf.
[6] Available at: http://hdr.undp.org/sites/default/files/Country-Profiles/CPV.pdf

indicators examined. Nevertheless, positioned 126 out of 189 countries, Cabo Verde remains among the lowest positions in the global index.

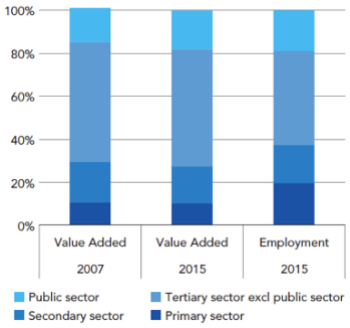

Figure 2: Sectoral distribution of Value Added and Employment (Source: World Bank, 2018)

3. The environmental fragility of the country significantly increases the exposure of its inhabitants to climate change, taking into account the approximately 80% of the population that resides in the coastal zones prone to sea-level rise and acute erosion, as well as the 36% living in rural areas and depending on rainfed agriculture[7]. Ranked as a middle-income country, and despite its fragmented and isolated territory, scarce natural resources, dry climate and small size population, the country remains a model for good governance in Africa and the remarkable progress in socio-economic performance lifted the country out of the Least-Developed Country status in 2007[8]. However, climate change appears to be a risk of a major setback to the achievements of last decades.
4. The current institutional organization is outlined in the Constitution approved in 1992, which states Cabo Verde as a unitary country composed of 22 municipalities, separate legal entities with patrimonial and administrative capacity. The "Estatuto dos Municípios" (Law 134/IV, 1995), in the specific, defines the responsibilities to which municipalities are entitled, which go from municipal planning, healthcare, rural development and others. The lack of updated law provision on local finances, for instance, and a clear framework for decentralization, however limit decisional power of municipalities. Moreover, the particular geography of the country, dispersed amongst separated land territories, makes it difficult to mobilize and supervise municipal staff[9].
5. The success of national planning towards the achievement of the Sustainable Development Goals (SDGs) promotes Cabo Verde as an advanced democratic system within the African continent, that guarantees access to education for 93% of the population, to water for 86%, and to electricity for 92.2%[10]. Traditional capacity constraints, however, together with the limited fiscal space and domestic finance, add on the economic fallout due to the Covid-19 pandemic, resulting into the highest recession of country's modern history. Moreover, notwithstanding the valuable progress in poverty reduction achieved over the last decade, still 35% of total population lives below the national poverty line (3.10 USD/day), with a 44% residing in rural areas[11].
6. The economic development of the country during recent years is considered extraordinary by several international observer organizations, particularly in comparison to the rest of the African continent and considering peculiar constraints such as the geographical characteristics, the weak economy of scale for production and delivery, and the environmental fragility and proneness to shocks[12]. A six-fold growth of the Gross National Income (GNI) between 1986 to 2008 resulted in remarkable welfare improvement for the population with the incidence of poverty falling from 58% in 2001 to 35% only four years later. Extreme poverty at national scale dropped to 10%, and equality significantly improved as demonstrated by the reduction of the consumption-based Gini index (from 53 to 42). As an additional consequence of these achievements, the country transitioned to lower-middle income status in 2007.
7. The economic and social progress made by Cabo Verde since independence in 1975, and particularly in the last 30 years, were based essentially on tourism and Foreign Direct Investment (FDI). Such model, however, has shown evident setbacks since the 2008 Global Finance Crisis. Adding on, the outbreak of the pandemic resulted in a dramatic contraction of the GDP, mostly due to the shutdown in the tourism sector. The robust economic growth of the years 2016-2019, around 4.7%, was abruptly halted in 2020, with a contraction of 14.8%[13], and the gains in poverty reduction achieved over the past 5 years were erased[14]. Current external and fiscal balances will be further negatively impacted by the ongoing exposure of the country to climate change and natural disasters.
8. The economy in Cabo Verde is mainly concentrated in the tertiary sector, while tourism alone contributes with over 45% of the GDP[15]. Despite its significant role in the national economy, the relative employment capacity of tourism is well below of the agriculture sector. Moreover, the low production volume and reliability of national agricultural and fisheries supply chains refrains tourism operators to rely on domestic sectors, hence only about 10-12% of fruit and vegetables are locally supplied. Equally worrying, Cabo Verde has been known as a country of emigration[16], in spite of the partial turnaround between 2011 and 2015 (from -1,822 to -1,010)[17]. Any decline in national socio-economic performance induces further risk of outmigration, in particular in the younger age cohort, where around 25% of the population is unemployed, and the exposure of young women is even higher.
9. The full participation of young people and women is a critical constraint to ensuring the equality of the labour market in Cabo Verde. Particularly worrying is the registered increase, by 12.4%, of youth unemployment between 2001 and 2015. As for

[7] As described also in the CV's updated NDCs: https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Cabo%20Verde%20First/Cabo%20Verde_NDC%20Update%202021.pdf
[8] African Development Bank, 2014. Cabo Verde - Country Strategy Paper 2014-2018: https://www.afdb.org/en/documents/document/2014-2018-cape-verde-country-strategy-paper-47480
[9] OECD: Cabo Verde Unitary Country: https://www.oecd.org/regional/regional-policy/profile-Cape-Verde.pdf
[10] Cabo Verde 2020 Update to the First Nationally Determined Contribution (NDC): https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Cabo%20Verde%20First/Cabo%20Verde_NDC%20Update%202021.pdf
[11] FAO (2019) Climate-Smart Agriculture in Cabo Verde: https://www.fao.org/documents/card/en/c/ca5405en/
[12] World Bank (2018). Adjusting the development model to revive growth and strengthen social inclusion: https://openknowledge.worldbank.org/bitstream/handle/10986/30550/130289.pdf?sequence=9&isAllowed=y
[13] The World Bank in Cabo Verde: https://www.worldbank.org/en/country/caboverde/overview#1
[14] World Bank Group (2021) Macro-poverty Outlook: https://www.afdb.org/en/countries/west-africa/cabo-verde/cabo-verde-economic-outlook
[15] More detailed information on the importance of the tourism sector in CV available in: https://peds.gov.cv/caboverdef4dev/wp-content/uploads/2018/12/executive-summary_F2_PRINT.pdf
[16] Emigration trends of CV available here: https://www.iom.int/countries/cabo-verde
[17] Cabo Verde 2015 Statistical Yearbook: http://ine.cv/wp-content/uploads/2017/02/statistical-yearbook-cv-2015_en.pdf.

women, the unemployment rate is generally higher than men (17.4% against 12.9%), particularly for young women living in urban areas (74.3% among the 15-19 cohort)[18]. The traditional gender norms, which assign almost exclusively to women the responsibility for domestic chores and family care, reduce opportunities to access and participate in the labour market and imposes an imbalanced representation of Cabo Verde's society[19].

10. With a manufacturing sector accounting for around 20.4% and the agricultural one for around 9.6%, national economy has remained relatively unchanged over the past 30 years. Nevertheless, the most recent negative developments that displayed major negative backlashes particularly on the tourism sector, coupled with the increasing threats posed by climate change to a pre-existing fragile environment, suggest the need for a significant diversification of the national economy. The potential of agriculture remains largely unexploited due to the chronic inadequacy of infrastructure[20] for irrigation, water collection, and agricultural water management, and the traditional reliability on rainfed production, which, however, is becoming increasingly subject to the changes of rainfall patterns. Investing in the improvement of the agricultural sector allows not only to reduce rural employment and stabilize the labour market, but also to promote food security for livelihoods and reduce national dependency on import. With an annual average growth of the primary sector at 4.6% (2007-2016), the agriculture and fisheries sectors have remarkably contributed to the poverty reduction trend which included agricultural labourers, farmers and fishermen between 2008 and 2015.

11. The economic fragility, mainly driven by a volatile tourism sector, in a SIDS country as Cabo Verde adds onto climate vulnerability and the insufficient protection of environmental capital. Increasing both livelihoods' and ecosystems' resilient capacity can effectively contribute to climate change adaptation and, ultimately, to broader development objectives.

Gender

12. Gender Gap. According to the 2021 Global Gender Gap Report, Cabo Verde ranks at position 68 out of 156, with the highest scoring under the health ("health and survival") and education ("school enrollment") indicators[21]. Female literacy is up to 85% percent (was 53% in 1990) and the demand of contraception is generally well met. Enrollment at secondary school establishes a gender parity index above 1 since 1990, and the maternal mortality rate is relatively low, below the average of middle-income countries (42 every 100,000 live births).

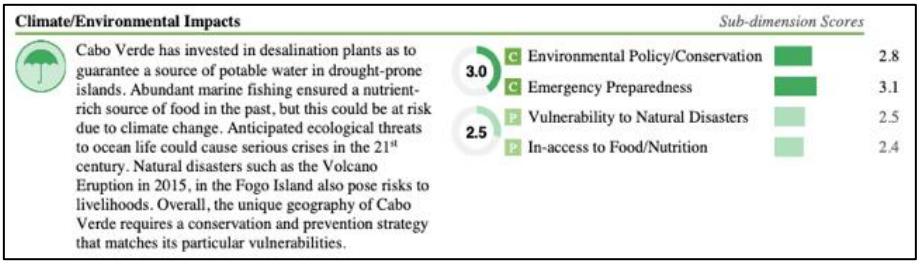

Figure 3: Cabo Verde Fragility Assessment

13. Social norms and Law. Equal rights are well anchored in Cabo Verde society and women's rights, specifically, are clearly included in national norms. Relevant legal frameworks have been adopted in the most recent years to address the gender-based violence that constitutes around ¼ of reported crimes, and specialized police offices have been established. Civil society initiatives are also contributing to increase awareness. Emigration is a historical tendency in Cabo Verde's demography, and women traditionally represent the majority of outgoing population. This trend results particularly evident in the island of São Nicolau, where it affects the evident gender imbalance and the comparatively low fertility rate. At the same time, financial remittances destined to Cabo Verde are the highest for São Nicolau.

14. Economy and Labour market. Gender and poverty are closely interrelated in the Cabo Verde society, where single mothers-headed households account for 37% of poor and 43% of extreme poor families[22]. In rural areas, the difference between men and women in regular and paid works is more pronounced, with 59% of men taking part in economic activities, compared to only 42% of women. The National Statistics Institute outlined the constraints posed to women by existing gender norms and traditional responsibilities to children and family care. On average, women dedicate 3,5 hours/day more than men to domestic chores and unpaid jobs, increasing their vulnerability in the labour market[23].

15. The National Gender Equality Plan for the period 2021-2025 (ICIEG)[24] aims to strengthen investments in women's economic empowerment, particularly for women in agricultural, fisheries and trade sector while PEDS stresses the need to accelerate women's access to decent work, especially in rural areas. According to the National Institute of Statistics (INE), resolving gender disparities in the activity rate would have a potential effect on GDP growth by 13.7%, highlighting how gender disparities in income generation is not only a social imperative but an opportunity for the country's further economic development.

16. The Rural Socio-Economic Opportunities Promotion Programme (POSER)[25], which aims to promote employment and income opportunities for the most vulnerable rural population, reached 12,311 beneficiaries in March 2021, of which 5,553 (41.1%)

[18] Cabo Verde Third National Communication to UNFCCC: https://unfccc.int/documents/183071
[19] The World Bank Group (2013) Country Economic Memorandum for Cabo Verde: http://documents1.worldbank.org/curated/en/857221468020338544/pdf/922480REVISED00UPDATE0BOARD0NUMBERS.pdf
[20] It should be noted that major investment in infrastructure were promoted until 2008, which, however, were almost entirely directed to the tourism sector (e.g. airports, road networks, energy and purification plants for drinking water, expansion of health care and educational facilities)
[21] World Economic Forum (2021) Global Gender Gap Report: http://www3.weforum.org/docs/WEF_GGGR_2021.pdf
[22] World Bank (2018). Adjusting the development model to revive growth and strengthen social inclusion: https://openknowledge.worldbank.org/bitstream/handle/10986/30550/130289.pdf?sequence=9&isAllowed=y
[23] More information on Cabo Verde achievements on the SDGs can be found at https://afrobarometer.org/publications/cabo-verde-sdg-scorecard
[24] Available at: https://resourceequity.org/record/2893-cabo-verde-national-gender-equality-plan-2015-2018/
[25] Available at: https://oportunidades.gov.cv/sobre-nos/

women. The investments less accessed by the female population were agricultural and water management projects based on modern agricultural and breeding technologies and practices. The reason behind this disparity can be attributed to the little access women have to arable land, as well as to the lack of experience and mastery of the techniques necessary for these activities.

17. Responding to the call made by the African Union to introduce minimum wage systems, Cabo Verde introduced in 2014 such a provision, through a single national rate valid for all sectors of activity. Given the under-representation of young female wage employee in the national labour market, a trend that can only partly be explained by the higher domestic responsibilities assigned to Cabo Verdean women, the measure resulted partly effective in enhancing gender equality[26].

18. Gender and climate change. In Cabo Verde, as per other SIDS, climate change has greater chance of impacting women and men differently[27]. Cabo Verdean women, especially those living in rural areas, have a greater chance to be over-exposed to climate change risks due to multiple factors linked to cultural norms that perpetuate gender inequality[28], including: (1) Disparities in income and productivity; (2) Disparities in access to policy-making and decision-making processes; (3) Limited access to information and capacity-building including activities that may enable them to replace unsustainable practices (e.g sand collection, firewood collection); (4) Non-recognition or underestimation of women's traditional knowledge and practices of their surroundings and natural resources management; and (5) Lack of disaggregated data and related underestimation of women's role and contributions in mitigating and adapting to climate change hazards[29].

19. In rural areas, the percentage of poor households that use firewood as their main source of energy for cooking is 80.7%, and 85.7% for the very poor[30]. Women traditionally are the main responsible for collecting firewood, devoting an average 16h/week to this task. As Cabo Verde faces cyclical droughts, the condition of collecting wood and fetching water become an even greater challenge for rural women and girls, that need to walk longer distance, increasing the time burden, to be able to provide water and energy for their families. Furthermore, climate change could increase the prevalence of some vector-borne diseases, as malaria, dengue and lately the ZICA, also linked to the reduced water availability[31]. Children and pregnant women are particularly susceptible to vector and water-borne diseases. In 2016, Cape Verde registered a ZICA outbreak, which affected a number of pregnant women, increasing cases of microcephaly in the country.

Youth

20. In 2020, the below-15 years group represent 28.1% of national population, and the 15-24 group 17.1%, both following a steadily decreasing historical trend, and projected to be further diminishing[32]. Primary education is universal and funding programs are in place to subsidize poor students. Evidence on the outcomes of such interventions, however, are not clear and progress are not monitored regularly. Rural areas, generally served by 1 or 2 secondary schools, receive the majority of funds, with the aim to reduce the consistent drop out. The inadequate quality of teaching in secondary school contributes to uneven opportunities, given that around 23% of teachers do not have a degree ("não licenciados")[33].

21. School leavers easily end up being part of the unemployed population, while the lack of technical skills clashes with the stated need for a more competitive service sector. The rate of youth unemployment (15-24 years) registers a steady growing trend, from 28.6% in 2015 to 41% in 2016, with an increase of 12.4 % points[34]. Emigration is an alternative strategy to unemployment for youths, and the opportunity to find a qualified job abroad is a major driver to the "brain drain" suffered by the country. At the same time, workers abroad contribute to the accumulation of national human capital and represent a valuable group of investors, both from outside or if they return to the country.

Climate Change

22. Being a country with mild temperature and weather conditions and classified as a dry sub-tropical state, the climate in Cabo Verde is significantly affected by the cold Canarian current and it is subject throughout the year to the Azores anticyclone. This phenomenon regulates the trade winds during the dry months (November to June) and it thus serves as a regulatory factor of rainfall anomalies. Between December and February, the archipelago receives air masses from extra-tropical latitudes.

23. On a yearly basis, Cabo Verde's climate unfolds around 3 main seasons, based on the intensity and dominance of regional climate systems that feature a transition season (November to February), a dry season (March to June), and a rainy season (July to October). Average temperatures slightly differ between northern (23°-25°) and southern islands (24°-26°), while along seasons, differences are more evident, with minimum values registered in January and February (15° to 18°) and maximum ones in August and September (32° to 34°). A similar temperature range appears between coastal and internal areas, whereby average annual temperature for the former is around 25°, while it can decrease to 19° above 1,000 m altitudes. Average rainfall is estimated between 150-300 mm in wet years, and below 100 mm in dry years. According to the 2020 Update to the First Nationally Determined Contribution, a reduction of annual precipitation is projected at about 2% between

[26] ILO (2019) Wages in Africa. Recent trends in average wages, gender pay gaps and wage disparities: https://www.ilo.org/wcmsp5/groups/public/---africa/---ro-abidjan/---sro-cairo/documents/publication/wcms_728363.pdf
[27] Climate change and health in small island developing states. A WHO special initiative. Geneva: World Health Organization;2018: https://apps.who.int/iris/rest/bitstreams/1175561/retrieve
[28] Thorough information is detailed in the Initial Gender Analysis included in Annex 2
[29] Technical Fiche (Summary), November 2020: Social and Gender Diagnosis in Communities for the project: Strengthening the Adaptation and Resilience of the Forestry Sector in Cape Verde - REFLOR-CV
[30] Cabo Verde 2015 Statistical Yearbook: http://ine.cv/wp-content/uploads/2017/02/statistical-yearbook-cv-2015_en.pdf.
[31] Gender analysis of agriculture sector and rural development in Cape Verde, FAO July 2018
[32] United Nations, Department of Economic and Social Affairs, Population Division (2019). World Population Prospects 2019, Volume II: Demographic Profiles (ST/ESA/SER.A/427): https://population.un.org/wpp/Graphs/1_Demographic%20Profiles/Cabo%20Verde.pdf
[33] World Development Indicators: https://databank.worldbank.org/source/world-development-indicators
[34] Cabo Verde Third National Communication to UNFCCC: https://unfccc.int/documents/183071

2011-2040, inducing prolonged dry spells, increased frequency and duration of drought, concentrated and erratic rainfall, and run-off even higher than the recent level[35]. This results in growing water scarcity, more intense desertification and land degradation trends, increasing uncertainty of water availability for agriculture, reduced area available for agriculture, and shrinking of native vegetation to microrefugia sites. Adding to the issue of limited and concentrated water availability, the intra-country precipitation ranges widely from as little as 100-150 mm in arid coastal areas to 800 – 900 mm in the highest mountains. Any change in rainfall pattern, then, has a polar opposite effect, resulting into severe and prolonged drought in one place, and flash floods and considerable run-off in another.

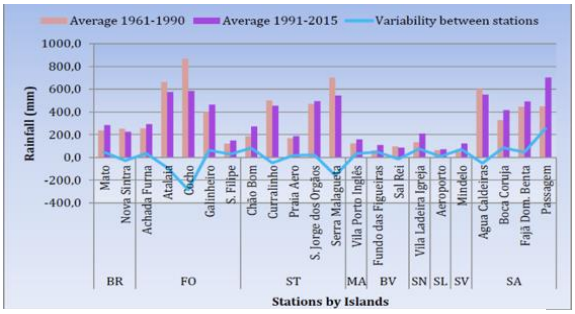

Figure 4: Distribution and variability of annual average rainfall in Cabo Verde (Source: INMG, 2017)

24. Due to its geographical characteristics, Cabo Verde is particularly sensitive to severe and multiple hazards, with a limited capacity to adapt. Events ranging from acute water scarcity to extreme weather conditions such as storms, floods and droughts, have immediate impacts on the recharge of aquifers, crop productivity, status of the environment, and eventually livelihood. Being classified by the UN as a Small Island Development State (SIDS) and a dry Sahelian country, Cabo Verde faces pre-existing vulnerabilities[36] to climate change impacts. Floods, landslides, forest fires, coast and beach erosion, and drought are indicated as the most adverse climate threats, with the latter representing a high risk for about 80% of the national territory. An increase in SLR is projected by 2090 of at least 0.13 m and up to a maximum 0.56 m[37].

Temperature

25. Current trend. Historically the annual average temperature has shown an increase of 0.6° since 1960, an average rate of 0.14° by decade. The 15 years from 1990 to 2015 show a growing trend in the annual average temperatures, with an additional increase of 0.2° as compared to the 1961-1990 period. The increase is more evident during the rainy season, between August and October, when the average temperature increase reaches 0.23° every 10 years. Similar to average temperature, variations in extremes have been showing a growing trend since 1995. The steady warming up of temperatures along the 20th and 21st centuries, deploying faster in West Africa and Sahel than global warming, resulted in periodic droughts, which affected large areas and negatively impacted the agricultural sector in the country[38], already confined by the scarce natural resources and harsh climate.

26. Projected trend. The 2020-2039 scenario projects an increase of temperature by 0.4°-0.8°, which is expected to grow further, up to 0.5°-1.0° by 2090, under RCP 8.5. Along the 2020-2039 timespan, estimations calculated for scenarios A2 and B1 foresee an average temperature increase between 0.2° and 0.4°[39]. In a limited number of years negative fluctuations, i.e. cooling of temperature, can be expected. Projections generally show a growing propensity for a sharper rise of temperature extremes, which will have significant impact on related climate parameters, for instance evapotranspiration[40].

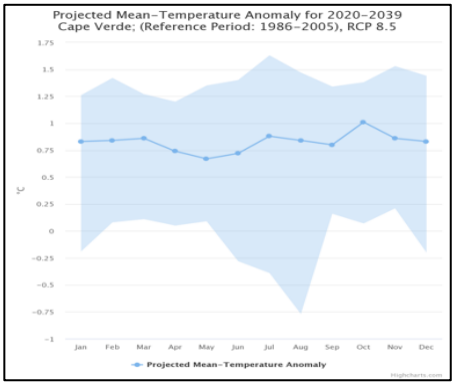

Figure 5. Source: WB Climate Change Knowledge Portal

Table 1: National CMIP6 Projections (Source: Elaborated from data available at https://climateknowledgeportal.worldbank.org/country/cabo-verde/climate-data-projections)

Annual temperature change	2020-2039			2040-2059			2060-2079			2080-2099		
	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
RCP 2.6	2,6% (0.48° to 0.74°)	2,9% (0.42° to 0.79°)	2,3% (0.47° to 0.78°)	3,8% (0.75° to 1.02°)	4,2% (0.58° to 1.03°)	3,4% (0.76° to 1.10°)	4,3% (0.86° to 1.21°)	4,7% (0.79° to 1.22°)	3,9% (0.86° to 1.25°)	4,2% (0.86° to 1.20°)	4,6% (0.77° to 1.21°)	3,7% (0.77° to 1.21°)
RCP 4.5	2,5% (0.49° to 0.75°)	2,8% (0.4° to 0.81°)	2,5% (0.5° to 0.86°)	4,5% (0.97° to 1.19°)	5,0% (0.89° to 1.2°)	4,1% (0.97° to 1.23°)	5,9% (1.30° to 1.49°)	6,7% (1.25° to 1.52°)	5,4% (1.28° to 1.57°)	7,2% (1.54° to 1.80°)	8,1% (1.49° to 1.83°)	6,5% (1.47° to 1.92°)
RCP 7	2,4% (0.43° to 0.65°)	2,6% (0.40° to 0.61°)	2,1% (0.46° to 0.64°)	4,7% (0.92° to 1.24°)	5,3% (0.87° to 1.26°)	4,1% (0.93° to 1.21°)	7,1% (1.30° to 1.49°)	8,1% (1.25° to 1.52°)	6,3% (1.28° to 1.57°)	9,8% (1.91° to 2.43°)	11,1% (1.95° to 2.43°)	8,5% (1.91° to 2.40°)
RCP 8.5	2,9% (0.55° to 0.79°)	3,1% (0.47° to 0.84°)	2,6% (0.56° to 0.85°)	5,5% (1.15° to 1.38°)	6,2% (1.11° to 1.44°)	4,9% (1.15° to 1.47°)	8,7% (1.94° to 2.13°)	9,9% (1.90° to 2.14°)	7,7% (1.91° to 2.13°)	12,7% (2.76° to 3.10°)	14,5% (2.71° to 3.16°)	11,2% (2.78° to 3.04°)

Precipitation

[35] Cabo Verde 2020 Update to the First Nationally Determined Contribution (NDC): https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Cabo%20Verde%20First/Cabo%20Verde_NDC%20Update%202021.pdf

[36] More detailed information on Cabo Verde's climate-related vulnerabilities in the following links: 1. ND-GAIN Country Index : https://gain-new.crc.nd.edu/country/cape-verde and the World Risk Index from World Bank Group : https://reliefweb.int/sites/reliefweb.int/files/resources/WorldRiskReport-2020.pdf

[37] Cabo Verde 2020 Update to the First Nationally Determined Contribution (NDC): https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Cabo%20Verde%20First/Cabo%20Verde_NDC%20Update%202021.pdf

[38] Cabo Verde Third National Communication to UNFCCC: https://unfccc.int/documents/183071

[39] Cabo Verde climate projections: https://climateknowledgeportal.worldbank.org/country/cape-verde/climate-data-projections

[40] Cabo Verde Third National Communication to UNFCCC: https://unfccc.int/documents/183071

27. Current trend. Considered as an island extension of the arid Sahel region, Cabo Verde is characterized by erratic and meagre rainfall of around 225 mm/year. Rainfall variation across the 3 seasons confirm the significant increase in rainfall rates and the further concentration of rainfall from mid-1990s[41]. While in the North precipitations are more irregular and less frequent, in the South they are more frequent and have intensified since 1998. Unusually heavy rains have been reported during some dry seasons, generally occurring between November and February. From an environmental perspective, the most evident impacts of irregular and deficient rainfall result in a reduced biodiversity of species and varieties, higher water-driven erosions and steeper slopes and, particularly affecting agriculture, in a lower soil fertility and leaching of organic matter from soils.

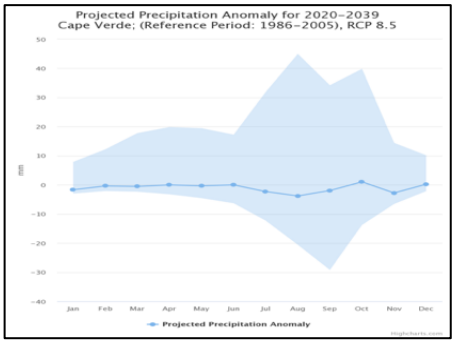

Figure 4. Source: WB Climate Change Knowledge Portal

28. Projected trend. The uncertainty around the precipitation forecasting models in West Africa makes future scenarios ambiguous. While national projections for the 2020-2039 suggest a decrease in quantity, concentration, and an increase of intensity, forecasting based on multi-model ensembles indicate a possible decrease of rainfall up to 24% by 2099[42]. Heavier rainfalls are expected according to different scenario analyses, leading to on average a more humid climate. Such changes will consistently affect rainfed agriculture, and hence the livelihoods of smallholders who depend on a single income source and are constrained by the limited availability of natural resources.

Table 2: National CMIP6 Projections
(Source: Elaborated from data available at https://climateknowledgeportal.worldbank.org/country/cabo-verde/climate-data-projections)

Total annual rainfall change	2020-2039	2040-2059	2060-2079	2080-2099
RCP 2.6	5% (-29% to +32%)	4% (-27% to +24%)	9% (-25% to +35%)	10% (-30% to +35%)
RCP 4.5	8% (-21% to +32%)	4% (-38% to +28%)	5% (-28% to +53%)	-1% (-42% to +32%)
RCP 7	0% (-15% to +20%)	-8% (-25% to +33%)	-5% (-40% to +34%)	-13% (-41% to +53%)
RCP 8.5	1% (-16% to +23%)	-7% (-30% to +34%)	-18% (-18% to +-49%)	-24% (-48% to +46%)

Climate Change Impact

29. Ranked by the World Risk Report at 141st of 173 countries vulnerable to natural disasters, Cabo Verde is highly exposed to the effects of climate variability[43]. According to the global index on country's exposure, sensitivity and capacity to adapt, Cabo Verde is ranked as 117th out of 182 countries[44]. Extreme weather events, like prolonged drought and land desertification, occasional but severe and highly damaging rains, and sea level rise (SLR) are considered the most devastating climate change impacts that increase the need for improving adaptation capacity and resilience in water, agriculture, and energy sectors[45]. Recurring events and long-term natural phenomena like devastating floods, SLR and ocean acidification, droughts and unexpected changes of temperature, are increasing threats that risk to reverse the country's development gains, if adaptation measures are not promptly introduced.

30. Around 30,000 people were estimated as in need of urgent assistance following the 2014 drought, which decimated the cereal crops harvest. Reduction of rainfall and increasing water scarcity are more frequently leading to yield losses, particularly of staple crops[46], severely affecting rural livelihoods and putting pressure on national food security. Climate change impacts are expected to entail, amongst others, the following damages: a) 2 million USD of income is expected to be lost due to crop failure from drought, b) around 150,000 inhabitants equaling 27% of population is becoming exposed to flash flood, and c) damages from landslides averaging 200,000 USD loss per year[47].

[41] Cabo Verde 2020 Update to the First Nationally Determined Contribution (NDC): https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Cabo%20Verde%20First/Cabo%20Verde_NDC%20Update%202021.pdf
[42] Cabo Verde climate projections: https://climateknowledgeportal.worldbank.org/country/cape-verde/climate-data-projections
[43] UNU-EHS (2016): http://collections.unu.edu/view/UNU:5763
[44] Notre Dame Global Adaptation Initiative - ND-GAIN Country Index (2018): https://gain.nd.edu/our-work/country-index/
[45] Cabo Verde 2020 Update to the First Nationally Determined Contribution (NDC): https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Cabo%20Verde%20First/Cabo%20Verde_NDC%20Update%202021.pdf
[46] FAO estimated in 2015 the lowest maize harvest in the country's history. FAO (2021) Global Report on Food crises: https://www.fao.org/emergencies/resources/documents/resources-detail/en/c/1398545/
[47] Global Facility for Disaster Reduction and Recovery (GFDRR) Annual Report, 2019: https://www.gfdrr.org/sites/default/files/publication/GFDRR%20AR%202019_lowres.pdf

31. Climate-related hazards, in light of climate variability, are sharpening their negative impacts, as they are compounded by the non-climate phenomenon such as volcanic and seismic activities. The increasing exposure to climate change and related fragility is largely recognized as a threat to the country's development, particularly for the poorest and most vulnerable. Responses to threats, however, are largely driven by reactive and emergency approaches, due to the current lack of coping capacity and the low availability of adaptive measures to address the adverse impacts and increase the resilience of human and natural ecosystems.

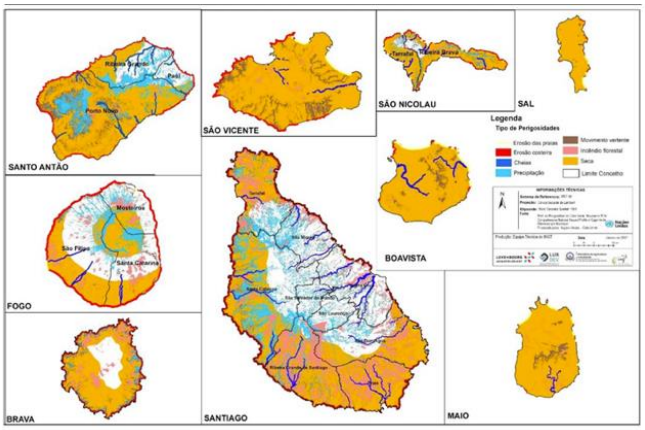

Figure 5.Map of the susceptibility to selected climate hazards in a high-risk scenario, per island, 2014/2021 (Source: 2020 Update to the first Nationally Determined Contribution)

32. In recent years, adverse events and disasters hit the country and caused significant damages both in economic and in social terms. Extreme rainfall led to seriously damaging floods in São Nicolau (2009), Boavista (2012), and São Miguel (2013), with an estimated toll of 2.6 million USD. In 2017-2018 an intense drought event occurred, which affected more than 70,000 people[48]. The combination of previous disasters events with the 2017-18 drought, had a tremendous direct impact on the economy, society, and environment as a whole, affecting around one-third of households. According to the analysis presented in INFORM (2019)[49], the physical dimensions of exposure associated with natural hazards are considerable (1.9), while the risks of hazards and exposure to droughts as exceptionally high (6.6 out of 10).

33. In Cabo Verde, recurrent droughts are continually reducing its agricultural productivity, and the food crises of the 20th century and the beginning of the 21st century led to an acceleration of rural exodus and migration, both among islands and internationally. Cabo Verde has a larger native population living abroad[50], 809,000 people estimated, and tops the ranking of 30 African countries where remittances matter most in GDP). As a result, the country faces increasing challenges related to international and internal migration, which has been resulting both in population loss (net migration: -7,392 people in 2017), and rapid and unplanned urbanization in recent years[51]. The impacts of climate change are expected to exacerbate these trends, with rural populations left with the only option to flee native locations in search of alternative means for living than agriculture and food production.

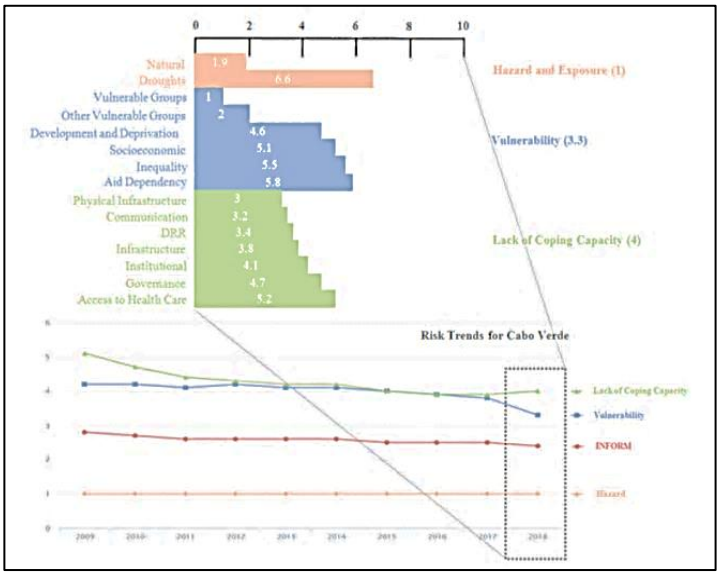

Figure 6: Cabo Verde risk profile (2018), and 2009-2018 trends for selected hazards, exposure, vulnerability, and coping capacity indicators

34. Taking into consideration the high exposure to climate change risks, there is an increasing effort to make natural resource management climate-proof. Adaptative solutions currently in place aim to address the extension of drought periods and desertification, increasing storms, extending soil erosion and growing salt intrusion. Hence, activities such as the efficient use of water resources, the conservation of water and soil, the reforestation and afforestation for the increase of vegetation cover, directly and indirectly reflect the adaptation needs of the country, the driest one in the entire Sahel region.

Aftermath of COVID-19 at national level and the trajectories of sustainable reconstruction

The impact of pandemic was significant and more severe than anticipated in 2020 in Cabo Verde. The safety measures disrupted the trade and mobility, and practically stopped the tourism sector. As per the economic impacts, the GDP is contracted by 14% in 2021. Exports and imports of goods declined by 50% and 13% respectively, and service sector contracted by 72%[52]. As a country importing 80% of the essential food, Cabo Verde is severely impacted by any disruption for shipping, commodity supply or price fluctuation. Although the country is not explicitly food insecure, COVID-19 opened eyes on the vulnerability and exposure of the food market[53]. The "Harmonized Framework

[48] GFDRR – Global Facility for Disaster Risk Reduction. ACP-EU: Natural Disaster Risk Reduction Program. Focus Day on Post Disaster Response and Recovery Frameworks Brussels: ACP House, 2017. Available at: https://www.gfdrr.org/sites/default/files/publication/CABO%20VERDE%20-%20ACP-EU%20NDRR%20Focus%20Day%20presentation%20-%209%20June%202017.pdf and WB2018b=WB –World Bank. Concept Program Information Document (PID) - Cabo Verde Disaster Risk Management Development Policy Credit and Loan with Cat DDO - P160628 (English). Washington, D.C.: World Bank Group. Available at: http://documents.worldbank.org/curated/en/125621531480106694/pdf/Concept-Program-Information-Document-PID-Cabo-Verde-Disaster-Risk-Management-Development-Policy-Credit-and-Loan-with-Cat-DDO-P160628.pdf

[49] Index for Risk Management (INFORM). Available at: http://www.inform-index.org/

[50] Cabo Verde 2015 Statistical Yearbook: http://ine.cv/wp-content/uploads/2017/02/statistical-yearbook-cv-2015_en.pdf.

[51] Government of Cabo Verde. Emergency Program for Mitigating Drought and the Bad Agricultural Year of 2017/2018 Campaign (EPM-DA) in Cabo Verde. Praia: Ministry of Agriculture and Environment, 2017 and The World Bank in Cabo Verde. Praia: World Bank, 2019. Available at: http://www.worldbank.org/en/country/caboverde

[52] Cabo Verde: Third Review Under the Policy Coordination Instrument-Press Release; and Staff Report, IMF, April 2021: https://www.imf.org/en/Publications/CR/Issues/2021/04/02/Cabo-Verde-Third-Review-of-the-Policy-Coordination-Instrument-Press-Release-and-Staff-Report-50334

[53] Brilhante M, Varela E, P. Essoh A, Fortes A, Duarte MC, Monteiro F, Ferreira V, Correia AM, Duarte MP, Romeiras MM. Tackling Food Insecurity in Cabo Verde Islands: The Nutritional, Agricultural and Environmental Values of the Legume Species. Foods. 2021; 10(2):206. https://doi.org/10.3390/foods10020206

for the identification and analysis of risk zones and populations in food and nutrition insecurity"[54] estimated that 21 per cent of the national population are at risk of food insecurity and 3% are facing a food crisis due to the COVID-19 impacts. The negative impact on household and livelihoods income sources affected the productive capacity and purchasing power of the population and increased the food vulnerability of livelihoods.

Another foreseeable consequence is the overspilling impact of the collapse of tourism, leaving many without primary income source. Although the remittance growth by 0.5% was a sign of solidarity and an initiative to offset the crisis, the scale of remittance is still insignificant compared to the required amount to compensate the economy. The intra-sector and inter-sector diversifications of economy are both required to support the country's response to the crisis and build resilience. The new reform agenda of the second Strategy for Sustainable Development defines the development of agriculture and fishery as a priority area. The development of the agriculture sector is important not only to strengthen the economy but to protect the most vulnerable who are already engaged in subsistence agriculture. Such a turn in socio-economic development is already backed by decision-makers. However, its implementation must now resolve the long-standing problem of resource scarcity compounded by climate change impacts.

Agriculture

35. Despite shortcomings and its structural weakness, the primary sector in Cabo Verde allows not only the economic and social development of the country, but it also ensures the livelihood of rural families, whose main income depend on agriculture. Agriculture in Cabo Verde is constrained by geographical and climate challenges, yet the availability of unexploited land opens opportunities for development, as confirmed by recent shifts leading the transition from purely subsistence to market-oriented agriculture. Out of the total agricultural landscape, which covers around 79,000 ha, equal to 19.6% of total land area, arable land makes up for approximately 41,000 ha, of which only 36,000 are currently cultivated[55]. Arable land represents around 12.9% of agricultural landscape, 0.99% is cultivated by permanent crop, 6.2% by meadows and pastures, 22% by forest and 58% by other land uses[56]. Activities in the primary sector are dominant in the island of Santiago, which typically enjoys an arid tropical climate along 2 seasons: moderate (between December and June, with 22°-23° seawater temperature), and warm (between July and November, with 26°-27°). The lack of regular precipitations registered in the past 2 and half years negatively affected productivity and led to a decrease of -7.5% of agricultural output[57], nevertheless, the sector constitutes the main source of income for around 18.7% of total population, about 28,000 people, 25% of which is represented by women.

36. Although agriculture shares less than 10% of the GDP due to its underdevelopment and resource constraints, it is a strategic sector for poverty alleviation, employment, economic shock absorption, and long-term resilience. With only around 30% of food needs covered by domestic production, the country's food security is an open challenge, nevertheless agriculture is largely considered a potential engine for economic growth, also as it currently takes 50% of the labour market[58]. The Government of Cabo Verde recognizes the climate change vulnerabilities endured by the agriculture sector in a SIDS country, hence is actively promoting the agriculture sector as part of the national Green Growth strategy. Agriculture was recognized as a major driver of the poverty reduction trend the country experienced between 2008 and 2015, thanks to the average annual growth of the sector at 4.6%, also led by the expansion of irrigation facilities, from 11% to 14% between 2004 and 2015[59]. The development of rural infrastructure for small-scale irrigation systems and the introduction of new technologies as horticulture contributed to raise income-earning opportunities for the poorest agriculture labourers. Further development of the sector, moreover, could represent a buffer to absorb the extreme poverty that affects around 38% of total population and is largely composed by the farmers and agriculture-dependent livelihoods. Increasing the share of irrigated agriculture and providing better opportunities to farmers to participate in the agricultural value chain is an essential strategy to reduce extreme poverty, while at the same time increasing resilience to climate variability of rural poor.

Figure 7: Disaster Risk Profile of Cabo Verde
(Source: World Bank - Global Facility for Disaster Risk Reduction and Recovery, 2019)

37. The agriculture predominantly comprises of subsistence and family farming systems, covering around 95% of agricultural land, and run by smallholders cultivating <1-1.5 ha per farm. Both rainfed and irrigated systems are severely constrained by the water-scarce conditions and the low availability of arable soils. Rainfed areas take over 81% of the total cultivated areas. Irrigation is applied in only around 18.9% of farms, while 73.4% relies on rainfall[60]. Maize is the dominant crop, taking 44% of total crop

[54] http://maa.gov.cv/index.php/min-a-a/70-seguranca-alimentar/projecto-sisan/208-quadro-harmonizado-de-identificacao-e-analise-de-zonas-de-risco-e-das-populacoes-em-insequranca-alimentar-e-nutricional-ch
[55] Cabo Verde 2020 Update to the First Nationally Determined Contribution (NDC): https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Cabo%20Verde%20First/Cabo%20Verde_NDC%20Update%202021.pdf
[56] Climate-Smart Agriculture in Cabo Verde: http://www.fao.org/3/ca5405en/CA5405EN.pdf
[57] AfDB (2019) Cabo Verde Country Strategy Paper: https://www.afdb.org/en/documents/cabo-verde-country-strategy-paper-2019-2024-country-strategy-papers
[58] Ibid
[59] Cabo Verde Ministry of Agriculture and Environment. Ambição 2030 – Sector Agricultura: https://peds.gov.cv/caboverdef4dev/wp-content/uploads/2018/12/Sector-Agricultura_print.pdf
[60] AfDB (2019) Cabo Verde Country Strategy Paper: https://www.afdb.org/en/documents/cabo-verde-country-strategy-paper-2019-2024-country-strategy-papers

harvested, and it is followed by pulses. Coconut, sugarcane, groundnut, banana, and coffee are the main cash crops. Cabo Verdean authorities estimate to 1.5 million consumers as the potential market of national agriculture, to be achieved mainly in fresh produce market[61].

38. Between 2021 and 2016, agriculture in Cabo Verde has been exporting products for an average value of 3.7 million USD, with the top five agricultural produce being: dry peas (0.33%), dry beans (0.22%), rice (0.20%), crude materials (0.2%), and oil and virgin olive (0.15%). Imports of agricultural products account on national budget for around 212 million USD, in order to meet national food security needs. The most relevant imported agricultural products are: rice (rice millet equivalent, 10.36%), food preparations (6.13%), chicken meat (5.36%), soybean oil (4.08%), and wheat (2.98%)[62]. Around 85% of the domestic demand for cereal, for rice and wheat for human consumption, is only met by imports[63]. Traditional diets are slowly diversifying from a cereal-based regime to more protein- and micronutrient-rich ones. To support this transition and achieve food security goals as set in the sectoral and development policy, the improvement of marketing and commercialization capacities of smallholders, to be achieved also through digital tools tailored at national and local scale, is a crucial challenge.

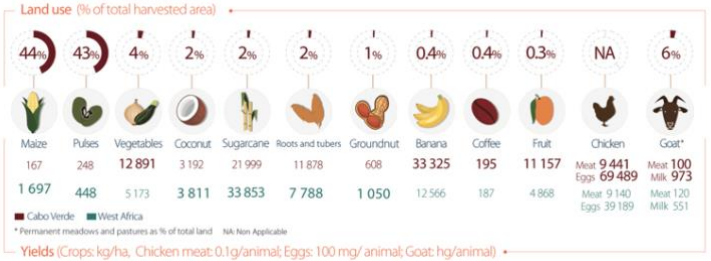

Figure 8: Source: FAO, 2019

39. The geographic and climatic characteristics of Cabo Verde, a SIDS highly exposed to climate change, represent a severe constraint to the full deployment of agriculture potential, hence limiting the sector's contribution to overall development efforts. Valuable adaptation solutions include a range of measures. On one side, the implementation of effective water management and water storage systems as well as the employment of non-conventional water resources would reduce the dependency of agriculture on erratic and unpredictable rainfall and avoid the overexploitation of groundwater. On the other, the restoration and protection of land resources based on eco-system approaches and through the increase of vegetation cover will serve as a preventive solution to degradation and an effective measure to improve soil moisture and support the diversification of productive systems.

Water scarcity

40. With an availability of 537m^3/year/person, Cabo Verde ranks below the water scarcity level (1000m^3/year)[64]. While demand is growing, both for human consumption and for different sectors such as tourism, agricultural water consumption remained stable. Pressure on water resources is increasing due to the lack of clear legislation that requires better resource management and encourages the rationalization of water for domestic use and agriculture. The limited supply of water resources, heterogeneously distributed across the country, associated to the increasing variability of rainfall patterns, makes water a clear indicator of climate change effects on livelihoods, as noticeably recognized by the National Strategic Plan for Water and Sanitation (PLENAS)[65]. Given a verified national condition of water scarcity, the Plan indicates the standard water right for Cabo Verde population, corresponding to 40 to 90 liters/day/person, with at least 5 liters/day of potable water, and highlights the need for an integrated management of resources and improved resilience of supply systems in the face of climate change.

41. Scarce water resources and inadequate water infrastructures are amongst the major reasons of the low yields and production failure. Due to the rugged terrain and volcanic soil of the populated islands, only between 13%-17% of the precipitation infiltrates, 50% evaporates, and 20% is lost through runoff[66]. Although the annual surface water resources are estimated at 181 million m^3 [67], the utilization of water resources is rather poor due to the lack of harvesting and storage facilities. The recognition of the importance of increasing harvesting and storing facilities has received a large support from the Government and attracted the development agencies. Since 2006, increasing number of dams have been constructed. However, the country-level potential is yet to be exploited. Furthermore, more sophisticated and eco-system centred technologies than concrete dams are required to overcome the dry season, when rainfall is completely absent. Decreased evaporation of dams, diminished leaking, betterment of water allocation rules, accessibility to stored water, effective sediment management, and minimized conveyance loss are required criteria to improve the functionality of the dams.

42. Groundwater reservoirs are deemed strategic resources, given the very low availability of surface waters and unreliability of rainfalls. According to estimations, the available groundwater amounts annual 124 million m^3, from which 65 million m^3 is technically exploitable and 44 million m^3 is supplemental in drought periods. These figures can decrease by 25 % within 20 years due to climate change. Further dry up of feeding springs are expected due to temperature increase and rainfall anomalies, which is a significant threat to communities, depending merely on groundwater resources. Adding to the pre-existing vulnerability of groundwater resources, inspection missions proved that 40 % of wells, boreholes and reservoirs are not sustainably exploited[68]. The increasing exploitation of resources, with rates above 45%, is leading to salt water intrusion

[61] Voluntary National Review on the implementation of the 2030 SDGs (2021): https://sustainabledevelopment.un.org/content/documents/282392021_VNR_Report_Cabo_Verde.pdf
[62] https://www.fao.org/faostat/en/#data/QV
[63] A full review of Cabo Verde's food production, consumption and trade available at: https://www.fao.org/giews/countrybrief/country.jsp?code=CPV&lang=en
[64] Estudo de vulnerabilidade e adaptação às mudanças climáticas em Cabo Verde, ENDA énergie. Document made available by FAO country office
[65] Cabo Verde National Strategic Plan for Water and Sanitation (PLENAS), available at: http://faolex.fao.org/docs/pdf/cvi148923.pdf
[66] Resolution No. 66/2010 approving the National Plan of Action for Integrated Management of Water Resources (PAGIRE): http://www.fao.org/faolex/results/details/en/c/LEX-FAOC119727
[67] FAO Aquastat, available at: https://www.fao.org/aquastat/statistics/query/results.html
[68] Synthesis by UNDP based on NAPA: Building adaptive capacity and resilience to climate change in the water sector in Cape Verde

and contamination of coastal aquifers. The limited rainfall cannot compensate such rates and the pace of reservoirs' replenishment is not sufficient to respond to the growing demand. The lack of adequate aquifer recharge combined with low capacity of storage facilities is consequential to groundwater resources, as the human-induced pressure on groundwater is already a challenge. The groundwater quickly moves downstream to areas at lower altitude and discharges wells, springs, tunnels and streams, thus remaining inaccessible in upstream parts. It, eventually, reaches the ocean as submarine discharge[69]. Making groundwater use, as strategic basis of water resources, more sustainable and risk-free is of critical importance to both reserve water resources and avoid environmental impacts by salinity.

43. Agriculture accounts for almost 90% of total groundwater abstraction, thus being responsible for the sharply declining groundwater tables. However, groundwater is economically available only in flat areas at coastal sides, where it becomes vulnerable to saltwater intrusion if upper lenses of freshwater are over-pumped[70]. Persistent droughts, shrinking aquifers, soil salinity due to seawater intrusion and decreasing irrigated areas are additional factors contributing to the vulnerability of the agriculture sector. Increasing the storage capacities and improving the use of water resources are of utmost importance to adapt to climate change impacts.

44. With the development of technologies and the decreasing prices of facilities, unconventional water resources have been receiving growing attention by national relevant stakeholders, for their potential to augment the scarce supply available and reduce vulnerability to climate change. According to figures indicated in the 2020 Update to the first NDC, the capacity to produce desalinated water currently reaches 43,720 m^3/day, set to increase. The mobilization of water resources for agriculture through desalination is similarly indicated as a valuable strategy in the National Plan for Agricultural Investment and Food and Nutrition Security (PNIASAN, in Portuguese)[71] to strengthen the resilience of populations. Currently operating desalination facilities apply Sea Water Reverse Osmosis membrane technology (SWRO), with a production capacity between 500 and 5,000 m^3/day. However, these infrastructures are highly energy-intensive and prevent the country from reducing its water carbon footprint. Overcoming this challenge is stated as Adaptation Contribution #1 in the Update to the first NDC, whereby the application of low-carbon and solar-based desalination techniques is indicated as a measure to achieve a resilient water management system. To this scope, the proposed intervention foresees the development of small-scale desalination units, based on off-grid plug&play solutions that can be rapidly deployed in a diversity of settings through containers of different sizes, from 2.5 to 12 meter-high, and from 2.4 to 11.7 tons. Available technologies will apply reverse osmosis process for the re-use of saltier water flow and will integrate renewable energy sources in a sustainable manner through energy recovery technology that requires 1/3 of solar panels compared to traditional systems.

45. Maximizing the productivity of the limited water resources available, while ensuring their conservation and protection, is fundamental to the adaptive development of the country's agricultural sector. To this goal, adaptation measures should be proposed according to the strategic objectives defined by national policies calling for enhanced resiliency of water management systems in the face of climate variability. Possible technical measures, in this respect, include the increase of storage capacity to reduce the runoff and enhance groundwater infiltration, the improvement of infiltration and replenishment of water bodies through ecosystem-based approaches, or the reduced hydro-inefficiency through desalination plants and reduction of water losses in the water supply. Equally important, institutional and technological interventions relate, for instance, to the development of integrated climate information systems for watershed management or the improved access to digital tools for decision-making.

Land resources and forestry

46. Land degradation is a major environmental issue in the country, limiting the full exploitation of agricultural potential which is reflected in the National Adaptation Programme of Action on Climate Change, and calls for increased investments for the conservation and protection of vulnerable production bases, including forests, through the promotion of plant species against soil erosion[72]. The phenomenon is the direct consequence of the combination of endogenous conditions, such as topographical features, limited plant cover and inadequate land management practices, and climate-induced effects such as increasingly long and frequent drought and heavy rainfall. Moreover, land erosion and uncontrolled runoff lead to land degradation and desertification, ultimately causing severe damages in productive assets. Finally, natural events and continued improper agricultural practices enhance water erosion[73] and prevent the replenishment of nutrients, reducing the natural fertility of the land, particularly as associated to the almost absent plant coverage.

47. Soil and water conservation measures, including reconstruction, cleaning and maintenance activities, by institutional practice are conducted by farmers associations, through the signature of agreements with the Ministry of Agriculture and Environment (MAA), and in close collaboration with the Direction of Agriculture, Forest and Breeding. However, there is an evident need for a centralized monitoring and coordination of management activities to inform decision-making processes at above-watershed levels and ensure integrated planning at larger scale.

48. Governments over the years strived to combat land degradation. The main scope has been to ensure soil ecosystem services and support agriculture, hence concentrating efforts in constructing mechanical and biological structures (e.g. large dams

[69] Land use, land cover and trends in CV: https://eros.usgs.gov/westafrica/land-cover/land-use-land-cover-and-trends-cabo-verde
[70] United States Geological Survey (2010): Groundwater resources of Mosteiros Basin, Island of Fogo, Cape Verde, West Africa
[71] Ministry of environment, housing and territory planning. 2019. National Plan for Agricultural Investment and Food and Nutritional Security - PNIASAN. Praia, Republic of Cape Verde
[72] Cabo Verde National Adaptation Programme of Action (NAPA), available at: https://www.adaptation-undp.org/projects/cape-verde-national-adaptation-programme-action-napa
[73] Several research results show that the water erosion rate on the islands of Santiago and São Nicolau (watersheds scale assessment) exceeds 4,000 t/km^2/year. Ref.: Cabo Verde Hydrology – Studies and Theses– Study in São Nicolau Island, by Olivry, 1987; Soil erosion in Cabo Verde: Study of processes and quantification at three watersheds scale. Doctoral Thesis - Joint Research Unit (UMR) - National Centre for Scientific Research (CNRS)-University of Bourgogne, France; 226, by Tavares, 2010)

for rainfall retention, landfills, vegetable hedges, etc.) for water harvesting and soil conservation. Nevertheless, land degradation and loss of soil quality continue nowadays across the country, taking different dimensions and forms. The island of Santiago is a case in point of the erosion risk endured by the country. In the country's largest agricultural island, over 50% of soils are at around 90% of erosion exposure. Adaptation measures recommended by national strategies significantly rely on ecosystem-based approaches to ensure erosion control and prevent soil loss of soil due to water and wind erosion, leading to environmental catastrophes. Maintaining the vegetation cover by clearing fields after major storms and reforesting activities, and developing the adaptation capacity of forestry production systems are indicated among the most effective actions to undertake.

49. One of the programmatic approaches to combat land degradation was launched as early as in the '70s, when large-scale restoration of degraded land started through afforestation projects. The objectives of the rapid afforestation are soil erosion control, soil moisture retention, infiltration acceleration, biodiversity conversation and the economic aspects[74]. From an agricultural point of view, forests have further ecosystem functions such as providing shelters for crops and protection against natural hazards such as wind and flood damages. The central efforts put into afforestation are now under severe threat due to climate change. The communities seeking for alternative income resources rely on forests, for the management of which they are directly responsible, through agreements signed with the Ministry of Agriculture and Environment. Thus, any decline in forest areas has a spill-over effect on the environment, and, once again, on livelihoods.

50. Its forestry endowment, places Cabo Verde rather at the bottom of the global ranking. With an average value of around 368.7 km^2 along the period 1990-2019, however, the country has been recording a positive increasing trend[75], equaling to 2,400 ha and 4.14% per year[76], mainly thanks to national efforts for reforestation[77]. Forest areas currently represent around 22.07% of land use, covering about 84,000 ha. Despite the harsh condition of the overall environment that reduces the productivity and quality of forestry resources because of the limited density and growth of plants, essential ecosystem services, such as soil protection and regeneration of water resources, are ensured by forests. Furthermore, thanks to its forest cover, Cabo Verde is a net carbon sink.

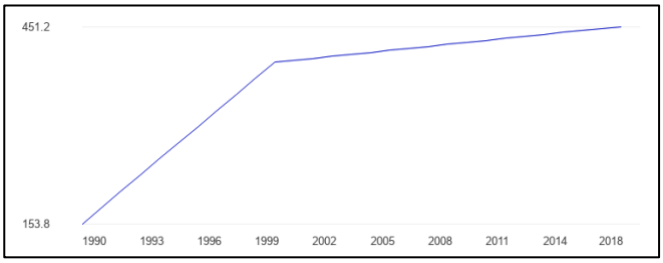

Figure 9: Cabo Verde Forestry historical series (Source: The Global Economy, 2021)

51. Forest-based economy is a valuable input to local economies, mainly driven by wood and non-wood products. Fuelwood, charcoal and fodder share the major part of Cabo Verde forestry economy, which also includes some timber from highlands. The overall production of fuelwood is estimated at around 268,000 tons/year[78]. Enhancing awareness and strengthening stakeholders' capacities on the key role of forests against climate change are hence crucial objectives that well complement the economic considerations over the forestry sector.

Moving beyond the mitigation potential: the adaptation role of forestry in the face of climate change[79]
Forests and trees act at the interface between natural resources and human activities by providing key adaptive nature-based solutions. For this reason, forest and trees have been increasingly addressed in National Adaptation Plans, which outline national climate change adaptation priorities across relevant sectors. Although being originally considered solely for its mitigation capacity, the forestry sector is gaining attention within climate change adaptation strategies. A major reason is due to its vulnerability to climate change, common to any other agricultural subsector. Furthermore, adaptation potential of forests and trees is displayed through the multiple ecosystem goods and service they provide. Finally, and eventually most importantly, forests and trees are increasingly recognized as themselves providers of goods and services supporting vulnerable natural and human livelihoods (e.g. crops, water systems, communities in coastal and mountain landscapes).

Project approach

52. To support communities in climate change adaptation, an integrated approach of natural resource development is required. Such integrated approach relies on two main pillars of increasing storage facilities and installing desalination units downstream coastal wells to augment water resources, and expanding ecosystem services to prevent land degradation and improve groundwater replenishment, with associated benefits for sustainable new businesses. The importance of stakeholder participation and of integration of biodiversity conservation and agroecology in land use decision making and actions are priorities of both the Third National Communication on Climate Change[80] and the CBD strategy of Cabo Verde[81]. By proposing the use of endemic and native species for planting new tree stands and green lining selected slopes, the proposal meets the listed priorities of increasing the resilience of the agricultural sector, also covering different production systems (irrigated and rainfed) and contributing to a desired increase in species diversity. Moreover, the activities directly address the development of resilient management of crops; the integrated and sustainable use of water and irrigation; the

[74] Ibid: https://eros.usgs.gov/westafrica/data-downloads
[75] Cabo Verde: Forest area: https://www.theglobaleconomy.com/Cape-Verde/forest_area_sq_km/
[76] Climate-Smart Agriculture in Cabo Verde: http://www.fao.org/3/ca5405en/CA5405EN.pdf
[77] Cabo Verde Third National Communication to UNFCCC: https://unfccc.int/documents/183071
[78] Cabo Verde 2020 Update to the First Nationally Determined Contribution (NDC): https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Cabo%20Verde%20First/Cabo%20Verde_NDC%20Update%202021.pdf
[79] FAO (2020): Addressing Forestry and Agroforestry in National Adaptation Plans. Supplementary Guidelines
[80] https://unfccc.int/sites/default/files/resource/0136895_Cabo%20Verde-NC3-1-Cabo%20Verde%20-%20Third%20National%20Communication%20on%20Climate%20Change.pdf
[81] https://www.cbd.int/doc/world/cv/cv-nbsap-v2-pt.pdf

management of agriculture, forestry and other land use (AFOLU) through community involvement and a transparent information system, together with training and awareness raising at several levels.

53. These pillars together can have significant contribution to climate change adaptation through the development of the agriculture sector, thus supporting the household food security, the trade balance of commodities, the employment and income generation of communities, the diversification of economy and sustainable use of natural resources, with the goal, ultimately, to support the long-term resilience of the communities. The project activities directly respond to the country priorities defined in the Third National Communication on Climate Change[82], especially to those defined under the assessment of vulnerabilities, adaptation and impacts regarding: (1) water resources, (2) agriculture, and (3) biodiversity. It is in line with the Adaptation Contributions defined by the updated Nationally Determined Contribution, namely with the: (1) improving water security and natural replenishment while reducing water carbon intensity, and (2) increasing and sustaining land-based food security through regenerative agriculture.

54. The project concept involves an integrated, two-fold intervention to build resilience. On one hand, it targets the expansion of water availability through a suite of non-conventional water management structures for storage and desalination; and on the other hand, it incorporates the development of the forestry sector through expansion of soil conservation measures on watershed slopes. These include the expansion of native tree and shrub coverage based on community participation in a context of reinforced institutional capacities to monitor, manage, and display results, while fostering sustainable local business with ecosystem products and services. Such a two-fold intervention is anchored in the holistic approach of climate adapted watershed management. The project intervention is scaled at watershed level not only to allow adopting an integrated approach but leveraging existing adaptation efforts. All too often, lack of integrated landscape perspectives for systemic watershed management and the insufficient coordination of actions have hindered an effective upscaling of successful new or localized solutions. Climate adapted watershed has a further advantage of distributing project benefits amongst communities. The target watersheds include more than 50,000 rural citizens, of which more than half are youngsters above 15 years of age or adults, and more than half are women. The elders do not reach 4,000 elements. Nevertheless, the number of rural households directly involved in, or impacted by the project activities amounts to 16,290. The balanced intervention between upstream and downstream areas enables an inclusive development method, whereas upstream development does not trade off the needs of downstream communities. Due to the diversity of the islands, such intervention is defined by the needs of communities and tailored to local conditions, following a co-management approach to ensure sustainability.

55. Both pillars ultimately contribute to the sustainable expansion of agriculture and resilience of smallholders and forest-dependent communities. To amplify the project impact, activities also address the agricultural supply chain from the recent agricultural practices to the food markets. Beyond the improvement of on-farm water management and garden irrigation, good agricultural practices are established for the main staple crops (maize and pulses) and cash crops (coffee, sugarcane and banana). Sustainability of agricultural production, however, depends on the successive phases of the supply chain, involving post-harvest and marketing activities. Therefore, disrupted food markets require support to supply communities. To enhance the intra-country trade and enable the food markets to uptake and evenly distribute commodities, digital market solutions are provided.

Project area

56. A multi-criteria approach is applied for the pre-selection of target areas, based on: (1) the magnitude of potential project impact; (2) the simultaneous development of staple crop and cash crop production; (3) the leveraging of existing investments and projects regarding water resource, agriculture and forest development; and (4) the resource endowment. The islands of Santiago and São Nicolau are accordingly pre-selected in consideration of the agricultural vocation, the similar socio-economic profile and climate change challenges, as well as priorities indicated during consultations with national stakeholders. Further vulnerability assessments and targeting analyses to be carried out during the development of the full-design proposal will identify the specific areas of interventions in the pre-selected islands and watersheds.

57. The target areas of both islands include mainly two types of habitats: a) arid to semiarid in the lower altitudes and b) semi-humid to humid in the higher altitudes of rougher terrains, in bioclimatic zones identified as Thermotropical -Arid-Euhyperoceanic[83]. While the former can hold sparse to dense woodlands with short trees and shrubs and a variable carrying capacity for grasses in the understory, the latter can host taller and denser forest stands. In addition to rainfed croplands, the woodland zones include many areas complying with the FAO definition of forest and zones where tree density and height is not enough for it to be classified as forest. Nevertheless, such areas correspond to agri-silvicultural systems, used to crop maize and pulses and/or grazing by domestic livestock (mainly goats). At the higher altitudes, where soils are adequate, forests are composed of *Pinus sp. Cupressus sp*, or *Grevillea sp*, among others, with forest fruit trees such as *Tamarindus indica*. Emblematic species *Dracaena draco* and endemic shrubs used for fodder, such as *Euphorbia tuckeana*, are also present. These higher remote areas are the habitat for the highly valued and endangered *Sideroxylum marginatum*. Less expressive costal arid areas include stands of *Phoenix sp*. and *Tamarix gallica*. The target watersheds do not include protected areas.

[82] https://unfccc.int/sites/default/files/resource/0136895_Cabo%20Verde-NC3-1-Cabo%20Verde%20-%20Third%20National%20Communication%20on%20Climate%20Change.pdf
[83] Rivas- Martinez et al. 2017 International Jounal of Geobotanical Reserach Vol. nº 7. 2017. pp. 1-103

58. Santiago communities. The number of agricultural household in Santiago is 18,755, considering also livestock. The estimated direct beneficiaries (11,680) of the project represent 17 communities, namely, Cidade de Calheta, Calhetona, Fonte Machado, Achada Veneza, Serrado, Ribeireta, Casa Branca, Monte Bode, Igreja, Joao Dias, Gongon, Fundura, Serra Malagueta, Ribeirão Manuel, Achada Salineiro, Achada Loura, Ribeira Grande (Cidade Velha). The majority of the population has access to electricity; nevertheless, the great majority of the households have poor access to water and sanitation public network connections. The main source of domestic water are boreholes, municipal water points and streams. Fetching water is a women' and girls' task, and it contributes to gender inbalance in particular regarding time poverty. In regards to cooking, the majority of the household collects firewood as main energy. Likewise, it is traditionally a women' and girls' chore. The intra-house gender relations are imbalanced, with women mainly responsible for the unpaid work. There is also an unbalance at the community level, and women are underrepresented in decision making position in the community-based associations or managing the water facilities. This contributes to gender inbalance affecting negatively women, who share to less power and reduced access to natural resources and productive activities.

59. São Nicolau communities. In São Nicolau rural families account to around 2,132, and the target population, as compared to Santiago, includes less women and more youth. The estimated direct beneficiaries (4,619) of the project represent 14 communities namely Ribeira Brava, Caleijão, Ptchena, Fundo Figueira, Ribeirão, Talho, Pombas, Campinho, Cabeçalinho, Água das Patas, Morro Braz, Bélem and Preguiça. These demographic differences can be explained considering the significant emigration of women who depart looking for jobs in other islands or abroad. This leaves the communities with an increasing demographic gender imbalance and a low fertility rate. Abandonment of land and of agricultural activities is high, with youngsters turning to construction for employment. Some young community members attend formal training for installing photovoltaic and wind energy collection infrastructures. Desalinization equipment is also found, although not always fully functional. There is an evident interest of women for commercial, transformation, marketing and business for agricultural and livestock produce.

Table 3: Characteristics of the selected islands (Source: community consultation, Cabo Verde 2015 Statistical Yearbook)

	Population	Average age	Unemployment rate	No schooling	Agricultural population	Average family size of agricultural population	Average maize production	Forest cover
Santiago	294,135	30,94	9.6%	10.68%	127,731 (43.4%)	5.2	3,486 tons	38%
São Nicolau	12,424	27,27	11.37%	10.25%	9,222 (74.2%)	4.6	177 tons	7%

60. Rural communities are mostly dedicated to rainfed agriculture and livestock breeding and herding. Irrigated agriculture is also present, mostly in the less arid areas of Água das Patas in São Nicolau and Serrado, Ribeirao Manuel, Joao Dias, Fundura, Serra Malagueta in Santiago. The rural economy in the project area is based on family farms, located along the streams. Rainfed farms produce corn, beans (stone, bongolon and congo) sugar cain the main crops, and irrigated farms are dominated by sweet potato, cassava, horticultural products and fruit tree being. Yields are globally low, barely sufficient to provide for the households, and only small portion reaches local markest. The water requirement of crops is slightly above the global average but not extremely high at 5-6,000 m^3/ha. Only small portion (less than 30%) of this is supplied from rainfall in irrigated areas. The effective precipitation represents only a small rate of the rainfall due to the high runoff (lateral flow towards the Ocean), high infiltration and deep percolation through the loamy-sand soils (please see further information in the coming paragraphs). This makes farm water management characterized by informal "deficit irrigation" There is neither monitoring system nor irrigation scheduling in place to assess the efficiency of water use. The full proposal development will include a rapid appraisal to further characterize irrigation gaps. This gap of knowledge will be also addressed through the introduced methodology in Component 3 (please see further information in Chapter A). Communities, and especially women, have a significant experience with tree plantation campaigns and during consultation they confirmed the interest in plant production and plantation activities. Due to the droughts and land degradation, there is a progressive abandonment of agriculture especially among young population and conflicts over water use in the communities are increasingly reported (please see also information in Section H.)

61. Among the entire archipelago, Santiago is the most populated island and the most endowed with agricultural land (23,378 ha of the 38,000 ha of total national agricultural land), and around 42% of the territory is covered by agricultural land. Erosion by water is estimated to be affecting around 37% (36,667 ha) of the island's territory, which is one of the most impacted by the last decades drought, followed by flood in 2020[84]. While the island receives a somewhat sufficient amount of 317 million m^3 rainfall in dry conditions, 41% is lost due to run-off, 47% to evaporation, and as little as 12% infiltrates aquifers. The technically available groundwater is around 20 million m^3, but water tables considerably drop during prolonged drought periods[85]. The island is topographically divided into: (1) upper catchments–significance of groundwater recharge; (2) middle reaches–significance of rainfed agriculture; and (3) lower reaches–significance of groundwater use. Due to the poorly functioning/ underdeveloped water infrastructure, the agricultural drought is predicted to cause over 8 million USD loss of agricultural assets every 10 years in Santiago, carrying one of the highest potential loss nationwide[86]. Due to the density of population as the indicator of investment magnitude, the existing agricultural activities as the indicator of investment potential, and the lack of climate-proof and resilient infrastructure of water management as the indicator of the investment need, the project impacts are expected to be the largest here.

[84] Cabo Verde National UNCCD Report 2014-2018, Ministry of Agriculture and Environment-General Direction of Agriculture, Forest and Breeding, 2018. Document made available by FAO country office
[85] Synthesis by UNDP based on NAPA: Building adaptive capacity and resilience to climate change in the water sector in Cape Verde
[86] World Bank, GFDRR: Disaster Risk Profile. Cabo Verde

62. Ribeira de Charco of Santiago (Municipality of Santa Catarina)[87]. In Santa Catarina, being a rural area, agricultural and livestock represent the main source of income for the majority of families, with households concentrated in the rural areas of the municipality. Data from the latest census show that the predominant labor force in the agricultural sector is women. In terms of labor market, the inactivity rate in Santa Catarina is 46.8%, while the occupancy rate stands at 45.9%, increased by 2.7% from the previous year.

63. Ribeira de Flamengos (Municipality of São Miguel). The main economic activity in São Miguel is agriculture, practiced on a family basis on irrigated properties, essentially along the streams. The majority of agricultural systems, however, are rainfed, with corn, beans (stone, bongolon and congo), sweet potato and cassava being the predominant crops. Mainly conditioned by the limited amount of precipitation, yields are low and productions quite scattered. In terms of labor market, the inactivity rate in Ribeira Brava is 57,5%, with a decrease of about 7% from 2019. The occupancy rate stands at 35.1%.

64. Ribeira Grande of Santiago. Agriculture, livestock and fishing are the main economic activities of this municipality, constituting the livelihood of most families. The agricultural systems implemented are both irrigated and rainfed, with irrigation having a greater incidence in the Ribeira Grande de Santiago Valley, Mosquito de Horta, Pico Leão, Santana, João Varela /São Martinho Grande and São João Batista. In terms of labor market, the inactivity rate in this area is 53.2%, with a rate of youth (15-24) not attending school or unemployed at 36.4%, above the national standard (32.6%).

Table 4: Agricultural potential of target islands[88]

Island	Area (km²)	Agricultural lands (ha)	Rainfed area (ha)	Rainfed crops	Irrigated area (ha)	Irrigated crops
Santiago	991	23,378 (23,6%)	22,121 (90%)	Maize, beans, horticulture, mango, roots	1,257 (10%)	Sugarcane, horticulture, banana, roots
São Nicolau	344.61	1,509 (4,37%)	137.2 (50%)	Maize, beans, mango, almond tree	136.8 (50%)	Sugarcane, roots and tubers, sweet potatoes, banana, horticulture crops

Table 5: Land use/Land cover of target watersheds (ha)

Land use Land cover	Santiago			São Nicolau
	Flamengos	Charco	Ribeira Grande	Ribeira Brava
Forest land	460	275	640	250
Cropland	1926	1608	270	387
Grassland	490	980	454	110
Settlement	60	48	80	98
Other lands	80	180	78	89
TOTAL	3016	3091	1522	934

65. The island of **São Nicolau** has a tropical, dry climate, despite being one of the rainiest islands of the archipelago (351,846 m^3). The intensity of rain drives the high susceptibility of the island to rainfall-driven landslide hazards, which in 2009 culminated into a severe event when 3 people died and damages to structures were broadly reported. Around 14,835 ha, corresponding to 43% of São Nicolau's territory, is subject to erosion induced by run-off, and 16,215 ha, or 47%, to degradation. Listed among the mountainous islands, São Nicolau has a fair share of irrigated areas (50%) and its economy is significantly relying on agriculture. The limited water availability from rainfall, however, represents a significant constraint to the full development of the sector and, ultimately, of the socio-economic conditions in the island. Despite the limited monitoring capacities, data available from the operating meteorological stations have recorded, between 1981 and 2017, 4 dry years (1986, 2005, 2008 and 2011), and 9 very dry years (1981, 1982, 1983, 1984, 1985, 2003, 2012, 2104 and 2017), corresponding to about 42% of the considered period. Although rainfall series show high irregularity, the island has generally been experiencing one dry or very dry year every two[89]. Its exposure to natural hazards makes São Nicolau one the most vulnerable islands of the archipelago to different natural extremes. Amongst these, drought represents a considerable threat to the agricultural vocation of the island, with average agriculture income loss estimated between 2 and 4 million USD per year. Similarly, São Nicolau is highly exposed to flash floods, caused by the presence of only small-scale catchments with rivers at low-lying areas, which get quickly flooded during rainfall events. While floods are indicated as the most impactful risk for the entire country, it can be expected that agricultural drought will result particularly harmful to the socio-economic growth of São Nicolau, hence further increasing the already-significant level of poverty in the island[90].

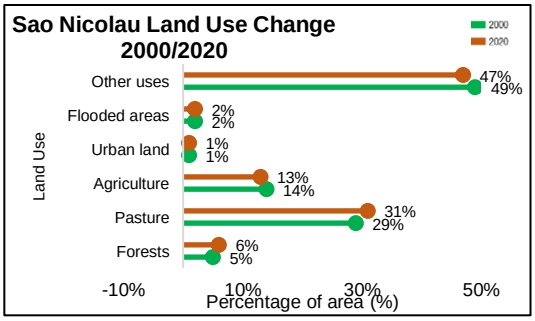

Figure 10. São Nicolau Land Use, Land Use Change, and Forestry (LULUCF) – 2000/2020 (Source: elaboration from presentation of REFLOR-CV project)

66. Ribeira Brava of São Nicolau. In the island of São Nicolau, the city of Ribeira Brava is settled in a deep valley, bordered by abrupt rocky hills in a rough topography area. Its name, "The wild stream", indicates that the impetuous, dangerous, fast

[87] Watersheds/Municipalities data and figures source: Instituto Nacional de Estatística – Cabo Verde Estatísticas do mercado de trabalho 2020 and CV local FAO office sources based on socio-economic profiles of the local communities in the selected target areas
[88] Monteiro, Filipa, Arlindo Fortes, Vladmir Ferreira, Anyse Pereira Essoh, Isildo Gomes, A. M. Correia, and Maria M. Romeiras 2020. "Current Status and Trends in Cabo Verde Agriculture" Agronomy 10, no. 1: 74. Available at: https://doi.org/10.3390/agronomy10010074
[89] Government of Cabo Verde: Estudo e Calculo da disponibilidade hídrica nas ilhas de Santiago e São Nicolau. Fevereiro 2019. Document made available by the FAO country office
[90] World Bank, GFDRR: Disaster Risk Profile. Cabo Verde

running waters and floods of raining epochs are not recent features. The municipality has a strong agricultural vocation, deployed in both rainfed and irrigated systems. Of the arable areas, a significant majority is located on slopes and small plots on finds and streambeds. Irrigated crops are mostly cultivated in small plots, mostly maize and beans, and dispersed in horticultural systems including sugar cane (about 2/3 of the cultivated area), banana, root vegetables and tubers.

67. In terms of labor market, the inactivity rate in Ribeira Brava is 49.7%, with the lowest record of underemployment in the country, at 2.5%. The rural communities of this municipality are mostly dedicated to rainfed agriculture and livestock breeding and herding. Irrigated agriculture is also present, mostly in the less arid areas of Água das Patas and Campinho, which are alike the neighboring and more humid municipality of Fajã.

Table 6: Distribution of communities in Ribeira Brava by agricultural activities (Source: community consultation)

Rainfed agriculture	Irrigated agriculture	Livestock breeding	Aquaculture associated with agriculture	Forestry
41%	14%	44%	0%	1%

68. Rural households in the target islands confirmed being exposed to similar weather and environmental challenges, including low precipitations, high-density torrential rains, prolonged droughts, reduction and modification of growing seasons. The development of water storage capacity and the improvement of efficient irrigation infrastructure are generally indicated as the mostly needed adaptation interventions, to improve access to resources and promote crop diversification as means to enhance families' food security and increase commercial opportunities. Through the implementation of a composite water harvesting/land restoration approach, the project will address the main vulnerabilities exposed by climate change and will foster the development of climate-resilient water and land management systems. The design of an integrated watershed information system, moreover, is expected to build an enabling environment for informed decision-making, while activities in support of the agricultural supply chain will deploy climate-smart production for the increased resilience of communities.

Table 7: Social and biophysical characteristics of target islands/watersheds (Source: indicators obtained with ILWIS software. INIDA, GeoSpatial LAB, 2001)

Island Name	**Santiago**			**São Nicolau**
Municipality Name	Ribeira Grande de Santiago	S. Catarina de Santiago	São Miguel	Ribeira Brava
Watershed Name	Ribeira Grande	Ribeira de Charco	Ribeira de Flamengos	Ribeira Brava
Area (km^2)	15.22	30.91	30.16	9.37
Total drainage length (km)	4.39	8.29	6.63	2.67
Longest flow path length (km)	1.83	1.56	1.95	8.13
Longest drainage length (km)	1.77	1.48	1.91	7.49
Outlet coordinate (UTM)	204041.97 / 33467.12	187001.97 / 49177.12	205941.97 / 56427.12	131510.96 / 216970.06
Outlet elevation (m)	2.0	4.0	2.0	0.0
Longest flow upstream elevation (m)	950	530	934	881
Longest drainage upstream elevation (m)	838	478	637	599
Drainage density (m/km^2)	2888.15	2682.74	2200.23	2181.90
Total drainage length (m)	43,971.20	82,916.00	66,364.10	7,527.80
Perimeter (km)	32.97	31.40	36.66	17.25

Consultation meetings in Santiago and São Nicolau held between 5 to 14 July 2021

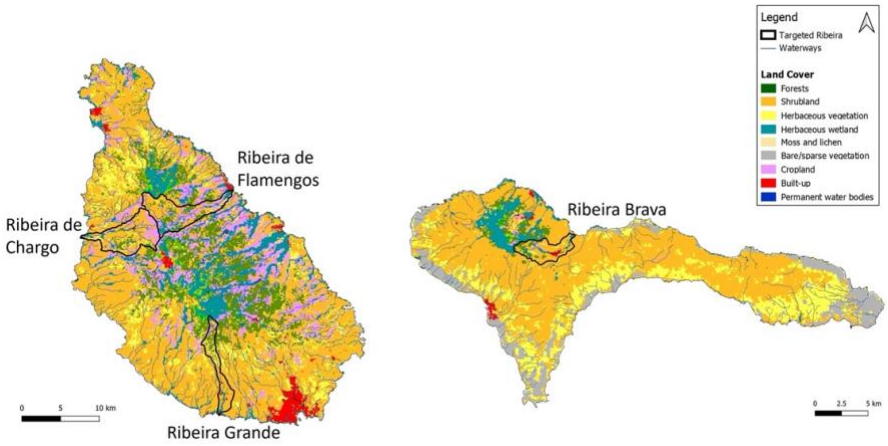

Figure 11. Land cover maps of target watersheds (Santiago, on the left, and São Nicolau, on the right)

Aftermath of COVID-19 on project selected target islands

Santiago

Having the greatest agricultural potential, the island of Santiago has proved very vulnerable and suffered from a significant reduction in the agricultural production and a significant increase in food prices due to the COVID-19 restriction measures. Restrictions to movement led to a reduction in farmers' access to markets and agricultural fields, hence agricultural work carried out through farmers' mutual assistance slowed down and led to a reduction in production capacity resulting in:

- General disruption of agricultural supply chains to markets due to the lockdowns and disruptions in movement
- Significant losses in agricultural income of rural households
- Price variability and disruptions in food value chains due to shortages related to reduced agricultural production
- Disruption of agricultural products transportation and access to the main markets of Assomada and Praia
- Reduction of people's access to a diverse and nutritious diet.

During the consultation meetings with the communities in the island of Santiago, the community members indicated the losses of their agricultural production capacity, already weakened by the drought, to the impacts of quarantine measures taken during the COVID-19 pandemic. The decline in agricultural production activities particularly affected poor and extremely poor families, concentrated in areas close to the watersheds, especially the ones located furthest from the central markets for agricultural products. In general, consultees expressed their grave concern that COVID-19 aggravated the unemployment mainly affecting young women.

São Nicolau

During the consultations process in São Nicolau, communities made little reference to COVID-19. The decrease of employment availability (especially for the female population, more oriented to services) and the growth in prices of food and animal feed were mentioned as a consequence of the pandemic. Civil society organizations, official entities, and private sector representatives, especially from hostels and restaurants services, mentioned the shutdown of tourism as an implication of COVID-19. At the time of consultation (July 2021) there were no reported cases and the island proved comparatively safe from the virus. The pandemic's impacts are mostly economic and driven by external factors. Women appear particularly affected as employed in services and sent back home for non-paid domestic chores (the elder) or reverting to emigration (the younger).

A. Project Objectives

69. The overall objective of the project is to build adaptation resilience through improved water management and land restoration that would further facilitate climate-adaptive agricultural activities. This will be achieved through the three components listed below in a 5-years project implementation period. The project involves an integrated, two-fold intervention to build agricultural resilience. On one hand, it targets the expansion of the national water storage capacity through a suite of non-conventional water management structures; and on the other, it incorporates the development of the forestry sector through reforestation and afforestation with suitable wooded species and exploitation of the forest ecosystem products and services. Such a two-fold intervention is anchored in the holistic approach of climate adapted watershed management, which responds to the vertical and horizontal needs of the distinct areas of the catchments, including upper, middle parts of the catchment and the flat, low-lying zones.

70. The project intervention is scaled at watershed level not only to allow adopting an integrated approach but leveraging existing adaptation efforts. All too often, lack of integrated landscape perspectives for systemic watershed management and the insufficient coordination of actions have hindered an effective upscaling of successful new or localized solutions. Climate adapted watershed has a further advantage of distributing project benefits amongst communities. The balanced intervention between upstream and downstream areas enables an inclusive development method, whereas upstream development does not trade off the needs of downstream communities. Due to the diversity of the islands, such intervention is defined by the needs of communities and tailored to local conditions.

71. The first objective of the project approach is the increase of water availability through enhanced water storage and increased unconventional water to supply agriculture with increased amount of surface and groundwater resources, thus building the adaptive capacity and improving agricultural productivity. As the country is scarce of renewable water resources, despite local experience with soil conservation measures, and the run-off has been yet little exploited, the project activities involve non-conventional water management techniques. The selection of techniques depends on the site conditions, whichever

best suits the geographical, technical, environmental, socio-economic, and agricultural productivity and profitability criteria. Water harvesting methods are proposed both at macro-catchment and micro-catchment levels to store and utilize rainfall and run-off. Although conventional naming of water harvesting structures distinguishes macro and micro-catchment technologies, macro structures are not to coincide with large-scale infrastructure. They are called 'macro', because they act at system level but are designed at small-scale level in the project context. Due to the lessons-learnt from the past large-scale dam constructions, the project promotes small-scale infrastructure that are manageable directly by communities. The macro-catchment structures involve small-scale surface check dams and reservoirs to store water and recharge groundwater through infiltration in gently sloping areas, Jessour[91] system to intercept high-discharge run-off and retain water in mountainous areas, and cut-off drains to re-direct water to agriculture use in flat areas. The micro-catchment methods involve in-situ water harvesting techniques at farm level (pits, ridges, bench terraces, etc.) and tanks for gardening. Finally, taking into account similar interventions applied in the country elsewhere from target areas, desalination units are proposed to address the seawater intrusion, particularly evident in drier seasons. Groundwater is recognized as a fundamental natural resource for the country, but the growing use of it, and saltwater intrusion and contamination of coastal aquifers, demand adaptive solutions for the sustainable management of these strategic reservoirs. Ensuring both a fair access to water and a sustainable use, is a key objective of the present proposal, to be achieved through the reduction of water losses and the increase of desalinization. Water mobilization, including the employment of desalinated water for agriculture and the use of renewable energy for water pumping, is indicated as a key action in the PNIASAN, while the Updated NDC 2020 indicates desalination as a valuable activity under adaptation contribution #1: Improving water security and natural replenishment while reducing the water carbon intensity.

72. The second objective of the project is the land restoration through afforestation and vegetation cover. The purpose of forestry-based land restoration is to prevent land degradation, improve soil moisture and retention capacity, increase infiltration, protect productive assets and ensure sustainable forest and woodland management. Large-scale afforestation projects have been on-going for long time, however, the adaptation function of forests requires further improvements, such as reverting the monospecific exoctic coverage (mainly *Prosopis juliflora*) with the plantation and management of diversified compositions in adequate watershed locations. For this, prior experience with endemic and native species[92], as well as with suitable fruit and fodder species in similar agroecological conditions will be leveraged and the good practices scaled out to harvest benefits of forest ecosystem services. Thus, land restoration will also reinforce biodiversity conservation objectives in Cabo Verde[93] and will provide sustainable agroecologic solutions with re-naturalization of bare areas surrounding agricultural lands, for instance with the plantation of native *Faidherbia albida (syn. Acacia caboverdeana)* in semi-arid areas. Similarly, plantation of well adapted tree species, such as *Grevilia sp*, *Pinus canariensis*, or *Cupressus sp*, or installation of the endangered endemics *Sideroxylon maginatum* and *Dracaena draco* in semi-humid and humid areas at higher altitudes will be promoted. To protect the forests from illegal wood harvesting, capacity-building related activities are implemented in forested areas to support the better use of forest ecosystem products (non-timber forest products, such as foods and bioproducts for pharmaceuticals and personal care). Additionally, pigeon-pea terraces have been piloted in several islands to act as natural green belts and runoff barriers, proving to be effective to prevent soil erosion, reduce runoff and control desertification through maintained surface cover. Aloe Vera interventions are proposed to be employed to complement soil conservation and water retention structures and barriers, which may hold trees and rainfed crops or horticulture and fruit trees (such as mango), especially when closer to water lines in deeper soils. For land restoration purposes, greenbelts and re-naturalization of surface are proposed in bare areas surrounding agricultural lands. To protect the forests from illegal logging, capacity-building related activities are implemented in forested areas to support the better use of forest ecosystem products (non-timber forest products, such as foods and bioproducts for pharmaceuticals and personal care).

73. Both objectives ultimately contribute to the sustainable expansion of agriculture and resilience of smallholders and forest-dependent communities. To amplify the project impact, activities also address the agricultural supply chain from the recent agricultural practices to the food markets. Beyond the improvement of on-farm water management and garden irrigation, good agricultural practices are established for the main staple crops (maize and pulses) and cash crops (coffee, sugarcane and banana). Sustainability of agricultural production, however, depends on the successive phases of the supply chain, involving post-harvest and marketing activities. Therefore, disrupted food markets require support to supply communities. To enhance the intra-country trade and enable the food markets to uptake and evenly distribute commodities, digital market solutions are provided.

74. The overall project design is outlined along 3 components aligned to AF result framework, namely:

- Component 1: Building an enabling environment for informed and integrated watershed management to support the planning of adaptive development. This component aligns to AF Outcome 1, Outcome 2, Outcome 3 (Indicator 3.2), Outcome 4 (Indicator 4.1), Outcome 8;
- Component 2: Improving water storage capacities and promoting land restoration to build resilience of land farming communities. This component aligns to AF Outcome 4 (Indicator 4.2), Outcome 5, Outcome 6;

[91] Jessour (plural of Jesr) are water harvesting techniques, traditionally used in dry and water-scarce areas to grow crops and small fruit trees. They consist in a succession of small dams, built across gullies and along slopes, that partially retain surface water and sediments and allow the cultivation of crops beyond their climatic zone
[92] Vasconcelos et al. 2022 REFLOR-CV Adaptation of local communities to the impacts of climate change in Cabo Verde through restoration of wooded areas. 10pp
[93] CBD Strategy and Action Plan – Cabo Verde https://www.cbd.int/doc/world/cv/cv-nbsap-v2-pt.pdf

- Component 3: Supporting agricultural supply chain to improve climate-smart production, food security and livelihood of vulnerable communities. This component aligns to Outcome 1, Outcome 3 (Indicator 3.1 and 3.2) 4 (Indicator 4.1), Outcome 6 (Indicator 6.2), Outcome 8.

B. Project Components and Financing

Project Components	Expected Outcomes	Expected Outputs	Amount
1. Building an enabling environment for informed and integrated watershed management to support the planning of adaptive development	1.1. Climate-informed decision-making and planning in integrated watershed management through increased capacities of water storage and desalination potential	1.1.1. Climate, topographical, hydrological, vegetation cover and agricultural features of involved islands surveyed, and spatial dataset compiled and harmonized with the MAA information system 1.1.2. GIS-based spatial analysis for the identification of water harvesting/desalination potential and for suitability assessments of potential plantations prepared 1.1.3. Automated and computerized information system for the identification and prioritization of water harvesting/desalination sites developed and calibrated 1.1.4. Capacity-building for relevant authorities and stakeholders on the use of Water Harvesting/Desalination Information System (WATHDIS) carried out, and on registering, archiving, and retrieving georeferenced data on forestry interventions, harmonizing and integrating data with the MAA information system carried out	1,250,000
2. Improving water storage/desalination capacities and promoting land restoration to build resilience of farming communities	2.1. Increased water harvesting and desalination capacities through sustainable development of climate-resilient water management	2.1.1. Catchment structures to conserve, promote infiltration, and distribute surface runoff (check dams and reservoirs in flat areas and *Jessour* systems in mountainous areas) to harvest rainfall and run-off deployed 2.1.2. Cut-off drains to divert water from storage to agricultural lands developed 2.1.3. Micro-catchment structures (in-situ water harvesting techniques in arable lands, and tanks and cisterns in gardens) to harvest rainfall at farm level deployed 2.1.4 Site-specific desalination units downstream coastal wells as adaptation to seawater intrusion during extreme dry periods developed.	5,500,000
	2.2. Improved land restoration through re-naturalization and afforestation of degraded lands	2.2.1. Protective afforestation practices (greenbelts, tree plantations, woodland conservation and windbreakers) implemented in specific sites to improve the replenishment of groundwater 2.2.2. Revegetation (expansion of green cover and green lining, mainly with wooded species, and optionally with herbaceous coverage in erosion-prone areas implemented 2.2.3. Capacity-building programmes on participatory management of water structure and land restoration delivered	
3. Supporting agricultural supply chain to improve climate-smart production, food security and livelihood of vulnerable communities	3.1. Improved climate-smart production through resilient agricultural practices and sustainable livelihood diversification	3.1.1. Good agricultural practices (GAP), including climate-smart practices (CSP) of main crops to improve resource use efficiency, productivity and resilience established 3.1.2. Combined GAPs and CSPs piloted and demonstrated in pilot farms and scaled out to communities to strengthen climate resilience at scale 3.1.3. Forest ecosystem products as diversified and sustainable production method identified and introduced 3.1.4. Exchange visits between watershed beneficiaries to improve farmers' knowledge on GAPs and CSPs, and forest products organized 3.1.5 Knowledge management framework to promote climate resilience in agriculture and natural resource management established	1,589,055
	3.2. Enhanced livelihood of vulnerable communities through enhanced and digital access to food markets	3.2.1. Central information system on food markets, farming, and forest products established and integrated into governmental database 3.2.2. Early forecasting mobile application developed to facilitate production, diversification, commercialization, and decision-making 3.2.3 Capacity building programmes on information system and application operation to further strengthen access to markets and alternative income resources	
4. Sub-total Project Activities			8,339,055
5. Project/Programme Execution cost (max 9.5% of total Project Cost – point 7 below)			875,930
6. Total Project Cost			9,214,985
7. Project Cycle Management Fee (max 8.5% of Total Project Cost)			783,243
Amount of Financing Requested Total project costs + FAO Project Cycle Management Fee)			**9,998,228**

C. Projected Calendar

Milestones	Expected Dates
Start of Project/Programme Implementation	01-2023
Mid-term Review (if planned)	03-2025
Project/Programme Closing	12-2027
Terminal Evaluation	03-2028

PART II: PROJECT JUSTIFICATION

A. Project components

75. The project will promote climate-resilient ecosystems through improved water management and land restoration for adaptive agriculture and, ultimately, enhanced food security in the face of climate change. According to climate change scenarios, the most evident effects will correspond to the increased intensity and frequency of drought, and the enhanced unreliability of rainfall, with more intense, more frequent and shorter events. As such, the impacts on water and land resources will be particularly evident, with restricted availability and depleted quality. Mainstreaming climate change adaption measures is hence a strategic need for Cabo Verde, to reduce the most adverse impacts on livelihoods.

76. Agricultural production and food security, together with human health, are at stake, constrained by the effects on the already limited endowment of land and water resources. Therefore, deploying adaptive solutions across spatial, institutional and social frameworks is a necessity thoroughly indicated in the most relevant national strategies on climate change, which outline, on one side, the need to invest in effective and innovative solutions for land and water management for agriculture, while on the other, call for the improvement of technical and institutional capacities of both national and local actors and communities to address the ever more evident threats and increase the sustainability of human and natural ecosystems. The 2015-2030 Nationally Determined Contribution, in the specific, focuses its adaptation actions along strategic axes, including the promotion of integrated water resources management and the enhanced adaptive capacities of agro-sylvo-pastoral production systems.

77. The project design builds on the recognition that water management in national history only dates back to a few decades ago, with strong technical and institutional expertise still under improvement. Conversely, such recent experience paves the way for the full exploitation of potential in water management, particularly in the face on increasing climate change-driven challenges. The employment of renewable resources is rather at infancy stage, predominantly in agriculture and irrigation. The provision of water infrastructure, e.g. dams and water storage facilities, exemplifies existing limitations, mainly due to knowledge and technical gaps. Project activities take into account the need to establish an enabling environment allowing to build up the critical knowledge of public and private institutions, also through the provision of an adequate institutional setting. To this scope, Output 3.5.1 illustrates the creation of an umbrella knowledge management program for the coordination and monitoring of project results and the up-take and scaling up of lessons learned, which will enable stakeholders to perform their roles effectively.

78. To respond to the diverse challenges of livelihoods and address the gaps highlighted by national and sub-national policy, the proposed project is formulated using a participatory approach, to ensure communities' needs are effectively responded to and effective measures are accordingly mainstreamed at higher levels. The bottom-up approach applied in the project design, stemming from the recognition of the diverse needs voiced through communities' consultations, is identified as an effective framework to ensure its scalability and sustainability. To this scope, capacity development and knowledge sharing activities are included across components and final beneficiaries, to be identified in detail in the fully-developed proposal, are indicated at different levels.

79. Project's components display a flow of activities that serve complementary adaptation objectives, while at the same time proposing bi-directional implementation modalities so that some activities build onto each other and outcomes reinforce each other's impacts. In first place, the project sets the conditions to establish an enabling environment for the integrated management of resources at watershed scale and activities are designed to effectively inform decision-making, as well as planning and development of water storage facilities, soil conservation measures, and plantation activities. In line with the objective of strengthening communities' resilience, the improvement of water storage capacity and the enhancement of water availability are thus addressed through the deployment of water harvesting and water desalination solutions, while land and soil degradation trends are tackled via the expansion of green cover and afforestation, across suitable agroecological conditions. Finally, improvements along the food value chain are promoted, from the introduction of strengthened agricultural practices at production level, to the development of digital tools at distribution level to improve supply/demand exchanges.

Component 1. Building an enabling environment for informed and integrated watershed management to support the planning of adaptive development

80. Rationale: The development of the agriculture sector faces an overall scarcity of natural resources in Cabo Verde. However, the existing potential of water storage and unconventional water resources is yet to be exploited. The objective of the component is to build an enabling environment for the climate-informed planning and decision-making in integrated watershed management. Such planning and decision-making mechanisms are supported and geared towards the development of water resources through a high-rigor assessment and prioritization of water harvesting sites and desalination units. Due to date, there is no comprehensive, multi-criteria-based assessment of water harvesting sites, while scattered information are available for desalination points. Therefore, the component starts with the activity of collecting, collating and compiling relevant datasets to support the assessments. The types of datasets extend to climate, topographical, hydrological, quality, and agricultural features that form the basis for the identification and analysis of sites. Based on the compiled dataset, a multicriteria assessment (MCA) methodology is developed to provide a spatial analysis of water harvesting/desalination sites, likewise, to enable informed decision-making on the investment in increased storage facilities and desalination units. Apart from the water harvesting and unconventional resources potential, the proposed layers of spatial analysis support the information generation on climatic, environmental and agricultural particularities, thus providing a multifunctional tool for spatial assessments and for supporting the registration and monitoring of reforestation and afforestation interventions. To enhance the consistency of future investments, the methodology is set to be automated and developed as online application, called "Cabo Verde Water Harvesting and Desalination Information System" (WATHDIS). A capacity-building programme is designed for two levels of stakeholders: technical sessions for water, forestry, environmental and GIS professionals of relevant authorities to acquire knowledge on the use, operation, maintenance and calibration of WATHDIS and of other spatial data analysis tools adequate for land use and land cover management; policy-making sessions for decision-makers to improve understanding of the results and mainstreaming results into national planning of adaptive development.

81. Identified intervention needs: The dispersed and diverse geography of Cabo Verde currently represents a key constraint to the development of the full potential water resources and related potential. Overcoming this limitation requires the

elaboration of an integrated analysis and planning information system combining field calibrated/validated datasets and high-resolution satellite imagery. The project will thus carry out spatial analyses to collect relevant data in Santiago and São Nicolau and compile integrated datasets, to be later validated at target areas level. Field data will thus be combined with GIS-based spatial analyses to produce a comprehensive information system that will serve as a digital Decision-Support System (DSS) for the definition of water harvesting and water desalination sites and for monitoring and managing reforestation and afforestation activities. The ownership of the Water Harvesting/Desalination Information System will be ensured by the conduction of capacity development activities for stakeholders at national and municipal levels. Component 1 directly addresses the need for an integrated planning and decision-supporting system to guide the definition of sites for water storage and desalination, and for the wise allocation of vegetation solutions, ultimately increasing the water availability in target areas.

82. Outcome 1.1: The outcome of the component is "Climate-informed decision-making and planning in integrated watershed management through increased capacities of water storage and desalination potential".

Outputs: Based on the rationale and identified interventions needs, the following outputs are proposed under the Outcome 1.1:

1.1.1. Climate, topographical, hydrological, vegetation cover and agricultural features of involved islands surveyed, and spatial dataset compiled and harmonized with the MAA information system
1.1.2. GIS-based spatial analysis for the identification of water harvesting/desalination potential and for suitability assessments of potential plantations prepared
1.1.3. Automated and computerized information system for the identification and prioritization of water harvesting/desalination sites developed and calibrated
1.1.4. Capacity-building for relevant authorities and stakeholders on the use of Water Harvesting/Desalination Information System (WATHDIS) carried out, and on registering, archiving, and retrieving georeferenced data on forestry interventions, harmonizing and integrating data with the MAA information system carried out

Component 2. Improving water storage/desalination capacities and promoting land restoration to build resilience of farming communities

83. Rationale: The component involves structural and non-structural measures to augment water resources and reverse long-standing environmental degradation. Due to the low level of renewable freshwater resources, the design of the first outcome incorporates a suite of non-conventional water sources, adapted to local particularities. It addresses the water scarcity through increased water availability and improved access to the stored water. Macro-level and micro-level structures are combined to reinforce the impacts. Around the agricultural lands in flat areas, such as valleys and hilly stages, small-scale surface dams and reservoirs are proposed to capture run-off and store it for drought-prone periods.

84. In mountainous and hilly areas, Jessour-type systems are planned to slow down the high-discharge run-off, retain water, protect areas from flooding and divert water to agricultural lands in the islands of São Nicolau and Santiago. To support the country efforts in securing groundwater resources, the constructed storage facilities are designed as earthen structures. The controlled infiltration provides a natural recharge of aquifers. As high potential sites for water storage development are not directly in the proximity of agricultural lands, cut-off drains are constructed to convey water to the lands. As result, the water loss through conveyance can be minimized, and water can be controlled throughout the irrigation period. In order to support the development in arid areas in all islands, whereas system-level structures are less effective, micro-catchment structures are proposed or combined with macro-catchment structures. Such micro-structures involve in-situ water harvesting techniques (i.e. pits, ridges) in agricultural lands producing staple and cash crops. The Component, thus incorporates interventions at both system and on-farm levels. The aim of operating at both levels via the interaction between Component 2 and 3 is to reinforce the impacts of each other. Also, it is paramount to move farmers away from the role of "passive" recipients of water infrastructure, and strengthen their ownership. Linking system level structures to farm level structures, and on-farm production under Component 3 increases the understanding of efficient water management in both rainfed and irrigated farms. Augmented surface water resources also reduces the pressure on groundwater resources, as farmers will have access to sustainable water sources over an extended period of time. Availability of surface water entails socio-economic gains, as cost of gravity-fed water conveyance is substantially lower than lifting and desalinating groundwater.

85. Complementary to the increase of water availability granted by enhanced water storage capacities, the installation of solar-powered desalination units, located downstream of coastal wells, will provide additional adaptive solutions for irrigation, in line with main climate change adaption strategies. In lack of alternative resources, farmers in irrigated areas vastly rely on saline groundwater. Continuous access to surface waters cannot be guaranteed though, therefore, the complete suspension of groundwater use would compromise the yields. Desalination technology, however, is inaccessible and unaffordable for smallholders. In general, high energy cost of irrigation and desalination technologies is the main constraint to develop water resources in Cape Verde. The merit of the small, plug&play unit is its inexpensive, decentralized nature. As the desalination unit is an auxiliary device on the pipe, the process requires additional pressure, thus energy use per unit of pumped water increases. To avoid any incurred cost that would jeopardize farmers' income, and to ensure that all farmers have equal access to water for irrigation, solar-powered units are proposed, as the cheapest solution for improving their resilience. Solar-powered units not only minimize the cost of desalination but the plug-in systems provide a combined configuration of desalination and pumping, replacing the existing, traditional energy source (diesel or grid connection) with renewable

energy. This innovative intervention is also in line with the national efforts defined in the National Energy Targets to contribute to the goal of achieving 50% renewable energy in total electricity production. The installation of different size off-grid desalination units, ranging between 5,000 to 40,000 liters/day of water production, will deploy containerized solutions to sustainably produce clean water by consuming 70% less energy than conventional desalination technology. The plug&play system of desalination units allows the decentralized production through compact and easy-to-install working units, without the downsides of conventional desalination plants. In order to ensure the sustainable use of groundwater resources and the effective recharge-withdrawal balance, wells will be equipped with real-time multimeters, including water level and conductivity measurement functions. The second outcome of the component addresses the land degradation associated to multiple factors.

86. Forests and woodlands have multiple benefits beyond soil stabilization and conservation potential, such as increased water retention and infiltration capacity of soils, prevention of soil erosion in particular gully expansions, protection of agricultural lands from wind, control of evapotranspiration through shading and natural barriers of pest and weed infestation. Additionally, they are sources of rural sustainability by providing renewable products for subsistence and business as well as social and cultural amenities. Thus, soil conservation measures, afforestation, reforestation, and woodland conservation are considered as relevant vehicles for the sustainability and improvement of the country´s natural capital. Land restoration is achieved through two main interventions. The first targets soil conservation measures, such as (re)construction of terraces, barriers, and half-moon structures by local communities, and the second corresponds to the production and plantation of endemic, native, forest fruit trees, and shrubs, which are installed in selected slopes with adequate agroecological conditions. The results of these practices gradually demonstrate that the historic blanket plantation of monospecific *Prosopis juliflora* stands in arid and semi-arid areas, with associated invasion of arable lands and water lines, can be avoided or replaced. In areas where the plantation of tree and shrub stands is not possible, other protective afforestation practices are proposed, such as greenbelts, woodland conservation and windbreakers around arable lands of Santiago and São Nicolau. Where afforestation is not feasible due to the topographical features, re-vegetation practices are introduced, building on the nurseries[94] and plant production sites established in all of the islands. Both target islands naturally have adequate conditions for the establishment of nurseries and the selection of plants would be conducted in consultation between communities and the Ministry of Agriculture, as per standard practice in place. Under the REFLOR-CV projects, several farmer associations were formed to conduct plant production, soil conservation, plantation of trees and shrubs and follow-up in Santiago, and similar sound conditions exist in the 3 targeted watershed. Similarly, in São Nicolau, training communities would prove successful to establish nurseries where the most favorable conditions allow[95]. Such practices aim at the expansion of green cover with suitable tree species (including the endemic island flagship species: *Dracaena draco*, which is considered endangered in the IUCN Red list) and green lining with climate-resilient plants (i.e. pigeon pee cultivation). The expanded vegetation cover provides multiple benefits, such as soil conservation, prevention of soil erosion, soil moisture retention and alternative income source for farmers (i.e. fodder). In areas with less cropping potential, such re-vegetation is also crucial to support other agricultural activities, such as livestock production. Replicating the practices existing nurseries and plant production sites already established in all of the islands and on prior various plantation experiences under the REFLOR-CV project, native and forest fruit trees, such as *Faidherbia albida (syn. Acacia caboverdeana)* and *Tamarindus indica* respectively and endemic shrubs, such as *Artemisia gorgonum, Globularia amygdalifolia,* or *Euphorbia tuckeana* will be produced and installed in adequate locations. Likewise, well-adapted tree and shrub species, such as *Pinus canariensis* or *Cupressus sp* will be considered in higher altitudes along with the Red List endangered endemic *Sideroxylon marginata*.

87. Natural resource management, in particular water resource management, is governed under a rather flat management system in Cape Verde due to the overall resource scarcity. Past experiences on irrigation infrastructure development show that further capacity-development is required to make the water sector highly-performing and in line with sustainable development. Lessons learnt from previous national experiences on water resource development will be thoroughly reviewed and presented in the full project proposal. Under the Ministry of Agriculture and Environment, the Agência Nacional de Água e Saneamento (ANAS) is the governmental institution responsible for the implementation of governmental policies on integrated water resource management. A more specialized agency is the Direcao Nacional da Ambiente (DNA), who is responsible for agricultural water management. As coordinating bodies, ANAS and DNA transfer the management responsibility (right of service provision, right of operation) of surface water infrastructure to public-private entities at island level, who are responsible for the financial management, service provision to end-users, and operation and maintenance (O&M) of infrastructure. The two entities involved in the project are ADS in Santiago and Electra in São Nicolau. The groundwater management remains under the direct responsibility of ANAS. The four organizations will be responsible for the management of water resources developed under the project (please see further information about the institutional and financial arrangement sunder Section J.). Irrigation development is a relatively small sector compared to water utilities, therefore, its institutional framework is yet in its kick-off stage. This might have an impact on the cooperation mechanism between farmers and water institutions, which can result in imbalanced expectations between supply and demand sides. In other words, farmers should not be encapsulated in a service recipient role. Nevertheless, the potential of system-level improvement can be exploited only if farmers are better integrated into the water sector. To overcome any institutional flaw

[94] It should be noted that by "nurseries" the proposal intends to refer to seedling nursery, leveraging on the ongoing experiences, to protect the country's natural heritage and promote the reproduction of endemic plants.
[95] At this stage, potential sites could include the villages of Faja, Belém, and Cachaco. The conduction of a comprehensive targeting analysis during the full-design proposal will allow a clearer selection of potential beneficiaries

and the need for knowledge accumulation, the project involves specialized capacity-building activities with dedicated knowledge products and publication outlets. To convert institutional development into a more participatory framework and to provide a harmonious development at all levels, the project also includes an output on knowledge management, acting as a programmatic umbrella mechanism to coordinate institutional and human resource development (please see further information about this output under Outcome 3.1.). This will also create a ground for enhanced participatory management by providing insight into the management functions for farmers.

88. Identified intervention needs: The development of water storage and desalination facilities, and scale-out and expansion of the functions of forests and vegetation cover are top priorities of the national climate change and adaptation strategies. Efforts have been put into the augmentation of water resources to eliminate the risk of water scarcity and reduce the pressure on groundwater resources. Consultations in both islands have highlighted the prior experience in the installation of water harvesting and torrential correction infrastructures, while also indicating the general obsolescence and dysfunctionality of the majority of infrastructures, because of siltation and general poor conditions and a need to improve the facilities. Furthermore, indications from national authorities have illustrated the potential of small desalination units, based on the experience of similar facilities installed in Santiago (outside the project target area). The increase of productivity and profitability is deemed the viable pathway to improve household food security, make better use of scarce natural resources, relax the financial burden on food trade balance and provide alternative income for vulnerable communities. Ultimately, proposed activities aim at overcoming the trap of combined resource scarcity and climate change to improve household food security and resilience of agriculture. Complementarily, afforestation, and land cover activities are proposed to overcome the challenges of soil erosion and land degradation, and to conserve soils through the expansion of green areas, while enhancing infiltration and facilitating the replishment of acquifers. Soils' stabilization responds to the need to fully exploit the agricultural potential of target areas, for both production purposes and for livestock, hence benefitting the most vulnerable communities. Finally, dedicated capacity development programmes are proposed in response to consultations' outcomes, calling for broader and direct participation in the management of water facilities and enhanced capacities in land restoration.

89. Outcome 2.1: The outcome of the component is "Increased water harvesting and desalination capacities through the sustainable development of climate-resilient water management".

Outputs: Based on the rationale and identified interventions needs, the following outputs are proposed under the Outcome 2.1:

2.1.1. Catchment structures to conserve, promote infiltration, and distribute surface runoff (check dams and reservoirs in flat areas and Jessour systems in mountainous areas) to harvest rainfall and run-off deployed

2.1.2. Cut-off drains to divert water from storage to agricultural lands developed

2.1.3. Micro-catchment structures (in-situ water harvesting techniques in arable lands, and tanks and cisterns in gardens) to harvest rainfall at farm level deployed

2.1.4 Site-specific desalination units downstream coastal wells as adaptation to seawater intrusion during extreme dry periods developed.

90. Outcome 2.2 The outcome of the component is "Improved land restoration through re-naturalization and afforestation of degraded lands"

Outputs: Based on the rationale and identified interventions needs, the following outputs are proposed under the Outcome 2.2:

2.2.1. Protective afforestation practices (greenbelts, tree plantations, woodland conservation and windbreakers) implemented in specific sites to improve the replenishment of groundwater

2.2.2. Revegetation (expansion of green cover and green lining, mainly with wooded species, and optionally with herbaceous coverage) in erosion-prone areas implemented

2.2.3. Capacity-building programmes on participatory management of water structure and land restoration delivered

Component 3. Supporting agricultural supply chain to improve climate-smart production, food security and livelihood of vulnerable communities

91. Rationale: Cape Verde has been in dire need for the augmentation of surface water resources. As alternative strategy in the past, farmers turned to groundwater, thus making agriculture responsible for the rapidly deteriorating groundwater resources. Component 2 addresses the issue along the chain of water distribution from water source to on-farm irrigation. However, providing better access to surface water is not sufficient to support a transformative change, if agricultural and irrigation practices are grounded in traditional norms. To overcome this challenge, the project will replicate the proven methodology of FAO. This methodology has been successfully introduced in five countries, of which two are in Sub-Saharan Africa. The methodology is built on four steps[96]: monitoring of agricultural and irrigation practices, identification of production gaps, simulation of enhanced production practices using a scientific tool, demonstration of results in pilot farms and scale out. The methodology is suitable to thourougly address the existing gap in knowledge about the diverse needs and practices in farm management. This methodology is the pillar Outputs 3.1.1, 3.1.2, 3.1.3 to introduce an all-encompassing "package" of good agricultural practices (GAPs, i.e. pest management, fertilizer use, land preparation, etc.) combined with climate smart practices (CSPs, i.e. drip irrigation, deficit irrigation, drought resistant crops, mulching, soil moisture monitoring, saline

96 Please see relevant experiences of FAO in the following links:
https://www.fao.org/family-farming/detail/en/c/1294233/
https://www.fao.org/policy-support/tools-and-publications/resources-details/en/c/1399030/
https://www.fao.org/in-action/building-forward-better/learning-resources/water-productivity/e-nugget-day-1-english/zh/

agricultural practices etc.) for the main staple and cash crops[97]. One of the supporting tool of this methodology is the AquaCrop simulation model. The tool has been designed to maximize the water productivity ("crop per drop"). It is used for both rainfed and irrigated agriculture, therefore, the methodology can cover and develop differentiated packages of GAPs and CSPs for different target communities. By applying an essentially water productivity model that measures the yield response to water supply, the defined GAPs and CSPs are in line with the objective of water saving. What makes this methodology particularly appealing for farmers is its specific focus on yield increase and profitability. The simulation phase incorporates financial considerations to optimize the farm running expenses while maximizing the yield and optimizing water use. This methodology also links the on-farm production with the system-level development in Component 2, as the modelling is built on the irrigation system configuration developed through this specific Component. The last phase of the methodology helps effectively scale out the package of GAPs and CSPs through the set-up of demonstration farms to pilot the recommendations and showcase their results to other farmers. This step of the implementation will ensure that all farmers have access to the means (i.e. drip irrigation units in irrigated lands, crop varieties etc.) and knowledge (i.e. documented know-how of practices, soil moisture data etc.) To replicate all elements of GAPs and CSPs package, the project will provide the referred means and knowledge during the implementation. To ensure that all farmers can accumulate sufficient knowledge to maintain the practices not only through informal exchange but through programmatic capacity-building method, the Component 3 involves organized exchange visits for learning purposes, as well as several learning tools described in Section K.

92. Component 3 incorporates the function to manage the knowledge generated by the projects. Its specific output on "knowledge management framework to promote climate resilience in agriculture and natural resource management established" is dedicated to set up a project-level mechanism for knowledge management. At its principle, the output will establish the institutional framework of the coordination, monitoring and assessment of knowledge up-take, and scaling up of lessons learnt to policy level. The output will operate all levels from the development of farmers' capacities to the international dissemination of project results. The expected stakeholders are the beneficiary farmers, water management institutions (Ministry of Agriculture and Environment, ANAS, DNA, Electra company, ADS company), and international forum for knowledge transfer (please see further information on this output under Section K).

93. On the other side, communities making income from forest products are supported with capacity-building on forest ecosystem products in order to overcome the above-mentioned challenge of fragmented production. Unpredictability and exposure of agriculture to climatic hazards put livelihood diversification in the forefront of resilience building. To support households in alternative income generation, the project sets out an activity on sustainable diversification that does not compromise biodiversity and the status of forest ecosystem. The activity focuses on the use of ecosystem goods (timber product from pruning, non-timber products such as medical herbs, tree oils etc.). Proposed interventions, furthermore, address the critical issue of food security also from demand side, taking into account existing distances amongst communities and islands, which add onto more traditional constraints in markets organizations. At community and island levels, the permanent threat of water shortages, poor logistic distribution, low access to national market production, lack of knowledge of the dynamics and cyclical trends of the market, poor financing and low investments represent severe challenges to the development of effective value chains. This scenario is compounded by post-harvest losses, mainly due to the lack of structures supporting marketing, (e.g. packaging and processing centres). The levels of losses can reach 24% to 45% throughout the value chain, mainly along the distribution and marketing, hence requiring strategic efforts to streamline information in order to overcome physical distances. A central information system on food markets, involving information about the produced crops, quantities, prices, trade modalities is inevitable to ensure market uptake and distribution amongst different communities. Such a system will well further strengthen the already advanced digitalization strategy of Cabo Verde in digital public services, by including the potential of the e-commerce. Building on the solid progress of communication development in the past years, the project proposes the establishment of an information set-up at system level that is directly linked to the central information system and for which a community-centered mobile application is developed. The application acts as an e-market space for vendors and buyers to virtually reduce the distances. Farmers overcoming the challenges of resource constraints and climate change, then, have guaranteed markets and are empowered to prevent food waste.

94. Identified interventions needs: The lack of precise information on the real effects of disasters events on food security and nutrition, on the social fabric and the overall national economy has been affecting the national capacity to address humanitarian and development needs, as well as the capacity of affected populations to fully recover from recurrent disaster events. The combination of insufficient reporting from drought and extreme temperatures impacts on the economy and society, mostly due to methodological difficulties and lack of technical capacity to register deaths and the severe consequences at local level, and the undeveloped ability of the Government to prepare for drought impacts in advance, pave the way for the country to pursue the application of innovative climate-resilient approaches in agriculture. Furthermore, food security in Cabo Verde is highly reliant on the import trade, hence highly vulnerable to any disruption in the supply chain, while rural communities often lack post-harvest or storing facilities and often located remotely from markets. The activities proposed under Component 3 respond to the need to improve the whole supply chain, from production to distribution, to strengthen domestic food supply and reduce dependency from foreign markets. On one side of the chain, thus, communities are better equipped to contribute to national food demand and are more climate-resilient thanks to the improvement of

97 Main crops are produced as following: maize (3 months) and beans in rainfed systems; bananas, sugar cane, cassava, horticulture, fruit trees in irrigated systems. Source: information available from the FAO country office

agricultural practices and the diversification of production[98]. On the other side of the chain, livelihoods are facilitated in the access to food information and to markets, through the development of a national database and the digitalization of commerce.

95. Outcome 3.1: The outcome of the component is "Improved climate-smart production through resilient agricultural practices and sustainable livelihood diversification"

Outputs: Based on the rationale and identified interventions needs, the following outputs are proposed under the Outcome 3.1:

3.1.1. Good agricultural practices (GAP), including climate-smart practices (CSP) of main crops to improve resource use efficiency, productivity and resilience established

3.1.2. Combined GAPs and CSPs piloted and demonstrated in pilot farms and scaled out to communities to strengthen climate resilience at scale

3.1.3. Forest ecosystem products as diversified and sustainable production method identified and introduced

3.1.4. Exchange visits between watershed beneficiaries to improve farmers' knowledge on GAPs and CSPs, and forest products organized

3.1.5 Knowledge management framework to promote climate resilience in agriculture and natural resource management established

96. Outcome 3.2: The outcome of the component is "Enhanced livelihood of vulnerable communities through enhanced and digital access to food markets"

Outputs: Based on the rationale and identified interventions needs, the following outputs are proposed under the Outcome 3.2:

3.2.1. Central information system on food markets, farming, and forest products established and integrated into governmental database

3.2.2. Early forecasting mobile application developed to facilitate production, diversification, commercialization, and decision-making

3.2.3 Capacity building programmes on information system and application operation to further strengthen access to markets and alternative income resources

B. Economic, social and environmental benefits

97. The chronic shortage of water resources has historically represented a constraint to the full development of Cabo Verde's agricultural potential. Livelihoods in both target islands and selected watersheds, are extremely exposed to the impacts of climate change as it shortens and intensifies rainfall events and reduces the reliability of rainfall patterns. Rural communities, who represent 36% of the national population, are all the more impacted due to the large majority of rainfed agriculture systems. Furthermore, the increasing land degradation, mainly driven by climate change impacts, reduces the productivity of soils and pushes away the employable population, particularly women and youth, thereby contributing to outmigration. The consequences of natural disasters add onto the pre-existing fragility of the population. Government estimations calculate that around 62.3% of rural households at national level suffered of low agricultural production between 2017-2018, mainly due to the ongoing drought.

98. The valuable socio-economic growth of the latest decade was mainly driven by the tourism and services sectors, which, however, have started to show a slower absorption capacity. The outbreak of the pandemic, despite the relative number of cases reported, significantly impacted the economy of these activities and demonstrated the need to diversify the contribution of different economic sectors at national level. Agriculture could significantly contribute to this objective, provided that adequate interventions are pursued as a strategic priority. Proposed interventions are designed to address the outstanding vulnerabilities, exacerbated by climate change impacts, thereby providing a wide range of benefits across relevant sectors, towards the increased resilience of target communities and ecosystems.

99. Within the pre-selected islands, project activities will be deployed across 4 watersheds (ribeira), for a total of around 8,560 ha, divided between 3 catchments of around 7,600 ha in total in Santiago (namely 1,520 ha in Ribeira Brava, 3,100 ha in Ribeira de Charco, 3,010 ha in Ribeira de Flamengos) and over 930 ha in São Nicolau. The identified target areas present different features in terms of land cover and a variety of land uses that can well host the suite of proposed interventions to achieve enhanced adaptation capacities of livelihoods. The agricultural potential, with its expected socio-economic benefits, can be well exploited across the 1,520 ha that characterizes the territory of the 4 watersheds, particularly extended in Ribeira de Charco (6,32 ha) and Ribeira de Flamengos (7,71 ha). At the same time, the availability of around 810 ha of herbaceous vegetation and wetlands, and green cover will allow to enhance the protection and replenishment of crucial groundwater resources, as they are fairly distributed amongst catchments, going from 357 ha in Ribeira de Chargo to 67 ha in Ribeira Brava. The need for economic diversification emerged from consultations, finally, will be supported by the already existing 1,200 ha of forest lands, that characterize Ribeira de Flamengos above all, with its 564 ha, as well as the other watershed (namely, 251 ha in Ribeira Grande, 256 ha in Ribeira de Chargo, and 137 ha in Ribeira Brava).

100. The target communities living in the project areas, including around 16,290 rural households, rely on agriculture as a primary source of income, thus are particularly vulnerable to the main effects of climate change such as the increasing unreliability of rainfall and drought events. The negative impacts on crop production of the 2018 drought were particularly impactful and resulted in a loss of productivity for the 2 main staple crops, maize and pulse, which dropped from 2.2 to 0.02 ton/ha. Agriculture is the only annual income for families in these areas, whose plots extend, on average, on 1.5 ha with levels of profitability ranging between 1,600 USD/ha for maize and 1,560 USD/ha for pulse, in case of high yields in

[98] Currently, the following non-timber products are produced in Monte Gordo Forest (Ribeira Brava): medicines, honey, soaps, while in Ribeira Flamengos farmers produce wild honey. No forestry products are available in Ribeira Charco and Ribeira Grande. Source: information available from the FAO country office

productive years. The severe setback caused by the 2018 drought event brought to a 10-times loss of value in agriculture, dropping from 1,600 USD/ha to 145 USD/ha. The proposed range of interventions, by enhancing water availability and restoring land resources also for agriculture, will reduce the vulnerability of the around 76,400 beneficiaries in target areas, divided between 69,500 in Santiago (47,181 in Santa Catarina/Ribeira de Chargo, 13,762 in São Miguel/Ribeira de Flamengos, and 8,556 in Ribeira Grande), and 6,900 in São Nicolau.

101. Rural households in pre-selected target areas are overly exposed to climatic conditions and to the effects of their variability, taking into account that around 90% of agricultural systems are rainfed. Moreover, the largest majority of cropped lands are very little diversified, with only around 10% of cash crop produced at garden level (micro plots), while the remaining areas are almost entirely cultivated with maize and pulse. The development of agricultural potential, with the expected benefits for the livelihoods, is constrained by the limited access to unreliable water resources, only temporarily available for around 3 months/year. Groundwater resources, in present conditions, are employed as supplemental resources for irrigation, which, however, present high level of salinity. In the municipality of São Miguel, where the Ribeira of Flamengos is located, the highest concentration of salt is registered, around 1.5 dS/m[99], which only allows the cultivation of moderately tolerant crops. The application of GAPs and CSA, and the deployment of desalination units will allow, on one side, to avoid the overexploitation of limited groundwater, while on the other will result beneficial in reducing land and water salinity.

102. Within rural communities living in target areas, it is estimated that around 4,620 beneficiaries live in reforested areas and carry out economic activities related to forests. In Santiago, the number of beneficiaries amounts to around 2,602 people, 52% of which are women; in São Nicolau, beneficiaries are estimated to be around 2,018, with 47% of women. Reforestation and land conservation activities proposed will benefit these communities thanks to the improvement of resources, namely pasture, non-timber wood. The potential of the use of sustainable forest products will be exploited through the implementation of Component 3, Outcome 3.1. Furthermore, the protection of land will reduce soil erosion and enhance water infiltration into the soil, hence contributing to the replenishment of groundwater. As a result, communities living in forested areas will benefit from the increased availability of water for consumption and irrigation, ultimately improving their resilience and food security.

103. Economic benefits

- The proposed actions to make water management climate resilient include a set of structural measures to improve access to water by increased storage facility, reduce the impact of unsustainable groundwater use, and eventually make agriculture more productive. Thanks to the improvement of the water harvesting system, the aggregated storage capacity in the target areas will correspond to about 1,8 million m^3, which will provide enhanced and more regular access to water for 16,290 households in the four watersheds (namely 9,436 in Ribeira de Chargo, 2,752 in Ribeira de Flamengos, 1,711 in Ribeira Grande, and 1,381 in São Nicolau). Accordingly, the increased availability of water will supply resources for the irrigation of around 4,190 ha of cropland, distributed among Ribeira de Flamengos (1,926 ha), Ribeira de Charco (1,608 ha), Ribeira Grande (270 ha), and Ribeira Brava (390 ha). By enhancing the access to surface water, the project will work towards a more balanced use of groundwater and surface water resources, thus relaxing the pressure on groundwater and supporting farmers in shifting away from diesel use. The conjunctive water use will include also the equipment of 18 wells with localized solar-powered desalination units at an average cost of 100,000 USD/each, with significant savings on the energy cost of irrigation compared to the current practices.
- Improved and more reliable access to surface water will support the resilience of agriculture to drought, with valuable improvements on farmers' revenues. As a direct result, the impacts of drought events, frequently leading to up to 90% yield failure, will be less impactful on farmers. Compared to a without-project scenario, and assuming such levels of yield drops due to drought, farmers can secure around 1,400 USD/ha revenue of maize and 1,200 USD/ha revenue of pulse.
- By converting the on-farm irrigation system of around 400 ha to gravity-fed drip system across the target areas, not only the overall water saving will increase by 40%, but also the yield productivity will grow by 40% thanks to the conservation of water at root-zone level. Drip irrigation by itself will result in an average 450 USD/ha increase in maize profitability, and 400 USD/ha increase in beans profitability.
- The further CSP and GAP practices will be developed in each watershed, and will be readily available for farmers in both islands, with over 90% of women and youth as potential beneficiaries. Due to the similarity of agro-climatic zones within the agricultural areas of the islands, the developed practices will benefit all farmers in the islands, namely around 14,000 households in Santiago and 1,400 in São Nicolau.
- The diversification to forestry products will directly benefit rural households and women in particular, who will be actively participating the production and value chains. Around 500 women in the four watersheds will be engaged, with a majority in Ribeira Brava and Ribeira de Flamengos, which share the highest percentage of forest cover. Moreover, 2 medium-capacity nurseries will be established and managed by women in the two islands.
- As confirmed by consultation with beneficiaries and stakeholders, the female population in the targeted areas have vast experience and strong vocation in tree plantation and forest restoration activities related. However, poor water and forest management have alienated the female population from traditional forest perimeter conservation or tree pruning activities. Leveraging on traditional knowledge and practices in natural resource management of women in the target areas, target capacity development activities will be administered to strengthen the vocation in tree plantation and forest restoration-related activities. The provision of tailored programs for forest restoration will not only provide higher

[99] The "decisiemens per metre" is the standard unit of measure employed to indicate the concentration of dissolved (soluble) salts in water from all sources. Further information available at: https://www.landscape.sa.gov.au/mr/publications/measuring-salinity

opportunities of employment for current forest dependant communities, but will also build capacities of that female population that, over the years, has been alienated from forest perimeter conservation and tree pruning. Furthermore, given the traditional involvement of women in firewood collection, capacity development programs will be address the sustainable production and commercialization of of firewood, eventually leading to female-driven sustainable management of wood resources as complementary source of energy.

104. Social benefits

- The developed WATHADIS system will inform the population of the watersheds, regardless of their engagement in different sectors. In agriculture, the system will provide information to around 3,300 farms, 2,900 in Santiago and 400 in São Nicolau. As water harvesting is vital also for other sectors, including livestock and domestic water use, the system can benefit a wider range of vertical stakeholders, from water authorities to communities.
- Catchment structures like check dams will significantly improve the availability of water resources through the storage of around 70,0000 m^3, hence reducing the employment of groundwater and the salinization of soils and providing safer and more reliable access to water resources to around 1,500 farmers in the 4 target areas.
- The improved yield will support the household food security of poor communities. The four watersheds, hosting around 39,000 male and 38,000 female beneficiaries, will have better access to food, both through local markets and the developed application for equitable food distribution.
- The roll out of the newly established value chain of non-wood products will create 10 jobs for women, who will be directly employed in the nurseries, and provide indirect employment for around 500 previously unemployed women.
- The largest share of benefits generated by the project will address the most vulnerable population, namely women and younger smallholders, who will account for 50% of trainees participating in the capacity development training provided across the 3 project components. Specific gender quotas will be set for women-headed households, which will represent at least 20% of target attendants.
- Youth and young rural families will be directly addressed by project activities, also considering the significant participation in the consultation process and the potential of younger generations in the uptaking of proposed innovations. At production stage, youth will benefit from the introduction of newly-applied agricultural practices (GAPs and CSPs) that will allow higher yields and increased profitability of the sector, hence opening employment opportunities so far only provided by non-agricultural sectors and emigration. Youth involvement in the process of developing, piloting and scaling out of practices is fundamental, as these practices are considered modern farming in the traditional rural families, in Cabo Verde. At marketing stage, innovations represented by the proposed digitalization with early forecasting mobile application, will directly advantage youth as the prevalent uptaker of technologies. Youth are expected to play role in the technology dissemination, as older generations require support in internalizing the technology. Capacity building included under Output 3.2.3, therefore, will be tailored to target younger rural families and ensure they can exploit their untapped talent, while consistently contributing to develop the agricultural sector in the target areas, in the framework of existing national efforts. Furthermore, experience among the young population in the construction sector will be advantageous when looking for human resources for installing water management infrastructures.
- In the Cape Verdean society women traditionally have a lower presence and occupy lower-paid positions in rural areas, a status confirmed by the the consultations in target areas. Building on this consideration, the project targets female population to strengthen their direct participation and improve their decision making, above all, in forest resources management and in product marketing. Activities foreseen under Components 2, specifically, will provide direct access to the production process, currently overcrowded by male population, through the establishment of seedling nurseries, while the deployment of mobile application under Component 3 will facilitate women's direct involvement in post-production activities. Providing the role of production and distribution of seedling and plant will fully integrate women into the supply chain. Also, the women-targeted activities in the post-harvest phase (marketing) will be an entry point to strengthen their role not only in the supply chain but in the value chain of agriculture. Hence, women's capacity to make decisions over natural resources management will be enhanced. Training activities indicated under each Component will take into account existing social barriers that limit women's full participation and decisional capacity, hence capacity development programs will account for current gaps, also created by social and cultural norms, and will be tailored to equip participating female trainees with needed technical and management skills and competences to perform as primary stakeholders.The project will also take care of women's involvement in Component 1, dedicated to support the planning and strategy-making of water resource management. Women's participation in the development and capacity-building on WATHDIS will be monitored.

105. Environmental benefits

- To support the replenishment of groundwater in upstream areas, the project will increase the green vegetation cover by 5 % in both islands (+40,700 ha), i.e. around additional 9,100 ha in Ribeira Grande, 9,800 ha in Ribeira de Flamengos, 19,600 ha in Ribeira de Charco, 2,200 ha in Ribeira Brava. Accordingly, the water retention capacity of the watersheds will be enhanced. Furthermore, the revegetation and increased green cover in target areas will reduce the run-off, while increasing the deep percolation of rain. Finally, the increased water retention will also contribute to the prevention of landslide, erosion and pluvial flood from high, upstream areas.
- The greenbelts around the agricultural lands will increase the current forest area (1,700 ha) by 2-3 % per watershed. As a result, forest areas in Ribeira Grande will pass from 640 ha to around 655 ha, in Ribeira de Flamengos from 460 ha to around 470 ha, in Ribeira de Charco from 275 ha to around 280 ha, and in Ribeira Brava from 250 ha to around 255 ha.

Afforestation practices and the establishment of wind breakers will provide protection along agricultural outskirts, bringing valuable environmental benefits to the cropped areas and setting more favourable conditions for farming activities.

- Equally important, the co-management approach, where communities are empowered as stewards of the areas they plant and of the areas they use for livelihood is the main vehicle through which the identification, location, reporting, and weeding of invasive species will be attained. To amplify environmental benefits, the project will leverage the results of REFLOR-CV, as illustrated Section A. Additionally, the project will make use of the forest management plans under development by the Forest Service (DGASP/MAA), which includes specific measures to monitor invasive and/or exotic species that may become invasive due to drought, other environmental conditions or maladoption. In addition to collaborative work between local communities and the forest service, the MAA is putting together an information system and GIS-based online tool to register and monitor land cover dynamics. These measures can be directly applied in the target watersheds. Local communities responsible for the management and monitoring of forest restoration activities will be trained to report to this system. Through creating a link with the central governance of environmental protection, the environmental benefits of the project will be strengthened.
- The strategic importance of groundwater resources is largely acknowledged by national sectoral plans, which, at the same time are increasingly aware of the potential depletion of resources due to the insufficient replenishment processes. Furthermore, the current rate of groundwater extraction for agriculture (60,000 m3/day) significantly contributes to soil and water salinization. The improved access to surface granted by the increased water storage capacity through earthen structure will directly contribute to the enhanced recharge balance of shallow aquifers. In the 4 target areas, the aggregated capacity of water harvesting facilities will reach between 400,000 and 500,000 m3, hence allowing the replenishment of groundwater resources above the extraction rates. Furthermore, the deployed check dams will boost the groundwater augmentation by natural infiltration across the four target watersheds.
- By deploying the 18 localized desalination units, the moderately saline water will be treated, and current salinity levels ranging from 1.3 to 1.7 dS/m can be decreased by 35-40%. The reduced groundwater salinity will eliminate the risk of secondary salinization, thus improving the conservation of soil resources. Furthermore, small-scale solar-powered desalination units will result in valuable cost savings, between 50% and 70% compared to traditional technology, with calculated total savings of over 3000,000 USD and an average payback of 2.5 years.
- Additional environmental benefit of the project will be the alignment with national biodiversity targets. Both the Third National Communication and the Plano de Ação para a Conservação da Biodiversidade stress the importance of stakeholder participation and of integration of biodiversity conservation and agroecology in decision making and actions. Thus, the project contributes to the desired increase in the resilience of the agricultural sector, covering different production systems (irrigated and rainfed) and contributing to increase species diversity on steep slopes. Moreover, the activities of Component 3 directly address the development of sustainable management of crops. A comprehensive analysis of the conservation status and threats to the endemic vascular flora of Cabo Verde is provided by the Botanical Journal of the Linnean Society, fully taken into account during the project formulation. The guidance obtained here has been applied before in the REFLOR-CV project and is directly usable in the target watersheds. There are 47 endemic species in São Nicolau, and 37 in Santiago, with a 77% and 76% threat levels respectively. In line with the two strategies, the project will incorporate a monitoring mechanism to continue analysis and updating of the information related to the endemic species, defined by the Botanical Journal.

106. As clearly outlined under section 2/G, capacity development activities are streamlined across project activities. This approach clearly responds to the gaps identified by relevant national strategies on climate change adaptation and it has been articulated as an evident need throughout consultations, as per section 2/H. The provision of capacity development activities complements technical actions under each project output, with direct and impactful benefits for stakeholders at different levels. Strengthening capacities proves particularly beneficial for livelihoods impacted by climate change, as it enables them to enhance traditional knowledge with innovative solutions that better respond to the changing climatic conditions, thus allowing, on one side, to maintain agricultural production and on the other to diversify production and access markets more easily.

107. Based on consultations' outcomes and available data on the socio-economic profiles of target communities provided by the national FAO office, the expected total number of beneficiaries from project activities across the 3 components can be estimated at around 69,500 in Santiago (Santa Catarina: 47,181; São Miguel: 13,762; Ribeira Grande: 8,556), and around 6,900 in São Nicolau (Ribeira Brava).

Table 8: Expected benefits of the project

Current problem (Baseline conditions)	With/after the project (target conditions)
Economic	
• Rural poverty and reduced incomes from agriculture, particularly in rainfed systems (majority) • Disparity between urban and rural areas, in terms of vulnerability to natural disasters and weather shocks, particularly drought and landslides • Heavy reliance on tourism and service sector • Significant reliance on remittances • Low employment absorption capacity of tourism sector • High reliance on food import	• Empowerment of local communities through the participatory approach in the definition of water harvesting/desalination sites at watershed level (Component 1) • Increased income derived from enhanced agricultural practices (Component 3) • Diversification of economy, away from tourism (Component 1, 2, 3) • Further development of agriculture and forestry sectors, and alternative agricultural practices, more resilient to climate change impacts (Component 2, 3) • Strengthening of the food supply and trade inducing sub-benefits for other sectors e.g. tourism (Component 3) • Alternative for youth and women employment by enhancing traditional knowledge , skills (e.g. in forest management or construction) and innovation through digital tools (Component 1, 2, 3)

• Progressive unsustainability of subsistence agriculture due to water scarcity • COVID-19 impacts	• Tackling unofficial and non-paid employment of female population in forest and agricultural products commercialization (Component 2) • Enhancing human capital in the construction and maintenance of infrastructures and online management tools (Component 1, 3)
Social	
• Smallholders and rural livelihoods on average more subject to poor socio-economic conditions (36% of poor population) • Scarcity of water availability for different uses and reliance to groundwater, with associated costs, or to distribution networks for domestic consumption • Underrepresentation of women producers across the supply chain and lack of participation of female population in decision making related to production assets • Outmigration and abandonment of native localities to pursue different economic activities than agriculture • Increasing poverty and food insecurity due to limited agricultural production • Low employment levels in rural areas, particularly for women • Conflicts over scarce water resources and halting of households' investments in renovation of livestock, irrigation, transformation, or commercial activities	• The government and communities will better assess, programme and manage water storage/desalination facilities, thus increasing planning capacities at water shed level (Component 1) • Public institutions together and communities will acquire updated skills and capacities to better manage water potential (Component 1) • Smallholders and food producers in target areas will be more resilient to climatic risks thanks to the provision of sustainable solutions for increased water access, improved land resources and climate adaptive agricultural practices (Component 2, 3) • Enhanced absorption capacity of unemployed, reduction of outmigration, and contribution to poverty alleviation (Component 1, 2, 3) • Provision of alternative income and new transferrable skills (Component 2, 3) • Improvement of food trade balance and enhancement of supply chain at local level, through facilitated access to food markets (Component 3)
Environmental	
• Significantly exposed to climate change and severely hit by extremes as drought • Water scarcity and land degradation, further depleted by reduced rainfall and natural disasters • Highly variable rainfall, ranging from 100 to 900 m depending on the location • High run-off, low infiltration • Decreasing groundwater resources – over-pumping and reduced aquifer recharge • Rugged terrain leading to landslide	• Capitalization of the unexploited water storage facilities (**Component 1, 2**) • Capitalization of the unexploited water loss due to run-off (**Component 2**) • Potential good impacts of afforestation, land restoration and increased vegetation (**Component 2**) • Reduced depletion of groundwater resources thanks to the increased availability of resources from enhanced storage capacity (**Component 1, 2**) • Improved land and soil quality through green cover and natural protection (**Component 2**) • Enhanced sustainability of water management through watershed-level information systems for water harvesting/desalination (**Component 1**) • Improved use of land and water resources for agriculture through the application of climate-smart practices (**Component 3**) • Enhanced forest management for woody and non-woody products allowing for renewable sources of energy for domestic use (firewood, biomass) (Component 2)

C. Cost-effectiveness

108. The proposed concept combines a set of soft and hard interventions designed to address a measurable number of beneficiaries at watershed level, leveraging on local and pilot actions to scale up benefits at national scale. The proposed approach hence aims at developing activities to increase water availability and restore degraded lands in the target areas, with the objective to illustrate potential solutions at country scale. The cost-effectiveness of presented measures, therefore, emerges evidently as a backbone approach in the definition of activities across the entire project framework as a contribution to the expansion of water availability and the development of the forestry sector for enhanced national food security.

109. The project will ensure cost-effectiveness by incorporating the following notions:

- Minimized variable costs associated to the operation, maintenance of the infrastructure or constructing new infrastructure
- Number of beneficiaries at targeted areas (also potential job creation)
- Maximized benefits and return on investment taking into consideration the agricultural productivity level in the target areas
- Avoidance of future costs associated with damage, loss, and maintenance of the structures/activities (need to provide argumentation for the technical structures and upscaling of the digitalisation component)
- Community involvement with the mapping, identification, and development of concrete interventions- especially those relating to the digital app, the CSPs and GAPs-and because of multi-level capacity building and access to data and information
- Take advantage of existing infrastructures in the targeted areas

110. The detailed cost/activity estimation will be included in the full proposal and it will itemize costs per person to thoroughly illustrate the cost-effectiveness of approach of project activities. While maximizing the amount of investment on concrete interventions, the project will fund soft activities in support (e.g. policy dimension, capacity building), and in so doing it will sustain the replicability beyond the watershed level and the maximization of adaptation benefits per amount invested. The full proposal will detail the quantitative cost-effectiveness ratio of each proposed activity, also including a detailed comparison with alternative activities.

111. The developed access to irrigation water will directly contribute to the increased profitability of 4,100 ha farm land. The project builds around the traditional cropping pattern, including maize and pulse, and promotes the diversification and crop production in gardens. The total estimated cost of the development of non-conventional storage facilities amounts 990,000 USD in the four watersheds. The investment will serve all cropped areas, thus providing irrigation water to 3,804 ha in Santiago and 387 ha in São Nicolau watersheds. ANAS and the Electra and ADS companies, in São Nicolau and Santiago respectively, will manage the system-level infrastructure (check dams, cut-off drains, Jessour-type systems, solar

desalination units). As per national regulations, farmers pay irrigation fees to partly recover the O&M cost of the infrastructure. Beyond the collected fee, the national authorities are responsible for keeping the infrastructure in the necessary condition for acceptable level of service. Fees vary as per the source of water. Farmers should pay around 1.9 USD/m^3 for desalinated water, 0.64 USD/m^3 for reused water. The high prices are due to the applied technology (centralized and large-scale infrastructure of desalination plants), the competing demand over the limited resources, and the inefficiency of the existing systems (water loss through conveyance, etc.). Such high water fee is the main reason of the increasing number of informal wells, and the use of saline groundwater without any treatment. Access to gravity-fed water infrastructure designed directly for irrigation purposes and decentralized, solar-powered water desalination and water lifting will significantly decrease the cost of irrigation. Precise calculation requires the pre-design and bill of quantities of the proposed infrastructure, which will be provided at full proposal level. Based on it, the full proposal will also present a cost-benefit analysis to demonstrate how the project will reduce the cost of irrigation at farm level.

112. By estimating that 90% of land are cropped with maize, the total production volume of the cropped area can increase from annual 2,900 to 3,700 tons, as per the pessimistic scenario. The added-value by the enhanced access to water is 626,000 USD per annum. Thus, it is expected that the infrastructure development at system level will prove a high return on investment. In addition, the estimated cost of the modernization with drip irrigation amounts to 565,000 USD per 300 ha. Drip irrigation will not only increase the productivity by 40%, as indicated above, but will also contribute to the higher profitability of land units. The revenue increase of maize is expected to reach 2,200 USD/ha, compared to the current 1,600 USD/ha. The revenue increase of the drip-irrigated area can reach up to 180,000 USD/ha, without entailing additional running cost. The investment cost will be recovered within 4 years. The project design incorporates the current development barrier by skyrocketing energy prices that jeopardize the farmers' profitability. Although drip irrigation – owned and managed by farmers – requires energy, the project mitigates the risk on financial sustainability through providing renewable energy for groundwater use (solar-powered desalination units plugged into the irrigation pipes), and gravity-fed drip systems in areas with access to surface water. The foreseen CSPs and GAPs are inexpensive, on-farm practices that do not entail extensive running expenses. Therefore, the project acts as a catalyzer of better and water-efficient agricultural practices by supplying the required auxiliary tools (i.e. soil moisture sensor, seeds of drought resistant varieties etc.) and by providing capacity-building and knowledge transfer means. These together are sufficient to enable the take up of technologies/methods. Reference to the activity description of Component 2, the identification of CSPs and GAPs is based on computerized simulation that considers financial aspects. Thus, long-term profitability of updated farming practices are guaranteed through the applied methodology.

113. An alternative scenario to the project intervention on improved access to water is the development of infrastructure for managed aquifer recharge together with large-capacity irrigation wells. To increase the efficiency of structure for managed aquifer recharge, combining earth dams and injection wells, the project would require dams with larger surface area and treatment units to improve the water quality of surface water. On the other hand, farmers would be required to extract groundwater, thus increasing the energy requirement and production cost of irrigation. While the topographical conditions necessary require decentralized injection wells, the cost of wells would range between 50,000-100,000 USD/unit. Building on the project concept, only the injection well would cost 200,000-400,000 USD, while the storage facilities would be equal to the current estimations of 85,000 USD. In order to supply water for irrigation, the scenario would require the installation of additional boreholes that would entail extra 750,000 USD. Such system configuration would also increase the running costs of irrigation, amounting to around 0.65 USD/m^3 cost of recharge and 0.15 USD/m^3 cost of pumping. This would result in 300-400 USD per ha additional cost by pumping.

114. The cost-effectiveness analysis of afforestation and revegetation activities is based on the comparison between a "Business-As-Usual" (BAU, i.e. without project) and a "With project" scenarios. The total cropped lands in the four watersheds, under the current situation, amount to around 4,100 ha, or 54% on average. Climate-change induced effects are leading to the shrinking of these areas and to the degradation of soils, under the impacts of drought, flashfloods and increasingly intense precipitation. Different levels of land degradation are observed, from light to moderate, that can affect up to 50% of subsistence rainfed areas. Wind erosion and biological degradation solely, are associated to the loss of top soil and soil life of up to 10% in Santiago. The "without-project" scenario, accordingly, can be expected to maintain the current trends of diminishing croplands. In order to ensure an acceptable level of productivity and safeguard food security levels, households will have to increasingly revert to food import or drastically reduce the variety of diets, with long-term severe consequences for families' and national budget and health.

115. Building on successful, FAO-developed methodology (REFLOR-CV experience), the applied strategy to make forest and tree restoration sustainable and cost-effective consists of increasing local capacities, benefits, and incentives to the production and plantation of native and endemic species, along with the capacity and co-ownership for the maintenance of forest and woodland stands. The strategy has four pillars: 1. Development of an enabling environment with improvement of capacities from local farmers to institutions; 2. Implementation of soil conservation, plant production, and plantation activities with the rural communities; 3. Analysis and support to local businesses and value-chains related to plant production and forest products; 4. Awareness raising, technical support, co-learning, and advocacy to bring the forest sector into a higher political level by enhancing its role in the country's climate action. This is done with parallel support to responsible cropping and increases in local businesses and trading. Such activities are contextualized and upscaled through the local and regional MAA institutions, centrally monitored and technically supported (please see further information on central monitoring under

Section B). The monitoring is organized such that improvements over the baseline are measurable and reported to international commitments, such as the NDC or the GHGI [100].

116. In order to prevent such a scenario and increase climate-resilience of rural households, the project foresees the establishment of two community-run nurseries, one per island, whose cost would amount to around 10,000 USD, with an estimated annual production of around 300,000 plants in total. The intervention would not entail additional costs for farmers, while, conversely, would provide a range of benefits as mentioned above.

Table 9: Comparison between proposed project and alternative scenario

Component	Benefits generated	Alternative to project
1. Building an enabling environment for informed and integrated watershed management to support the planning of adaptive development (**1,250,000 USD**)	The component will strengthen climate-informed decision making for different beneficiaries (i.e. authorities and local stakeholders) by integrating collected information on water storage/desalination capacity with GIS-based analysis into an integrated dataset. The resulting information will be standardized and computed into an automated system open to different users, which will guide decisions over the optimal installation of water harvesting and desalination facilities. Training activities will complement the concrete action to generate capacities of both local farmers and authorities responsible in the target area. Improved locally-based planning will enhance the economic profitability of activities as it will not require additional external human resources.	Without the AF intervention, decisions related to the setting up of water collection and desalination facilities will continue to be driven by approximate and outdated information, unable to present a detailed picture of the on-ground climate, topographical, and hydrological conditions, nor of the existing agricultural features. Information, furthermore, will only be available to selected users and authorities, via paper documentation rather than digital supports, with the consequence of potential information gaps, limited transparency in decision making, and, ultimately, less cost-effective selections. Finally, the missed opportunity to develop capacities in the management of an integrated water information system will leave stakeholders to continue applying traditional and potentially non climate-adaptive considerations in the planning of water harvesting/desalination facilities.
2. Improving water storage/desalination capacities and promoting land restoration to build resilience of farming communities (**5,500,000 USD**)	The component will develop a range of solutions for water harvesting/desalination, to be tailored to the site specificities, taking into account not only the geographical conditions, but also the potential supply and the expected demand. This approach will be applied to all facilities (Jessours/macro-/micro-catchment structures, cut-off drains, desalination units) to evaluate the highest effectiveness of investments. Under Outcome 2.2, designed interventions will require investments in the establishment of community-based nurseries and the purchase of seedling for afforestation and revegetation purpose. The employment of local resources in such activity will benefit around 200 households (equivalent to 1,000 people).	Without AF intervention, the chronical water scarcity will be increasingly overcome through the purchase of distributed resources for domestic use, and through the extraction of groundwater for agriculture, livestock and non-domestic consumption. Water availability will be further reduced, leaving the most vulnerable even more exposed to climate change impacts. Women and younger food producers, as well as smallholders in general, will not benefit from adaptive solutions to i) harvest rainwater to replenish surface and groundwater supplies for food production; and ii) treat saline water for agriculture. Furthermore, the missed investment to restore degraded lands will marginalize the most fragile as it will reduce the replenishment rate of groundwater, thus leaving them increasingly from already limited resources. Finally, rural households will not increase awareness on the importance of proper and climate-adaptive approaches for water and land management, and will remain water insecure, less capable of managing scarce water supplies to compound climate-related risks.
3. Supporting agricultural supply chain to improve climate-smart production, food security and livelihood of vulnerable communities (**1,665,000 USD**)	The component will strengthen stakeholders across the value chain thus reducing their vulnerability to climate risks through improved agricultural practices, diversification of production and increased accessibility to food markets. Community Development Associations (ADCs in Portuguese), mainly participated by women, will be empowered to i) develop capacity in applying GAPs and CSPs, and ii) diversify production by introducing different timber and non-timber products. Under Outcome 3.2, smallholders and rural households will be supported in their access to market and distribution chains through the development of a digital application, integrated into national information system, for early forecasting and production/commercialization decision making. The activity will be complemented by the conduction of training activities for the operation of the mobile app, thus enabling farmers, on one side, to overcome physical distances and any logistic disruptions of the supply chain, and, on the other, to process information in time for appropriate decisions on investment and production	Without AF intervention, farmers will continue to adopt tradition land and water management practices, with no or little adaptation considerations. The missed opportunity to acknowledge and apply innovative climate-resilient measures will limit their agricultural production and, at the same time, will require increasing investments from their side to respond to changing climatic conditions. Moreover, the most vulnerable amongst rural households, including women and younger producers, will not be equipped to diversify production and introduce sustainable forestry products, thus facing increasing competition with stronger producers. Access to markets and investment decisions, in addition, will not benefit from the introduction of technological and innovative tools such as the digital app linked to national information system. Smallholders, women and younger producers can be expected to be increasingly crowded out from the value chain, as they will be able to access only traditional and local trades. Finally, their capacity to take investment decisions based on multiple and update information will not be possible and resolutions in this respect will continue to be driven solely by a limited number of resources and knowledge. Reasonably, this will further reduce their resilience to the risks posed by climate change and natural extremes.

D. Strategic Alignment

117. Cabo Verde ratified the United Nations Framework Convention on Climate Change in March 1995, acceded to the Kyoto Protocol in 2006 and ratified the Paris Agreement on Climate Change on September 21st, 2016. The country submitted three national communications to the United Nations Framework Convention on Climate Change in 1999, 2010 and 2017. Cabo Verde has submitted the currently active NDC (Nationally Determined Contribution) in 2015, however, the proposed project features alignment with the updated NDC of 2020 that has been presented by the Minister of Agriculture in February 2021 and the new National Adaptation Plan expected to be approved by the government in the course of 2021. In that sense the project proposal team decided to use the still non-official NDC of 2020 (at the time of the elaboration of this project concept) and is fully aware that the alignment will be revisited at the stage of the full project proposal. Thus, the project is fully aligned with NDC 2020 but also with the National Plan for Agricultural Investment and Food Security of 2019, the Sustainable

[100] Please find relevant resources in the link: Vasconcelos et al. 2022 REFLOR-CV Adaptation of local communities to the impacts of climate change in Cabo Verde through restoration of wooded areas. 10pp

Development Strategic Plan of 2017 and the draft National Adaptation Plan, as key documents for the agri-environmental sector and the proposed project's thematic area. The proposed project is also aligned with the National Strategic Plan for Water and Sanitation (PLENAS), approved in 2015, which aims at promoting the development of Cabo Verde via the integrated improvement of water supply conditions, the sustainable use of natural resources and the environment, as well as equity and gender equality and the most disadvantaged social classes. Furthermore, AF project will pursue the main objective of National Action Programme (NAP) under the UNCCD (2000), which aims at reducing desertification and the effects of drought for sustainable development in Cape Verde. AF project is also in line and will actively contribute to the targets of Land Degradation Neutrality (LDN) of 2019 that Cape Verde intends to achieve by 2030. In addition, AF project will contribute to reach the main axes of National Gender Equality Plan for the period 2021-2025 and it will be aligned to the Strategy for Growth and Poverty Reduction III (2012 – 2016), which aims at building a diversified and productive economy through the development of competitiveness clusters, including agribusiness and technology sectors. Moreover, AF project will contribute towards achieving the objectives of the Second Voluntary National Review on the Implementation of the 2030 Agenda for Sustainable Development, endorsed in 2021. Eventually, the projects also exhibit alignment with the Cabo Verde's National Strategy for Disaster Risk Reduction (ENRRD) for all three proposed components, as well as with National Strategy and Action Plan for biodiversity (2014-2030) for the protection of native species and natural resources.

Table 10: Proposed project alignment with key national strategies

Updated NDC 2020
Project components 1 and 2 are aligned with the Adaptation contribution #1 of the strategy: improving water security and natural replenishment while reducing the water carbon intensity. Project components 1, 2 and 3 are aligned with the Adaptation contribution #3 of the strategy: increasing and sustaining land-based food security through regenerative agriculture. Project component 1 is aligned with the Adaptation contribution #7 of the strategy: using spatial planning as an ally in climate change adaptation and mitigation. Project components 1 and 2 are aligned with the Adaptation contribution #8 of the strategy: mitigating climate related disaster risks and vulnerabilities and promote adaptation to climate change.
National Plan for Agricultural Investment & Food Security
Project components 1, 2 and 3 are aligned with the Specific objective 1: Increase agro-sylvo-pastoral and fishery production and productivity through innovative, diversified and sustainable production systems, and reduce post-harvest and post-harvest losses. Project component 3 aligns with Specific objective 2: Develop value added, inclusive and competitive chains adapted to local, tourist, regional and diaspora markets. Project component 3 aligns with Specific objective 3: Promote the transformation and modernization of the agro-sylvo-pastoral and fisheries sector, through the development, dissemination and appropriation of technologies and innovations. Project components 1 and 2 are aligned with the Specific objective 4: Improve access to food and nutrition and strengthen the resilience of populations and prevention and risk management mechanisms. Project components 1, 2 and 3 are aligned with the Specific objective 5: Strengthen frameworks for concerted and coordinated action, agricultural governance and food security in the public, private and civil society sectors.
Strategic Plan for Sustainable Development (PEDS) – 2017/2021
Project component 3 aligns with PEDS development objective 1: Make Cabo Verde a hub economy in the Mid-Atlantic- program no.7: Development of the Digital and Nanotechnological Economy (Digital Platform and Innovation). Project components 1, 2 and 3 are aligned with the PEDS development objective 2: Ensure Economic and Environmental Sustainability".Project components 2 and 3 are aligned with the PEDS development objective 3: "Ensure social inclusion and the reduction of social and regional inequalities and asymmetries"
National Adaptation Plan (NAP)
Project component 1 aligns with Objective 1: Create an enabling environment to facilitate the integration of adaptation into planning and budgeting. Project components 1, 2 and 3 are aligned with the Objective 2: Improve the capacity to manage and share data and information, access to technology and finance for adaptation. Project components 2 and 3 are aligned with the Objective 3: Implement adaptation actions for greater resilience of the most vulnerable.
3rd National Communication on CC
Project components 1, 2 and 3 align with objective 1: Promoting water resource integrated management to ensure water to populations, food production, ecosystems and tourism industry. Project components 1, 2 and 3 align with objective 2: Developing adaptation capacity of agriculture/forestry/grazing livestock production systems as to improve agriculture production and promote food security of populations.
National Plan of Action for Integrated Management of Water Resources (PAGIRE) - 2010
Project components 1, 2 and 3 align with PAGIRE strategic axis 1: Increase availability of water (natural and unnatural). Project components 1 and 3 align with PAGIRE strategic axis 2: Improving knowledge and management of water resources. Project component 1 aligns with PAGIRE strategic axis 3: Create a favourable environment for the application of GIRE. Project components 2 and 3 aligns with PAGIRE strategic axis 4: Construction of infrastructure. Improving communication, information, education and awareness of water
National strategy on food and nutrition security, horizon 2020 update - 2014
Project components 1, 2 and 3 align with Strategic objective 2: contribute to improving the conditions of access to water, basic sanitation and other components of well-being by households. Project components 1, 2 and 3 align with Strategic objective 3: To increase agricultural and fishery production in a sustainable manner, improving food supply mechanisms, with innovative techniques and expanding the participation of young people, in particular 3.3 Adding value to agricultural and fisheries production and 3.7 Strengthening the capacity to adapt to risks and climate opportunities
Strategic Plan of the National Agrarian Research System (PESNIA-2017/2024)
Project components 1, 2 and 3 align with strategic axes 3: The conservation and rational management of soils and water resources. Project components 1, 2 and 3 align with strategic axes 5: Resilience and adaptation to climate change for food security. Project components 1 and 3 align with strategic axes 7: The management of agricultural knowledge and technological innovations
National Plan for Agricultural Investment and Food and Nutritional Security - PNIASAN 2019
Project components 1 and 2 align with Specific objective 1: Increase agro-sylvo-pastoral and fishery production and productivity through innovative, diversified and sustainable production systems, and reduce post-harvest and post-harvest losses. Project components 2 and 3 align with Specific objective 3: Promote the transformation and modernization of the agro-sylvo-pastoral and fisheries sector, through the development, dissemination and appropriation of technologies and innovations. Project components 2 aligns with Specific objective 4: Improve access to food and nutrition and strengthen the resilience of populations and prevention and risk management mechanisms. Project components 1 and 3 align with Specific objective 5: Strengthen frameworks for concerted action, agricultural governance and food security in the public, private and civil society sectors
National Gender Equality Plan (2021-2025)
Project components 1, 2 and 3 align with strategic axis 1: Productivity and developing the economic autonomy of women, which includes measures and actions to increase women's participation in income generation to strengthen women's economic empowerment. Project components 2 and 3 align with strategic axis 3: Autonomy in decision-making, the deepening of democracy, which involves also a more inclusive participation of women in decision-making
National Action Programme (NAP) under the UNCCD

Project components 1, 2 and 3 align with objectives 1: Ensure the effective participation of all actors; and 2: Conserve and improve natural resources (soil, water and vegetation).Project component 3 align with objectives 3: Promote research and the exchange of scientific information on the desertification; and 4: Strengthen the environmental information system.In addition, project component 2 aligns with municipality-specific priority to combat desertification, namely construction of irrigation infrastructures.
Land Degradation Neutrality targets (LDN, 2019)
Project component 2 aligns with target 1, which aims at reducing land degradation towards ecologically recovering, and with target 2, which aims at improving land productivity. Project components 2 and 3 align with target 4, which aims to reduce the extent of soil erosion through the fixing of waterways, maximizing the conservation of agricultural lands (dryland and irrigated), recovery of hydraulic structures damaged by heavy rains, and also to roll-out awareness raising and training programmes for farmers on soil erosion.
National Strategy and Action Plan for biodiversity (2014-2030)
Project component 2 aligns with priority 3: Reduce pressures and threats on marine and terrestrial Biodiversity. Project components 2 and 3 align with priority 4: Conservation of priority habitats and sustainable management of natural resources and priority 5: Valorization and increased resilience of ecosystems.
Municipal strategic plan for sustainable development, municipality of Santa Catarina (Santiago) -2017/2027
Project components 1 and 3 align with Objective 2 (Pillar 1): Promote an education and training of excellence at all levels of education, aiming to enhance the emergence of high value-added staff to serve the municipality of Santa Catarina and the country itself. Project components 1 and 2 align with Objective 9 (Pillar 2): Leverage the agricultural and livestock sector in the municipality through new investments and its integration with other agricultural regions in the country and with national tourist markets. Project component 2 aligns with Objective 16 (Pillar 3): Ensure a better quality of environment in the municipality's territory as well as the quality of life of people through good environmental management, particularly of green spaces;
Action plan for the development of agriculture of the island of São Nicolau – 2009/2012
Project components 1 and 2 align with general objective 1: Sustainable use of natural resources for the integrated development of river basins as territorial units. Project components 1 and 2 align with general objective 2: Contribute to the development of the agro-silvo-pastoral sector and the percentage increase in its specific weight in GDP. Project components 1 and 2 align with priority axes 1: access to and sustainable management of natural water, land and biological resources, including halieutics, namely for the strengthening of infrastructure and the sustainable management capacities of rural communities. Project components 1, 2 and 3 align with priority axes 2: the enhancement of agricultural, fishery and other products for the strengthening of conservation, processing and marketing activities, namely for the establishment of adapted infrastructure, private business capacities and/or associative, etc;

E. National Technical Standards and Environmental and Social Policy

118. The screening of relevant technical standards and legislation, as well as the relevant Environmental and Social Policy principles per concrete outputs are summarized in the Table 12. An initial screening of the Legal Framework for Environmental Impact Assessment (EIA) in Cabo Verde vis-a-vis the proposed project's tangible outputs indicates that an EIA will not be necessary at this stage, however the project proposal recognizes necessary compliance with international standards as well. Further analysis will be carried out during preparation of the full proposal in order to identify linkages at Activity level and understand whether national technical standards provide the project with all tools necessary for compliance with AF ESP and FAO's Environmental and Social Safeguard System and subsequent corrective actions will take place. During the full proposal development process, a comprehensive and detailed EIA will be conducted. The EIA will meet both the Adaptation Fund's requirements, in accordance with the Fund's Environmental and Social Policy, Gender Policy, as well as the FAO's Environmental and Social Standards. Table 12 presents an initial overview of the proposed project's compliance with the AF ESP and national level legislation. The full project proposal will describe how safeguarding measures can complement or strengthen national technical standards and achieve full compliance.

119. Given the focus of Component 2 on afforestation, increased vegetion and land cover activities, a safeguard measure will be introduced by the project to address the significant concern related to the potential proliferation of invasive and exotic species. In line with the AF Principle on Conservation of Biological Diversity, the project will ensure relevant activities indicated under Component 2 will not introduce or facilitate the proliferation of flora species potentially invasive, as per the national and international[101] classification. As described in Section B, the project will coordinate closely with DGASP/MAA, the responsible authoritiy for forest management and services. The forest management plans formulated by the authority already includes specific measures to monitor and eliminate the risk of invasive and/or exotic species. To further mitigate the risk, the activities will be integrated in the central information system on land cover dynamics. The project will promote only native/non-invasive plants that pose no threat to the ecosystem.

120. The screening of activities will guide the process ensuring compliance with national Laws, Acts and Decrees. A broad consultation process will be carried out at full proposal design to identify required permits and modalities to obtain clearances as needed. Assessments and feasibility studies will provide further clarifications on national environmental standards in place and will illustrate modalities to ensure compliance by project activities. Moreover, the analysis will support the design of an Environmental and Social Management Plan (ESMP), to included in the full proposal. Finally, controls will be indicated and performed in order to avoid any potential risk of negative impacts on the environment or increase of inequalities on vulnerable population.

Table 11: Compliance with national technical standards, rules, regulations and procedures, and ESP principles

Relevant Law, Regulations and Standards	Output	AF ESP	Description
Law No. 86/IV/93 establishing the Environmental Policy	2.1.1;1.1.2; 2.1.3;2.1.4;2.2.1; 2.2.2;2.2.3;3.1.1;	1,2,9,10, 11,12,13 ,15	This Act aims at improving the continuous use of natural resources for an autonomous development. It regulates surface and underground soil protection, agricultural exploitation, water sources, soil use for urbanization or

[101] Amongst reference datasets of invasive species, the following will be considered: the Global Invasive Species Database, published by the Invasive Species Specialist Group (http://issg.org/database/species/search.asp?st=sss&sn=&rn=Cape%20Verde&ri=19158&hci=-1&ei=-1&fr=1&sts=&lang=EN) and the Global Register of Introduced and Invasive Species, published by the Global Biodiversity Information Facility (https://www.gbif.org/dataset/4c575729-705c-47b8-adad-f1f2410395aa/metrics)

	3.1.2;3.1.3;3.1.4; 3.1.5;3.2.1;3.2.2; 3.2.3		for industries, flora and fauna protection. The Act deals with natural resources and pollution, protected areas and environmental impact assessment and establishes a series of measures for the accomplishment of environmental policy.
Legislative Decree No. 3/2015 approving the Water and Sanitation Code (CAS)	2.1.1;2.1.2;2.1.3;2.1.4;3.1.1	1,2,4,9,10,11,12,13,15	This Code concerns the definition of the fundamental principles for water resources, setting standards that guarantee their preservation, quality, sustainability and rational use. It also includes inland surface and ground water and water produced by desalination. It regulates the institutional framework, the ownership, planning and use, as well as water quality, hydraulic works, economic and financial regime of water resources.
Decree-Law No. 81/2005 ruling on the Environmental Information System (SIA)	1.1.1;1.1.2;1.1.3;1.1.4	1,2,9,10,11,12,13,15	This decree regulates the Environmental Information System (SIA) with the aim of improving proper circulation and dissemination of environmental information, with the undergoing principles of: access to information, participation of all citizens and environmental preservation.
Decree-Law No. 27/2020 approving the Legal Framework for Environmental Impact Assessment (EIA)	1.1.4;2.1.1;2.2.2;2.1.3;2.1.4;3.1.1;2.2.1;2.2.2;2.2.3;3.1.1	1,2,9,10,11,12,13,15	This Legal Framework regulates the Environmental Impact Assessment of public and private projects likely to have significant effects on the environment, meaning stakeholders and their related competences, the phases of the environmental impact assessment, the registration of consultants and the constitution of technical teams, as well as the fees.
Decree No. 4/2020 regulating the criteria and parameters for monitoring the quality of irrigation water	2.1.1;2.2.2;2.1.3;2.1.4	1,2,4,9,11,12,13	This Decree regulates the parameters for monitoring irrigation water quality (surface or underground water, desalinated water, recovered rainwater or treated wastewater), to meet or complement the water needs of agricultural crops, forests, ornamental, nurseries, lawns and other green spaces, prior to the addition of fertilizer
Law No. 48/V/98 regulating forestry activity	2.2.1;2.2.2;3.1.3;3.2.1	1,2,9,10,11,12,13,15	This Law regulates the forestry activity, specifying authorized activities to be performed by public and private entities in order to protect national forests. It applies to trees and forests which are not cultivated for agricultural purposes, to the exercise of forestry activity and to land subject to the forestry regime or likely to be afforested within Cape Verde.
Decree-Law No. 49/2021 approving the General Bases for the concession of the management, exploration and distribution of water resources for irrigation	2.1.1;2.2.2;2.1.3;2.1.4	1,2,4,9,11,12,13	This Decree-Law approves the general bases for the concession of the management, exploration and distribution of water resources for irrigation. The purpose of the concession is the service of management, exploration and distribution of water resources for irrigation dealt with the institution Água de Rega (AdR), Sociedade Unipessoal, SA.
Resolution No. 104/VIII/2014 approving the White Paper on the State of the Environment in Cape Verde	2.1.1;2.1.2;2.1.3;2.1.4;2.2.1;2.2.2;2.2.3;3.1.3	1,2,9,10,11,12,13,15	This Paper summarizes the state of the management of natural resources, namely land, air, water and biodiversity, and the environment and analyses how public sector agents (private sector, NGOs and civil society), have been making use of these resources.
Decree No. 7/2002 establishing conservation and protection measures for fauna and flora species.	2.2.1;2.2.2;2.2.3;3.1.1;3.1.2;3.1.3	1,2,9,10,11,12,13,15	This Decree defines conservation and protection measures for the flora and fauna species subject to extinction which are considered the basic components of national biodiversity and natural heritage of Cape Verde.
Decree-Law No. 5/2016 regulating the production, certification, marketing, import, export and control of seeds and planting material within the national territory.	2.2.1;2.2.2;2.2.3;3.1.1;3.1.2;3.1.3	1,2,9,10,11,12,15	This Decree-Law provides for the national system of seeds and seedlings, licensing and registration, production, quality control, packaging and labelling, certification, marketing, services and costs.
Law No. 37/IX/2018 approving the principles, norms and procedures that guarantee the recognition and effective exercise of the Human Right to Adequate Food	3.1.1;3.1.2;3.1.3;3.1.4;3.1.5;3.2.1;3.2.2; 3.2.3	1,2,4,5	This Law recognizes the Human Right to Adequate Food, by guaranteeing permanent and stable access to adequate, healthy, nutritious and safe food, always adapting to its food and cultural needs and preferences.
Legislative Decree No. 1/2006 approving the Territorial and Urban Planning and regulations at municipal level (Order No. 13/2014 approving the Regulation for Municipal Territorial Plan of Santa Catarina de Santiago (PDM-SCS); Order No. 8/2013 approving the Regulation for Municipal Territorial Plan of Ribeira Brava (PDM) within São Nicolau Island)	2.2.1;2.2.2;2.2.3;3.1.1;3.1.2;3.1.3	1,2,9,10,11,12,13,14,15	The Territorial and Urban Planning and municipalities regulations establish the administrative and legal regime for use, occupation and transformation of the entire territory. They aim at valorising of the diversities of the territory and ensuring the rational use of natural resources, preserving the environmental balance and historical, cultural and natural heritage, as well as modernizing cities while improving rural areas, combating desertification and encouraging the creation of income-generating activities. The municipalities regulation specifies licence requirements, approvals and authorizations to the competent authority.

F. Duplication

121. Cabo Verde holds various climate change, water management and agricultural related projects and initiatives financed either from the national government or from international donors. Initial screening for potential duplication has not highlighted any overlapping or duplication with other funding sources and the proposed one in technical, spatial, and/or temporal dimensions. The proposed concept will be able to maximize results through synergies and also avoid duplication. Other projects listed below will be taken into account to augment the results, and in some cases their lessons learned will be utilized to reinforce the objectives. At the stage of full proposal development and consultations, dialogue, coordination and knowledge sharing with all relevant stakeholders will be further implemented to ensure best alignment and create synergies with the existing initiatives at regional and global level.

122. Within the broad stocktaking of relevant proposals, the analysis paid particular attention to potential synergies and complementarities of current proposal with agriculture and environment projects conducted by FAO and the Ministry of

Agriculture and Environment (Executing Entity). As per below table, FAO is currently implementing 4 projects in partnership with the Ministry (see highlights, FAO - TCP/CVI/3702 is under the Ministry of Rural Development), across different sectors with potential complementarities. At full proposal stage, additional consultations will be arranged to collect information and define possible synergies, in particular on the promotion of good agricultural practices, the solutions for the provision of water for crops, the resilient and sustainable management of agricultural water, and the enhancement of adaptive capacities of the forest sector.

Table 12: Project proposal complementarity and non-duplication overview with parallel project interventions in Cabo Verde

Relevant Projects/ Programme	Description of the project/programme	Goals and Achievements (within/ after the relevant project/program)	Complementary potential and non - duplication	Timeline and Budget
UNDP-GEF Building adaptive capacity and resilience to climate change in the water sector in Cabo Verde	This project is designed to develop national capacity on climate change adaptation, also through a series of climate change adaptation technologies and practices at vulnerable and affected sides. The project aimed at developing and building upon traditional water management practices and technologies, disseminating lessons learned sustainable networks, platforms and information systems.	The project mainly focused on three aspects: integration of climate change risks and adaptation measures into key national policies, plans and programs for water resource management, implementation of small and medium scale climate change adaptation practices for water resource management in selected hydrographical basins, and spread of lessons learned and best practices from pilot activities, capacity development initiatives and policy changes.	The project has similar objectives to the AF project, such as increasing water use efficiency through the use of new technologies and building effective adaptive capacities. However, the project is geographically not overlapping, it is focused on Sant Antao Island and different municipalities in Santiago (i.e. Tarrafal and Santa Cruz). The AF project will draw from the lessons learnt and good practices of the GEF project, leveraging on key experiences.	**Duration**: 2009-2018 **Budget:** 3 million USD
FAO - TCP/CVI/3701 Strengthen the resilience of vulnerable agro-pastoralists in Santiago Island	The overall goal of the project is to build capacities to anticipate and manage risks threatening food and nutrition security at the community level. It will increase in production and implementation of good agricultural practices for risk reduction through learning at Agro-Pastoral Field Schools, thus allowing beneficiaries strengthened their livelihoods by expanding their activities and increasing their income.	The project will set up 10 Agro-Pastoral Field Schools benefiting 250 households and actively promote good practices for household resilience in the face of climatic hazards. Each school benefits from a microfinance structure to effectively support the good practices promoted.	The project is complementary to the AF project on improving awareness-raising but in different municipalities and watersheds of Santiago (Tarrafal, S.Cruz, Ribeira Grande, Calheta and Praia). Lessons learned from the building capacity activities will be taken into account especially for component 3.	**Duration:** 2018-2021 **Budget:** 276,000 USD
FAO - TCP/CVI/3702 Support in strengthening the adaptation capacity and resilience of the forestry sector in Cabo Verde	The objective of this project is to strengthen both the environmental responsibility of the and biodiversity as a base of environmental resources for the promotion of economic activity, namely agriculture, animal husbandry, forestry, tourism and fishery. Thus, it aims at increasing the resilience of women and men in forest communities, and also at improving adaptive capacity to face the additional risks.	The project will ensure: the enhancement of the success rate of forest plantations, their resistance to water deficit and the possibility of planting in degraded, saline or poor soils, the reduction of desertification of summits, slopes, escarpments and other isolated and deforested areas. The implementation of sustainable removal of brush with invasive vegetation and the reduction of plastic waste from reforestation by a more sustainable, efficient and functional plant production system.	The project has some objectives similar to the component 2 of AF project (promoting land restoration to build resilience). As the geographical coverage of the projects are distinct (the activities are implemented on Praia Santiago, Boavista et Fogo) an information exchange might facilitate the scale out of project best practices. At the full proposal stage the concrete activities planned in this project will be investigated to avoid overlapping and seek complementarities.	**Duration:** 2018-2021 **Budget:** 298,000 USD
FAO-TCP/CVI/3802/C2 Climate-resilient and sustainable farming in Cabo Verde – Phase I	The main goals of the projects are to introduce low-cost and low-maintenance water provision systems, in a sustainable and resilient to climate change manner. These systems will benefit from available low-quality water sources to provide clean drinking water for both crops and livestock. It directly contributes to Priority 2 of the government, which looks for integrated and innovative approaches to sustainable and participatory natural resource management, mitigation and adaptation to climate change and natural disaster risk are developed and implemented.	The project aims at identifying suitable farming areas for the implementation of the climate-smart farming systems for developing the Phase II of the project, through exploring the quality of the land and water resources and the crops cultivated. It also proposes the appropriate sustainable integrated farming solutions for the rural communities	AF project will take into account any relevant project results achieved during Phase I and the following Phase II of the project, to explore synergies or lessons learned and to build on products and best practices. The AF project will thoroughly examine the training material used in order to draw lessons.	**Duration:** 2020-2021 **Budget:** 39,000 USD
FAO-TCP/CVI/3804 Water management for resilient and sustainable	The overall objective of the project is to sustainably strengthen the livelihoods of people thanks to the mobilization and efficient management measures of water resources to meet food, nutritional and drinking water supply	The project aims at implementing techniques for the management of water resources, through the assessment of surface and groundwater sources, equipment of a borehole for agricultural use, construction of a desalination unit and	The project has similar objectives to the AF project. Although the project is geographically not overlapping and it will be developed on Praia area, a dialogue can be established for the	**Duration:** 2021-2022 **Budget:** 455,000 USD

agriculture and in response to COVID-19 pandemic in Cabo Verde	needs, and to build the capacities of national officials and beneficiary populations.	implementation of appropriate training on the efficient use of water. In addition, it introduces good agronomic practices to promote crops tolerant to high salt content as well as agronomic techniques for mobilizing and managing water and land resources	purpose of synergies, in order to share knowledge and best practices.	
FAO/EC GCP/CVI/046/EC REFLOR -CV Building adaptive capacity and resilience of the forestry sector in Cabo Verde	The project aimed at increasing resilience and enhancing key adaptive capacity to address climate change impacts on desertification and land degradation in Santiago (Rui Vaz,Tarrafal and Flamingos), Fogo and Boavista Islands of Cabo Verde, supporting thus poverty reduction, economic growth and environmental sustainability.	The project focuses on the integration of climate resilient forests into the policy framework and on the implementation of concreate actions to strengthen the adaptive capacity of the country, through afforestation and re-naturalization of forest areas, climate-resilient forestry and agroforestry management practices and improvement of participatory management of forest resources and building knowledge	The project is complementary to the Component 2 on reforestation activities. The AF project target areas are not overlapping with the FAO/EC project which is implemented in Rui Vaz and Tarrafal in Santiago Island, Fogo and Boavista Islands. The AF project will take into account all REFLOR products and tools while designing the activities and products and will review existing information that can further enrich or complement the activities.	**Duration:** 2017-2021 **Budget:** 5 million USD
BADEA Rehabilitation and Preparation of Three Water Basins in the islands of "Santiago", "Santo Antao" and "Boa Vista"	The project aims at enhancing food security through mobilization of surface and ground irrigation water, expansion of irrigated agricultural areas, natural resources development and sustainable management by protecting soil against erosion, and adaptation of agricultural activities to climatic change through awareness campaigns, in addition at reducing poverty and improving living conditions of the population through improving income-generating agricultural production and unlock the isolation of the project area.	The project will provide water resource mobilization facilities, including stone and concrete barriers for collecting surface water, pipeline wells and irrigation water reservoirs and tanks and the supply and extension of irrigation pipes from reservoirs to agricultural holdings, surface wells, supply and extension of irrigation pipes from reservoirs to agricultural holdings, and barriers of groundwater, facilities for protection against floods and for soil protection (e.g. construction of reinforced benches, planting of trees of fruit and forest species, rehabilitation of hectares with anti-erosive infrastructure)	The project is not geographical overlapping, but it provides synergies potential for water resource development since it takes place in a basin adjacent to that of Ribeira Grande selected in the municipality of Ribeira Grande de Santiago. The AF project can draw from the lessons learnt and good practices of the BADEA project.	**Duration:** 2019-2024 **Budget:** 15 millions USD
IFAD/GoCV POSER- Rural Socio-economic Opportunities Programme	The overall objective of the program is to improve the livelihood of poor rural populations by creating inclusive and sustainable economic opportunities in rural areas. The aim is to promote long-term employment for the rural poor through the support of micro-projects in favor of sustainable income-generating activities and to contribute to food security by reducing their dependence on food imports.	The project mainly leverages on the Regional Poverty Reduction Programs (PRLP) instrument to achieve its objectives which are designed and implemented in each region following the Local Poverty Alleviation Program. The implementation of PRLPs will result in the development of micro-projects and the implementation of inter-community actions at the level of each island. In addition, it provides training and networking, coordination and management components.	The IFAD project focuses on different thematic area, being part of a larger program (PRLP), but lessons learned could be in-built to maximize the efficiency of AF project implementation.	**Duration** 2012 – 2022 **Budget:** 37 million USD
JICA Water Supply System Development Project in Santiago Island	The main objective of the project is to ensure stable freshwater supply to the population, while improving access to safe freshwater by connecting regional water systems in the Santiago Island through construction of seawater Desalination facilities and treated water transmission facilities.	The project contributes to country's climate change adaptation through the construction of water supply facilitates, as seawater desalination and water transmission pipelines, which support to the subsequent preservation and replacement of underground water resources through seawater desalination.	No duplication has been detected from this project, since it targets a different area (Praia city and Calheta in the Municipality of São Miguel, and in Tarrafal, São Salvador do Mundo, São Domingos, Ribeira Grande Santiago and São Lourenço Orgaos). In addition, it mainly focuses on increasing the capacity of reservoirs through the construction of desalination plants. However, synergies or lessons learned may be explored during design consultations.	**Duration**: 2013- 2019 **Budget**: 166,087 USD
AWF Mobilization of surface water and capacity building for integrated water resources management	The main goal of the project is to contribute to socio-economic development and poverty reduction of the country by increasing water storage capacity and irrigated surfaces in a context of strengthened institutional and regulatory capacities.	The project aims at ensuring balanced use of water, through a detailed study and assessment on appropriate hydraulic arrangements to develop surface and groundwater, the revision of the water law to strengthen the framework for the integrated management of water resources and the definition of a program to build facilities for agricultural development and preservation of the natural environment	AF project will take into account the produced material of AWF project in terms of surface and groundwater resources and integrated water management in order to avoid duplication and draw lessons on products and best practices	**Duration:** 2012-2017 **Budget:** 1,804,098 USD
GCP/RAF/506/MUL Adoption of efficient and	The project builds on intraregional commonalities to strengthen collaborative approaches. It will mainly be implemented in three countries	The main objectives of the project will be to promote the adoption of efficient and climate-smart food production practices, including efficient practices for using a wide	AF project will draw lessons on the development of climate-smart practices on sustainable agriculture. The project is partially	**Duration:** 2017-2021 **Budget:** 500,000 USD

climate-smart agriculture practices in African SIDS	(Cabo Verde, Guinea Bissau and Seychelles). It aims at promoting efficient and climate-smart practices, strategies and policies for food production, sustainable value chain and rural development, while creating synergies through intraregional exchange and knowledge sharing activities.	range of easy-to-grow crops of high nutritional value, strengthening of the organizational capacity of smallholders to cope with the impact of climate change and reduction of post-harvest losses, as well as promoting viable market opportunities to incentivize adoption of climate-smart practices in the production of nutritious food.	complementary to the Component 3 of the proposed project, although AF project will be more in-situ by developing a good agricultural practice targeting the command area. The AF project will examine the products in order to avoid duplication and establish consultation with the project Steering Committee.	
FAO COVID-19 Rapid Impact Assessment on Food Systems, Agriculture and Food Security in Cabo Verde	The project aims at providing an accurate picture of the extent and severity of COVID-19-induced disruptions and food insecurity in order to timely address appropriate actions through an impact assessment with macro-level and micro-level studies.	The main goal of the project is to identify and prioritize the probable impacts of Covid-19 on food value chains, through a macro-level study on food supply, demand and trade and a micro-level study to assess the impact of the crisis on the local economy and on household.	No duplication has been identified from this project, but AF project will examine the assessment material used in order to draw lessons on COVID-19 impacts.	**Duration:** 2020-2021 **Budget:** 93,000 USD
BADEA Flamengos Watershed Development Project	The project aims at ensuring better control of surface and groundwater, by promoting water mobilization works, small irrigation techniques and the rational management of natural resources through a participatory and decentralized approach.	The main objectives of the project are the construction of water and soil conservation infrastructure and dams at the watershed level, as well as the reforestation of watersheds.	AF project will take into account the produced material of this project, leveraging on relevant existing experiences and capacities at the watershed level. Synergies or lessons learned will be explored to build on products and best practices.	**Duration:** 2011 – 2016 **Budget:** 10 million USD
Ministry of Agriculture and Environment (CV) Mobilisation Programme 1 - Agro-sylvo-pastoral and fishery development and enhancement.	The main objective of the program, in accordance with the specific objective 1 of PNIASAN, is to increase agro-sylvo-pastoral and fishery production and productivity through innovative, diversified and sustainable production systems as well as to reduce post-harvest and post-harvest losses.	The main goals of the program are the development and construction of hydro-agricultural infrastructure for the mobilization, conservation and distribution of water also for irrigation; promotion of fruit growing in wetlands; the dissemination of new production technologies for adaptation to climate change, and of new varieties and breeds adapted to the climate.	The program has potential complementary to the Components 2 and 3 of the proposed project, although the AF project will be more precise in solving issues in the target areas. The AF project will create synergies with Cabo Verde Ministry while designing the activities and products at full proposal level to further enrich or complement the program and avoid any duplication.	**Duration:** 2018 – 2021 **Budget:** 172 million USD
Ministry of Agriculture and Environment (CV) Mobilisation Programme 3- Development and dissemination of innovative technologies for the modernization of the agro-sylvo-pastoral and fisheries sector	The program aims at developing crop varieties tolerant to pests and diseases and resistant to drought and at improving zootechnical species adapted to local conditions while formulating and and disseminating agro-sylvo-pastoral packages adapted to the conditions of producers and consumers.	The overall goal of the program is to introduce new varieties tolerant to pests and diseases and resistant to drought and new technologies for increasing production, productivity and improving the food and nutritional security of populations, through different activities including the adoption of new varieties adapted to climatic parameters and irrigation water management techniques to cope with climate change	The project provides synergies potential for the development of new agricultural technologies and practices. It has a partial complementarity with Component 3, even though AF project will target specific areas. The full proposal development process will investigate the concrete activities planned in this program and the specific locations to avoid overlapping and seek complementarities.	**Duration:** 2018 – 2021 **Budget:** 13 million USD
Ministry of Agriculture and Environment (CV) Mobilisation Programme 4- Improving food and nutritional access and strengthening the resilience of populations	This program is aligned with the specific objective 4 of the PNIASAN. It aims to improve access to food and nutrition and to strengthen the resilience of the population of rural areas by promoting mechanisms for adapting and preventing the economic and environmental risks by focusing on vulnerable rural families and contributing to the reduction of food insecurity.	The main achievements of the program are to strengthen the resilience of agro-sylvo-pastoral and fishing families to face of climate change, while improving access to social protection, food security and nutrition of the most vulnerable. This also includes the implementation of adaptation measures to climate change through reforestation service contracts at pilot project sites, installation of pilot stations of water desalination for irrigation and building capacity of technicians in climate change adaptation activities	The program has similar objectives to AF project (implementation of adaptation measures as reforestation and water desalinization). However, the AF project will target specific areas not overlapping with the program. At full proposal level AF project will examine thoroughly the program to ensure a strong coordination and key experiences exchange while avoiding any duplication.	**Duration:** 2018 – 2021 **Budget:** 138 million USD
FAO/GEF (10863) Towards Land Degradation Neutrality for Improved Equity, Sustainability, and Resilience	This project aims at enhancing climate-resilient food production and nutrition, local livelihoods while reducing poverty in terms of improved land cover, land productivity, enhancement of soil organic carbon sequestration, through nature-based solutions for supporting Cabo Verde's voluntary LDN targets.	The main goals of the project are to strengthen the enabling environment for LDN by tackling fragmented policy and planning processes and weak institutional capacities while enhancing the evidence base for improved decision-making to support integrated landscape management, as well as generate positive impacts through innovative practices to enhance productivity, restore degraded land and increase climate resilience	No duplication has been identified, since the target areas are not overlapping. In fact, FAO/GEF project will target 3 watersheds: Ribeira Seca (Santiago Island), Ribeira Vale de Garças and Ribeira das Patas (Santo Antão Island). AF project targets Santiago islands, but different Ribeiras. However, leveraging on the contribution of Ministry to both	**Duration:** 2023 – 2027 **Budget:** 7,528,482 USD

			projects, the AF project will ensure a strong coordination and key experiences exchange, in particular seeking synergies for the development of national information systems. The full proposal development process will investigate the concrete activities planned in the FAO/GEF project to avoid duplication and seek complementarities.	

G. Learning, Knowledge Management and Lessons Learned

123. All proposed components have strong knowledge production and management elements as well as capacity-building and result-specific activities embedded across the project design. To meet the learning, operational and implementation objectives of the project, the knowledge management component and the stakeholders/ community members early involvement are of paramount importance. Capacity-building trainings, as explicitly requested by the consulted communities and stakeholders, will contribute to the sustainability and scalability of the project by enabling the communities to maintain the results and activities and share best-practices. The design of knowledge products during the full project development will be aligned with the specific learning requirements and gender/age group specificities of the communities at watershed level.

124. Throughout the project life-span, the KM component outlined across activies include tools and actions to promote the collection of relevant experiences and information to be shared among stakeholders both for capacity development purposes, as well as to support the scalability of project results. To this purpose, all project implementation steps will be duly documented and regular meetings will be conveyed to share lessons learned at all levels.

125. The fact that Cape Verde is a member of a number of international knowledge organizations and initiatives brings an advantage for the high-level dissemination of the project results at sub-regional and regional levels. Notably, Cape Verde hosted the 1st International Forum of Global Framework on Water Scarcity in Agriculture, where countries convened to advocate and share lessons on concrete, innovative and collaborative solutions to address water scarcity. A remarkable achievement of the Forum was the ratification of Praia Commitment by member countries. The Praia Commitment created a forum to monitor the achievements and coordinate members. Amongst the 17 commitments are the ones related the cooperation over the repository of knowledge and shared learning. The Forum provides a large-scale, international platform of multidisciplinary actors (including venues, dedicated website to host outreach products and social media accounts) to disseminate and advocate the countries' efforts towards adapted agricultural and food systems to mitigate the impacts of water scarcity and climate change. The project will leverage this platform as the international umbrella of knowledge management to up-scale its results and ensure that lessons will be shared at global scale, as well as to internalize the lessons learnt from partner members.

126. Equally important, knowledge products must be targeted towards the specific needs of communities, to strengthen consideration and knowledge on climate change impacts and adaptation measures. Being traditional communities, the project will use both formal and informal channels of knowledge transfer. As far as formal channels are considered, the knowledge products are meshed into each project activity to provide an iterative learning process during the implementation. Each specific output will be accompanied with dedicated capacity-building activity (please refer to the table on knowledge management framework). As far as informal channels are considered, the project will facilitate the traditional knowledge transfer through creating social interaction, i.e. through exchange visits, set-up of demonstration farms. Critical in exploiting the potential of project activities is to create synergies amongst different outputs. The near real-time documentation and publication of learning products will allow farmers to gradually build capacity on the specific project outputs and connect the sub-results to each other (i.e. system-level water infrastructure to on-farm practices). This will create a comprehensive overview of the project interventions towards the overall objective of building adaptation resilience through improved water management and land restoration. At full proposal development, a comprehensive plan of communication channels will be elaborated.

127. Output 3.1.5 output acts as an umbrella for coordinating the knowledge-management and information up-scale. Institutional framework with assigned resource persons and focal points will be set up. This will line up and operationalize the learning strategy of the project (fully elaborated at full proposal level). The strategy will capture knowledge products and information from all project activities, define knowledge management indicators, progress timeline of capacity-building, design and interface of knowledge products, communication modalities and inclusive language, specialized communication channels and dissemination methods. This Output goes beyond a dissemination and communication strategy of the project, as it will effectively measure the progress in knowledge management and address remaining gaps (ex-ante and ex-post analysis, impact assessments etc.). Through this function, the Output will support the up-scale of different project activities (i.e. climate resilient agricultural practices) and provide recommendations on best and efficient implementation approaches for future policies. To this end, this Output will respond to the often overlooked aspect of policies: how should the proposed action plans be put in place?

128. Component 1 sets out the development of various dataset and information systems related to the critical water sector of Cabo Verde, with a key project deliverable being the "Water Harvesting/Desalination Information System" (WATHDIS), which aims at strengthening stakeholders' capacity in terms of assessment and analysis of the water harvesting/desalination sites and as such enable them to be more proactive in terms of decision making related to investments and interventions to support storage and desalination facilities.

129. Component 2 is the "hard" component of the project and is seen as the cornerstone for developing and disseminating technical knowledge and capacities in different forms (water management, land restoration) and at different levels (intra-island, regional and national level). In more concrete terms, Component 2 includes a variety of structural interventions to maximize the collection and storage of non-conventional water resources while the non-structural capacity-building programmes will support communities in developing and implementing successful, participatory management of the developed infrastructures, scaling-up their results beyond the specific island level. The local communities will be benefited by the development of technical and operational skills as well as advanced forest restoration practices.

130. Component 3 holds strong knowledge, innovation and digitalization components. It foresees the dissemination of various of good agricultural practices (GAPs) and climate-smart practices (CSPs) enhancing agricultural communities' resilience and production capacity and alleviating risks. The development of a digital, mobile application will facilitate and improve intra and inter-island trade, supporting vulnerable communities' income and access to nutrition while preventing associated losses (e.g. food waste).

131. The lessons to be drawn, the resilient adaptive capacities, innovative climate policies and good practices to be developed in the framework of the proposed project will be elevated to work across programmes, sectors, and islands. Table 14 illustrates a concise overview of how the proposed project intends to shape its learning and knowledge management component.

Table 13 Knowledge management framework - schematic overview

Output	Learning objectives (LO) and indicators (I)	Knowledge products	Monitoring & Evaluation (M&E)	Dissemination & Upscaling
1.1.1.	**LO:** To enhance the knowledge, understanding and information availability of relevant features **I:** Number of features included the dataset Number of stakeholders/entities/community members having access to the dataset (disaggregated by gender)	Development of a survey guide and technical report/analysis of the relevant features Compiled and synthetized datasets from existing and new information	Continuous tracking and annual update of the relevant features Annual review of the compiled dataset to identify potential data gaps	Dataset to become available online at national and international level
1.1.2.	**LO:** To enhance the knowledge related to water harvesting/desalination potential **I:** Number of areas covered of the spatial analysis	Development of GIS-based database Development of accompanied technical report on the water harvesting/desalination potential	Annual update of GIS data Annual technical reporting and evaluation-based on stakeholders meeting- on water harvesting/desalination trends to further optimize the potential	GIS-based database to be expanded to national level and annual technical reports to become available online at national and international level
1.1.3.	**LO:** To enhance access to water harvesting-related information **I:** Number of stakeholders/ entities/ community-members able to have access and use the information system (disaggregated by gender)	Development of manual, ToR / ToS (terms of reference/terms of service) and training tutorials for the use of the information system Face-to-face training report	Annual monitoring and update of the information system to improve accuracy of water harvesting identification Annual review of the training report content to adjust to the needs and information gaps as identified by the involved stakeholders	Information system and identification of water harvesting sites to be expanded at national level Trainings to be delivered to stakeholders and community-members of other islands
1.1.4.	**LO:** To enhance access to water harvesting-related information **I:** Number of authorities/ stakeholders/ community-members trained in using successfully the WATHDIS (disaggregated by gender)	Development of manual, ToR / ToS (terms of reference/terms of service) for the information system operation Development of training tutorial for the use of the information system Assessment of report on training for stakeholder on WATHDIS	Annual update of manual and training tutorial as per trained stakeholders' feedback Assessment report to be updated annually based on the trained stakeholders' feedback User feedback of WATHDIS, troubleshooting reports	Capacity building on the approach and use of WATHDIS to be expanded at national level Training tutorials and annual assessment reports to be available online and open to comments for further improvement
2.1.1.	**LO:** To enhance water collection and harvesting techniques **I:** Number of community members benefited and hectares of land to be improved thanks to the developed structures	Development of guide for optimal use of the harvesting systems Technical assessment report on the performance and maintenance need of the developed structures	Annual update of the guide based on the stakeholders feedback Annual update of the technical assessment report	Guide and technical assessment report to become available online and open to comments for further improvement
2.1.2.	**LO:** To enhance water drainage techniques **I:** Hectares of agricultural land improved by the intervention along with the associated farming communities	Development of guide for optimal use of the drainage system Technical assessment report on the performance and	Annual update of the guide based on the stakeholders feedback Annual update of the technical assessment report	Guide and technical assessment report to become available online and open to comments for further improvement

		maintenance need of the drainage system		
2.1.3.	**LO:** To enhance water harvesting techniques **I:** Hectares of arable land/gardens to be improved and numbers of farmers able to harvest rainfall thanks to the developed structure	Development of guide for optimal use of the harvesting techniques Technical assessment report on the performance and maintenance need of the developed structures	Annual update of the guide based on the stakeholders feedback Annual assessment of the report on the land improved and satisfaction of beneficiaries Annual update of the technical assessment report	Guide and technical assessment report to become available online and open to comments for further improvement
2.1.4.	**LO:** To enhance water desalination techniques with the use of small-scale renewable energy installations **I:** Hectares of arable land/gardens to be improved and numbers of farmers able to be benefited by the developed structure	Development of guide for optimal use of the desalinated water volumes Development of guide for the use and maintenance of small-scale renewable energy installations Development of capacity-building curriculum on saline agriculture	Annual update of the guides based on the stakeholders feedback Annual assessment of the report on the land improved and satisfaction of beneficiaries	Guides to become available online and open to comments for further improvement
2.2.1.	**LO:** To enhance and diversify community members knowledge and capacities in afforestation practices **I:** Hectares of vulnerable land improved after the interventions Number of community members getting familiar with the practices (disaggregated by gender)	Development of guide for protective afforestation techniques Photo and video documentation of vulnerable lands Development of forest management toolbox	Annual update of the guides based on stakeholders' feedback Annual assessment of the report on the land improved and satisfaction of beneficiaries Toolbox user feedback	Guide, photos, videos and booklet to become available online through various media channels
2.2.2.	**LO:** To develop revegetation techniques and capacities **I:** Hectares of erosion-prone areas to be revegetated after the interventions	Development of guide for revegetation techniques Photo and video documentation of erosion-prone areas Development of assisted revegetation toolbox	Annual update of the guide based on stakeholders' feedback Annual assessment of the report on the land improved and satisfaction of beneficiaries Toolbox user feedback	Guide, photos, videos and inventory to become available online through various media channels e.g. social media/YouTube
2.2.3.	**LO:** To develop and enhance participatory management capabilities **I:** Number of stakeholders/ entities/ community-members trained in the capacity-building programme (disaggregated by gender)	Development of a guide for good and efficient water management structures Development of capacity-building curriculum development	Annual update of the guide and the capacity-building curriculum based on stakeholders' feedback Annual assessment of the satisfaction and participation degree of stakeholders	Guide and curriculum to become available online and open to comments for further improvement
3.1.1.	**LO:** To develop/enhance knowledge on resilient farming practices **I:** Number of community members trained in developing and implementing GAPs and CSPs (disaggregated by gender)	Development of training curriculum for GAPs and CSPs GAPs & CSPs inventory compilation	Annual update of the training curriculum based on stakeholders' feedback Annual assessment of the report on the land improved and satisfaction of beneficiaries	Training curriculum and inventory to become available online and open to comments for further improvement
3.1.2.	**LO:** To implement GAPs and CSPs **I:** Number of pilot farms Number of community members with improved capacities in climate resilient agricultural techniques (disaggregated by gender)	Development of training tutorials for the GAPs and CSPs/development of a guide for using GAPs and CSPs Photo and video documentation of pilot farms Development of guide on the multiple benefits of GAPs/CSPs in strengthening communities climate resilience	Annual update of the training tutorial/guide based on stakeholders' feedback Annual assessment of the status of pilot farms and satisfaction stakeholders	Training tutorial and guides to become available online and open to comments for further improvement Training tutorials, guides, photos and video footage to become available online via media channels e.g.Youtube
3.1.3.	**LO:** To enhance knowledge on forest ecosystems products **I:** Number of the stakeholders/entities/ community-members becoming familiar with new production methods (disaggregated by gender)	Development of sustainable production guide of forest products Alternative forest ecosystem products inventory compilation	Annual assessment of the satisfaction of stakeholders etc. that became familiar with the new production methods	Production guide and inventory to become available online and open to comments for further improvement
3.1.4.	**LO:** Improved knowledge of GAPs and CSPs **I:** Number of farmers/community members to be trained during the fact-finding trips	Development of training tutorials for the GAPs and CSPs Development of a guide for implementing GAPs and CSPs Fact-finding trips reports	Annual review of tutorial and guides based on stakeholders' feedback Fact-finding trips reporting and data gaps identification Annual assessment of the satisfaction of stakeholders	Tutorials, guides and all relevant report to become available online and open for comment for further improvement
3.1.5.	**LO:** To develop/enhance the design and implementation of climate adaptation policies through innovative agricultural practices **I:** Number of new policies designed/introduced and number of community-members beneficiaries intra-island and national level	Carry-out research and policy analysis for adequate and climate policies in agricultural sector Policy and innovation assessment documentation	Annual evaluation of the promoted agricultural practices based on improvements on productivity, income, and the functioning of agricultural value chain Annual assessment of approaches and practices	Policy analysis and other relevant documentation to become available online and open to comments for further improvement

3.2.1.	**LO:** To enhance access to information related to food markets, agricultural and forest products **I:** Number of stakeholders/entities/community members having access to the information system (disaggregated by gender)	Development of manual, ToR / ToS (terms of reference/terms of service) Development of training tutorial for the use of the information system	Annual review of manual and training tutorial based on stakeholders' feedback Annual assessment of the satisfaction of stakeholders, number of new users, user feedback, troubleshooting reports	Manual and training tutorial to become available online and open for comment for further improvement
3.2.2.	**LO:** To enhance access to information related to agricultural products trade and decision-making skills **I:** Number of stakeholders/ entities/ community-members having access to the application (disaggregated by gender)	Development of manual, ToR / ToS (terms of reference/terms of service) Development of training tutorial for the use of the application Technical assessment report on the application performance and software upgrade needs	Annual review of manual and training tutorial based on stakeholders' feedback Technical assessment report to be produced on annual basis Annual assessment of the satisfaction of stakeholders, number of new users, user feedback, troubleshooting reports	Manual and training tutorial and other relevant reporting to become available online and open for comment for further improvement Forecasting application to gradually expand at intra-island and national level
3.2.	**LO:** Improved capacities related to market access and alternative income generation **I:** Number of community-members acquiring access to the markets and benefited from alternative income resources (disaggregated by gender)	Development of training curriculum for capacity building programmes Development of market access database and step-by-step guide Development of local/island level business and commercial plans	Annual review of training tutorial based on stakeholders' feedback Annual review of local business and commercial plans based on trade volumes Annual assessment of the satisfaction of stakeholders acquiring access to the markets and benefited from alternative income resources against the baseline scenario	Training curriculum to become available online Market access database to become available at national level Business commercial plans to be developed at intra-islands and national level

H. Consultative Process

132. Initiated by the Government of Cabo Verde, the concept note formulation developed along a broad consultation process including stakeholders at different levels: governmental officials, public entities involved in the agriculture and water management sectors, technical experts, community representatives, gender specialists and women organizations. The Ministry of Agriculture and Environment (DGASP), the National Water and Sanitation Agency (ANAS), the Agrarian Research Institution (INIDA), and the local FAO office were involved at all stages of the concept note formulation and supported its development in line with the national adaptation priorities and the specific adaptation needs of the targeted watersheds.

133. The request of the Ministry to formulate the project was received 8th April 2021, based on previous discussions on climate change adaptation potential in Cabo Verde. Throughout the formulation, several online bilateral discussions were held among the Ministry of Agriculture and Environment, the FAO country office and the formulation task force. The initial validation of the project's log frame took place on the 22nd July 2021 and the further refinement of the technical specificities was agreed upon during the online meeting on the 6th October 2021. The project design was aligned to the adaptation priorities indicated by the Government, namely the upcoming National Adaptation Plan, the country's updated NDCs to the UNFCCC, the National Plan for Agricultural Investment and Food Security and the Strategic Plan for Sustainable Development 2017-2021 (PEDS).

134. The project formulation was based on community consultations in all the selected project areas. The consultation meetings took place in the island of São Nicolau from the 5th to the 11th July and in the island of Santiago from the 9th to the 14th July 2021. The consultation methodology followed a protocol outlined in the consultation framework developed by the project team and made available to the field team. The protocol included three data collection instruments in the form of guides that served as support for the conduct of a fruitful and comprehensive discussion, where problems, difficulties, needs and desired future solutions were openly discussed by the participants. These data collection instruments were: 1) Guide for multilateral meetings with entities, later transformed into a questionnaire distributed to local authorities who replied in writing; 2) Guide for meetings at the community level to lead the discussions with each community. The guide was also transformed into a questionnaire to survey members of the communities; 3) Individual questionnaires, later transformed into a survey guide, which could not be used due to lack of time.

135. The discussions of each consultation meeting, with the participation of officials from targeted municipalities, delegations from the Ministry of Agriculture and the Environment, representatives from community development associations (ACDs) and (rural) community members, kicked off with a power point presentation of the project outlining: 1.The climate change scenario in Cabo Verde, 2.The justification for the development of the project, 3.The project approach, 4.The main pillars of the project, 5.The project components, 6.The objective of the mission and the consultations, and 7. The areas of intervention selected at the level of each island and selected watersheds.

136. The consultation meetings took place in a very favourable and participatory atmosphere and led to fruitful debates on the problems and possible adaptation solutions to the difficulties encountered at watershed level. A particular interest was shown in the collaboration and exchanges that the proposed activities will establish between the relevant stakeholders: community members, municipality authorities and delegations from the Ministry of Agriculture and the Environment. The consultation meetings were conducted respecting gender equality and participation considerations as well as including youth population from the consulted municipalities. To ensure gender-responsive interventions, separate consultation sessions were conducted between women and men groups.

137. A dedicated section of the consultation framework focused on the gender component in order to gain concrete feedbacks on the specific issues the female population is facing in the targeted watersheds. Their potential role and participation modalities have been equally explored. In addition to the female population, additional consultations were carried out with the leading women organizations active in the country, namely MORABI and OMCV. All comments and inputs have been taken into consideration in the development of the current concept to ensure that the outcomes will benefit equally the female populations.

138. The consultations returned insightful indications and highlighted the specificities at watershed level that guided the concept formulation. The stakeholders participated in the consultations, discussed their experiences regarding climate changes impacts and resulting conditions, the consequences of those conditions in the economic activities and livelihoods and the advantages of the proposed interventions. In more details

Santiago: The main issues raised during the meetings was the need to enhance water use efficiency and develop water resources mobilization and storage facilities to scale-up the agricultural potential and eliminate the loss of agricultural land in the targeted watersheds. Furthermore, the consulted stakeholders signified the need to strengthen the capacity of the existing infrastructures for soil conservation, increased infiltration and torrential corrections through more suitable and resilient agricultural and forestry practices. The community development associations (CDAs) active in the targeted municipalities mobilize communities by raising awareness of the existing climate change issues and promoting active participation in the adaptation interventions design and implementation. Women showed willingness and a very strong interest in the practice of trade, processing, marketing and business in general concerning agricultural and livestock products. The communities have requested explicit support in water collection, storage and distribution systems as well as desalination and pumping infrastructures. Additionally, they have requested capacity-building and skills development for the use of digital technologies on water management, agricultural production and agricultural trade.

São Nicolau: The most crucial topic firstly raised in every meeting was the issue of drought events, their increasing duration and level of intensity. The climate vulnerability of Ribeira Brava is first and foremost perceived as resulting from a decreasing precipitation trend. Secondly, the risks of disasters from flash floods were also an important concern of local populations. All the questionnaires and meeting results show a strong availability of men, women, and young people to participate in soil conservation, (alternative) plant production, plantation/revegetation activities and capacity-building sessions. The consultations, moreover, raised the serious problem with emigration of young females who depart the island looking for jobs in Praia, Sal or abroad and leave the island with a significant gender imbalance and a low fertility rate. Similar to Santiago, the consultations revealed an evident interest of women for commercial, transformation, marketing and business for agricultural and livestock production, as appropriate adaptation measures and income sources. Given the geographical position of the island, the communities expressed the need of strengthening the intra-island trade, access to markets, and the promotion of added-value chains for agriculture and livestock products.

I. Justification for Funding

139. The proposed project components, outcomes and outputs directly address the adaptation priorities and gaps identified across national government policies and institutional programmes, with a clear and impactful response to the needs of the interface of the water and land sectors and climate change adaptation as outlined in the updated NDCs (2020) and the National Plan for Agricultural Investment & Food security. Furthermore, the design of proposed interventions stems from the climate change vulnerabilities voiced by identified and consulted communities and groups at risk. The recognition of adaptation challenges prompted the design of a comprehensive approach to develop effective solutions for addressing climate-related water scarcity and land issues to increase livelihoods' resilience, particularly in a SIDS like Cabo Verde.

140. The need for concrete adaptation actions in the water management and land restoration sectors in the islands of Santiago and São Nicolau, focusing on the most vulnerable communities, is rather imperative, in order to increase access and availability to land and water resources, while at the same time halting the depletion of already scarce groundwater and degraded soils. The support provided by the project is essential to ensure the provision of more secure resources in order to support the exploitation of the full agricultural potential in target areas, and, ultimately, to safeguard the incomes of subsistence farmers. Furthermore, the increase of capacities of rural livelihoods, as foreseen in the project, is necessary to ensure the adoption of climate-resilient agricultural practices. Finally, the project will be key in facilitating access to food markets for the most vulnerable communities, who may otherwise be crowded out of major supply chains and remain less food secure.

141. In absence of project intervention, the impacts of climate change on communities will be increasingly harsher, as productive resources will diminish and degrade, leaving farmers and rural families ever more dependent on emergency and assistance aids to respond to basic needs such as food security. The lack of integrated information systems at watershed level will leave farmers dependent on already available, and largely exploited, resources. In the face of increasingly scarce water resources, communities will resort to groundwater for agricultural production with the double effect, on one side, to negatively impact the replenishment capacity of aquifers, and on the other to tap on poor quality resources, with potential damages to soils. The application of traditional agricultural practices, as can be expected in a non-project scenario, will result into lower productivity levels, with the risk for rural communities not only of reduced incomes, but also of increased food security. Finally, if access to food markets is not supported through proposed investment, it can be expected that communities, and particularly women and youth, will not be able to develop commercial and entrepreneurial activities, thus becoming increasingly dependent to subsistence farming and more vulnerable to the impacts of climate change.

142. The proposed project does not require co-financing and proposed activities are contingent upon ongoing or pipeline projects. Activities build on existing infrastructures and information systems, as well as on acquired information and lessons learnt, as per section 2/F. The proposed project components, outcomes and outputs fully align with national government policies and institutional priorities for climate change adaptation and identifies impactful responses through an integrated land/water management approach. Needs and gaps for increased resilience to climate change as identified in the updated NDCs (2020) and the National Plan for Agricultural Investment & Food security, are clearly and directly addressed via the intersection of the land/water sectors and climate change adaptation. The components, outcomes and outputs also align with the needs of identified communities and vulnerable groups and with the AF outcomes. This alignment has resulted in the design of a comprehensive approach to develop tailored solutions for addressing climate related water scarcity and land issues, particularly in a SIDS like Cape Verde.

Table 14: Baseline and project alternative scenarios

	Baseline situation	Alternative (Additional with AF) intervention	Alternative (non-project) scenario
Component 1	Although interventions exist in all the islands to mobilize water resources, water scarcity persists since the existing potential of water harvesting and desalination at watershed level has not been fully exploited due to the absence of a comprehensive, multi-criteria-based assessment of water harvesting/desalination sites. Due to the lack of a water management information system in rural areas, the local communities have limited or no access to water supply/storage resources which makes it extremely difficult to manage resources for resilience and to plan agricultural activities accordingly.	The communities and other relevant stakeholders will have access to improved and more accurate sets of data related to water harvesting/desalination potential in the targeted sites. The planned information system (WATHDIS) will facilitate the improvement of targeted water harvesting/desalination and management interventions based on site prioritization.	The local communities will continue to be exposed to mis- and non-sustainable management of water resources. All relevant stakeholders and community members will continue to lack accurate information on water harvesting/desalination potential and availability. The agricultural land and production degradation will persist with the associated socio-economic impacts and risks as described in Part 1.
Component 2	The maintained water storage/desalination structures are inefficient/poorly operating, and the local communities have low-capacity of accessing and maintaining groundwater resources. The quality of land and soils is depleted and subject to drought, erosion and nutrient impoverishment.	The interventions will promote improvements of micro-catchment structures and on-field techniques, as well as the establishment of solar-powered desalination sites that will result into significant gains in water availability and accessibility, thus reducing the extra pressure on the limited groundwater resources. The planned afforestation and revegetation practices and the progressive replacement of dryland, rainfed, subsistence cropping by trees and native species, (including fruit trees where possible) will result into the improved resilience of the vulnerable lands. The increased vegetation in the slopes of the rugged topography will prevent soil loss and increase infiltration. The overall ecosystem development, through the proposed trainings and knowledge dissemination materials, will result into an enabled socio-economic environment for local communities, saving time for productive activities especially for women and youth, while at the same time regenerating agricultural and forestry activities.	The local communities will continue to be exposed to water losses and further degradation of vulnerable lands with the associated socio-economic impacts. In more details, there exists a greater risk of disasters, drought, landslides, floods, destruction of infrastructure and decrease in the amount of water available for irrigation. Those conditions will exacerbate the community conflicts over the scarce water supplies, not sufficient to ensure the productivity of cropped lands and maintain livestock. The unsustainability of incomes derived from rural activities will increasingly lead communities to migrate and leave elders behind, in search of employment opportunities elsewhere and in different sectors, adding onto already crowded destinations (Praia) and activities (tourism).
Component 3	The communities in the targeted islands are facing low productivity and resilience levels of the agricultural and forest product trade sector which exacerbate the food and income insecurity for the vulnerable communities. The agricultural and forest production and trade is fragmented due to the long distances amongst communities and islands and the absence of a reliable information exchange system.	The planned interventions (capacity trainings, pilot-based fact-finding trips, knowledge material) will bring significant improvements to applied agricultural practices, resulting into more resilience agricultural production and overall knowledge and capacities of the local communities. The information system, as requested by the local communities, will support, and further strengthen agricultural production and food security allowing crops diversification, increase in production and better decision-making in the areas of agricultural/forest production and trade. The planned interventions will bring significant investments in the transformation, transportation, marketing, and commercialization of agriculture, forestry and livestock production with socio- economic added values. The modernization of commercial activities will strengthen the technical and commercial capacities, particularly, of young people and women allowing for income diversification. Overall, the interventions will be fostering coherence between climate and agricultural/forestry policies, an important legacy for a SIDS country as Cabo Verde.	The vulnerability of communities dependent on agriculture for their livelihoods will persist and increase due to the future climate change impacts. The food insecurity, due to trade fragmentation, will persist forcing the local community members- especially the unemployed young women- to abandon the watersheds and subsistence agricultures and other relevant activities and emigrate either to other islands or abroad. Those conditions will exercise more pressure on the domestic agricultural and trade structures and to the central government authorities in overall.

J. Sustainability

143. The design of the project is developed around the notion sustainability and the formulation of activities critically responds to the objectives of allowing replication in the aftermath of project lifespan, as well as of integration with complementary programmes. To this purpose, 2 main approaches were particularly considered in order to address different areas of sustainability: the elaboration and implementation of proposed actions based on consultations and participatory approaches; and the generation of knowledge, institutional and management capacity. On one side, the participatory approach strengthens ownership and commitment of end-users, while the generation of knowledge builds the most favourable conditions for the scaling up of activities.

144. Accordingly, the proposed project sustains the achieved adaptation benefits across the following interlinked areas:

- The **socio-economic sustainability** is addressed through the increased availability of water, the diversification of agricultural production, and the enhanced access to market under Components 2 and 3. Firstly, the provision of more secure and accessible water will reduce the potential for conflict over a scarce resource. Secondly, the support to diverse economic activities beyond agriculture will provide a valid alternative to generate incomes and employment. Thirdly, the development of dedicated digital tools will facilitate livelihoods in post-harvesting activities, with long-term impacts to be expected particularly for women and younger producers.
- The **environmental sustainability** is addressed through the ecosystem-based approach proposed for the water storage, land restoration, and agricultural practices adaptation solutions under Components 2 and 3. Building on natural processes for water collection and resources' augmentation, revegetation and afforestation, and resilient agriculture, post-project impacts will generate not only long-term positive effects on the environment, but will be critical in the scaling up of the adopted solutions to the benefit of additional communities and target areas. Furthermore, with the expected impacts of climate change, leading to less reliable rainfall and increasing drought, the proposed interventions will represent sustainable solutions in the face of increasing salination of soils and groundwater resources, while the improvement of agricultural practices will increase the sustainability of agricultural activities.
- The **institutional sustainability** is grounded in the active involvement of governmental institutions responsible for natural resource management, public-private actors with transferred responsibility of irrigation infrastructure and farmers. The WATHDIS infrastructure will be operated directly by ANAS, as coordinating body of Ministry of Agriculture and Environment. The WATHDIS architecture will be designed through Google Earth Engine (GEE) platform, which provides open-access, open-source cloud service. The WATHDIS methodology will be developed and duly documented, and scripts will be handed over to the geospatial technical unit (Gabinete de Sistemas De Informacao). The merit of GEE-based application is its scalability. The capacity-building activity on WATHDIS will ensure that technical experts develop a good understanding of operation and calibration of the information system in other areas. The ownership of irrigation infrastructure at system level (dams, drains, water harvesting structure, desalination units deployed on wells) will be commissioned directly to ANAS, and management responsibility will be transferred to the ADS and Electra authorities. Technical documentation, as well as protocol on condition-based asset management will be delivered to support the maintenance of required level of service. Based on FAO experience, such methodology proved efficient to guide technicians on proper O&M, assess condition and criticality, and estimate life-cycle cost of the infrastructure. Thus, the asset management protocol will support the management in mobilizing and allocating resources to irrigation infrastructure over the entire lifespan of the assets. The protocol will be developed for both authorities, considering the different configurations of developed infrastructure[102]. The in-situ water harvesting practices, GAPs and CSPs (including drip irrigation) will be maintained directly by farmers. The information system and the maintenance of developed mobile application will be commissioned directly to the Ministry of Agriculture and Environment to act as data hub. The app maintenance will be the direct responsibility of the Directorate of Statistical Services and Information Management (Direcao dos Servicos de Estatistica e Gestao de Informacao). To support the information dissemination, the specialized capacity-building programmes, while the programmatic coordination mechanism of knowledge management will contribute to the long-term sustainability of the project results.
- The **financial sustainability** is one of the main considerations of the project design, as profitability has been a major obstacle of irrigation development in the country due to the high cost of water extraction and distribution. To avoid the pitfalls of grey infrastructure, the project proposes water harvesting structures that are, by nature, more consistent with cost-efficiency requirements and environmental safeguards. Gravity-fed infrastructure will reduce the operating costs, thus optimizing the unit cost of water. Therefore, the project will also contribute to reduced cost of irrigation at farm level. On the other hand, groundwater extraction and desalination will be powered by renewable energy in a decentralized manner. The plug&play desalination units are small-scale, localized, controlled equipment that are more cost-efficient than the existing medium-scale units. The use of PV system will minimize the operating costs. Also troubleshooting will be easier than larger scale units, where repair and purchase of spare parts would require higher maintenance costs. At farm level, drip irrigation is a structural measure that could incur cost. To avoid the dependence on expensive energy supply, the project proposes gravity-fed drip systems that do not require pump. As low-pressure system, the decay of assets is lower and lifespan of the system can extend to long term, without the need to replacement of pipes. Reference

102 Please see relevant FAO experiences in the following links:
https://www.fao.org/documents/card/en/c/CB3953EN/
https://www.fao.org/in-action/building-forward-better/learning-resources/irrigation-asset-management/e-nugget/en/

to the narrative on Component 3 in Section A, the developed GAP and CSPs are inexpensive practices that require only knowledge transfer, but maintenance of the practices do not add financial burden on farmers.

145. The **project's overall sustainability** is not delegated, simply and solely, the effective deployment of proposed activities. On one side, the participation of communities and institutions, from local to national scale, will be replicated and intensified in the phase of full project design, through a combination of top-down and bottom-up consultative processes and multi-stakeholders' dialogues. This approach will strengthen the representation of different perspectives, hence the definition of multiple-objectives actions, which can be expected to have longer-term acceptance and application. On another term, the integration of capacity development and training activities, as illustrated under Part 2/G, recognizes the importance of building and/or enhancing different sets of capacities, according to diverse roles and responsibilities, as well as topics and activities. To this scope, the targeting analysis conducted during the full-design phase, will critically take into account the existing knowledge gaps to tailor the capacity development activities included under the 3 Components to specific target audiences, with a particular focus on the empowerment of women's groups. Such a detailed capacity building strategy will significantly improve the sustainability of project's results well beyond its lifespan.

K. Environmental and Social Impact Risks

146. An initial screening of potential environmental and social impacts and risks is hereby presented, in compliance with the Environmental and Social Policy and with the Gender Policy of the Fund. The evaluation process reflects consultations' outcomes as illustrated in Part 2/H, as well as it considers indications stemming from the analysis of other projects, as indicated in Part 2/F.

147. The pre-assessment would classify the project in Category B. However, with the objective to increase the overall positive impacts of the project on the environment and livelihoods, particularly on women, a more detailed assessment will be presented and will inform project activities in the fully-fledged proposal.

148. The access and equity are essential part of the targeting strategy applied in this proposal, The targeting strategy incorporates social and environmental safeguards including but not limited to voluntary participation, equity in project benefits, vulnerability and marginal conditions, women and youth empowerment, compliance with national priorities, and feasibility of proposed intervention. The strategy in the full proposal will present the underlying dynamics that might pose a barrier for the involvement of the most vulnerable groups. The full proposal will also demonstrate the applied strategies to mitigate these eventual contingencies. The involvement of project beneficiaries has been conducted on the basis of structured, group-differentiated and gender-disaggregated consultation process. The full proposal development will continue the in-depth consultations to support the completion of full TS based on multicriteria assessment. The proposed structural and non-structural interventions are scale-neutral, therefore, target beneficiaries won't be discriminated against any other criteria. At full-design stage an extended set of criteria will be applied to further ensure equitable selection of final beneficiaries. Based on the full target and gender analyses, a participatory process will be established conveying municipality staff from the social service department, local community leaders, community-based association's leaders, local NGOs, and extensionist staff from the delegations of the ministry of agriculture and environment to conduct a transparent selection process. To this purpose, a set of key criteria will be agreed upon and applied throughout the joint collaboration for the final selection.

Table 15: Environmental and Social impacts/risks against ESP

No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
Compliance with the Law	
	Low risk - A complete risk assessment will be conducted at full design All project interventions are aligned to the relevant national and international law, detailed in Part 2/E as a first step of the risk screening. *Risk*: Law and regulations provisions at different scale may change by the time of full-design proposal submission (Low likelihood) *Impact*: Project compliance with regulations in place not ensured. *Mitigation*: Re-assessment and monitoring of project development and implementation against regulations in place
Access and Equity	
	Low risk – A complete risk assessment will be conducted at full design The project will not limit or impede access to essential services and rights for communities and individuals in target areas. The project design will assess risk and impacts at broad scale and will outline the planning necessary to ensure the fairest and most equitable sharing of benefits not only for direct beneficiaries, but also for any eventual additional stakeholders. A more rigorous analysis and further criteria of the targeting strategy will be detailed at full design phase through a broader stakeholder mapping and targeting, with focus on gender and age quotas. *Risk*: Consultations highlighted a more disrupted access to resources (land and water) for women and women-headed households that may be limit the fair and equitable sharing amongst beneficiaries *Impact*: Increased vulnerability of households who cannot equitably access resources (Low likelihood) *Mitigation*: A broad stakeholders' mapping and mitigation plan incorporated in the targeting strategy conducted and defined to identify potential beneficiaries, also through the application of key criteria for a selection based on non-discriminatory considerations, nor favouritisms.
Marginalized and Vulnerable Groups	
	Low risk – A complete risk assessment will be conducted at full design

	Vulnerable groups in target areas have been consulted in the initial consultations and have provided indications on the characteristics of vulnerability, women and youth. A full target analysis is thus foreseen at full design to guide project design and inform activities with the objective to strengthen capacities of the most vulnerable groups and empower them. Specific attention in the targeting strategy will be dedicated to ensure activities under Component 3 will not crowd out the poorest in the access to digital tools, in order to reduce and overcome any eventual digital gap currently existing. *Risk*: Project activities may enhance availability of resources for selected beneficiaries at the expense of more vulnerable, and eventually less visible, groups (Low likelihood) *Impact:* Marginalized groups and/or individuals are further excluded from accessing resources and socio/economic development processes, hence posed at higher risk of poverty and social emergination. *Mitigation:* A full target analysis based on disaggregated data to indentify vulnerable groups and potential adverse impacts from the project, which will then inform activities
Human Rights	
	Minimal risk – **A complete risk assessment will be conducted at full design** The most recent Special Procedure Report of the Office of the High Commissioner on Human Rights (2018)[103] recalls the recent improvement in poverty reduction achieved by governmental programs. The report, however, highlights how absolute poverty still affects 35% of the population, with higher incidence in rural areas and for women. The project will align to objectives included in the National Poverty Reduction Plan, which mainly targets rural areas while mainstreaming gender equality. Furthermore, the project will conduct a more rigorous assessment in target areas to evaluate compliance with the National Strategic Water and Sanitation Plan which defines 40 L/day of water as a minimum requirement and an individual right. *Risk:* Project activities do not contribute to national objectives for Poverty Reduction and human rights to food security and reduced poverty (Very low likelihood) *Impact:* Rights to food security and reduced poverty are threatened *Mitigation:* Detailed assessment of target areas with reference to national objectives and definition of the plan of activities accordingly
Gender Equity and Women's Empowerment	
	Low risk – **A complete risk assessment will be conducted at full design** The initial consultations in target areas showed an existing imbalance in responsibilities and decision-making, in line with national profile. An intersectional Gender Assessment will be carried out at full design stage to clearly identify those actions that can strengthen women's role (e.g. a direct involvement in marketing activities) and reduce gender-related differences in climate vulnerability. Finally, the full Gender Analysis will align to the Fund's ESP 5 on Gender Equality and Women's Empowerment, in respect to the 6 key guiding principles outlined in Gender Policy and Gender Action Plan. *Risk:* Women empowerment is overlooked and insufficiently addressed through project activities (Low likelihood) *Impact:* Gender gap is increased and women's role is confined to traditional status, with reduceds opportunities for younger female generations *Mitigation:* Intersectional full Gender analysis to identify, also through broad consultations, project activities with higher potential in reducing gender gaps
Core Labour Rights	
	Minimal risk – **A complete risk assessment will be conducted at full design** Cabo Verde has been a member of ILO sine 1979 and it has ratified 16 Conventions, including 8 fundamental ones, which are currently in force. C105 – Abolition of Forced Labour, and C 111 – Discrimination Conventions, in particular, were ratified since 1979, while C 182 – Worst Forms of Child Labour was ratified in 2001 and C138 – Minimum Age Convention in 2011, setting at 15 years the minimum working age. The project will ensure the respect of international labour standards at all times throughout implementation. *Risk:* ILO provisions are not fully integrated into project activities, thus undermining the respect of core labour rights *Impacts:* Project beneficiaries are threatened by the missed application of ILO provisions, hence are not free to associate, and are not ensured against compulsory labour, elimination of child labour, elimination of discrimination in employment *Mitigation:* In the framework of capacity development activities, programs will promote knowledge and application of ILO principles, within and beyond project actions. FAO abides to ILO conventions, therefore, enforcement of core labour rights will be assured via FAO Environmental and Social Safeguards and its international commitments. Through FAO mechanism, the compliance with core labour rights will be fulfilled.
Indigenous Peoples	
No risk – further assessment is not required. According to the United Nations Department of Economic and Social Affairs no indigenous groups are present in Cabo Verde. *Risk:* N/A	
Involuntary Resettlement	
	Minimal risk - A complete risk assessment will be conducted at full design The project involves the implementation of activities at small scale, hence does not foresee acquisition nor resettlement. Should, however, a situation of resettlement or economic displacement arise during the implementation of the project that was not anticipated during design, the implementers and FAO will ensure that a consultation and negotiation process is undertaken with the potentially affected people, according to the Free, Prior and Informed Consent (FPIC) and do-no-harm principles. In case no agreement is reached, the project implementers will modify the specific interventions associated with the affected people, or halt them if changes are not possible. In the case where project implementers fail to undertake a consultation and negotiation process with the affected people, the conditions and terms of the agreement could be considered to be breached and suspended, following FAO normal procedures for suspension.

[103] National report submitted in accordance with paragraph 5 of the annex to Human Rights Council resolution 16/21, available at: http://daccess-ods.un.org/access.nsf/Get?Open&DS=A/HRC/WG.6/30/CPV/1&Lang=E

	Risk: Voluntary resettlement and/or economic displacement of livelihoods prompted by project activities (Very low likelihoods) *Impact:* Affected population turns to relocation and/or loses access to assets and resources *Mitigation:* Consultation and negotiations to reach an agreement based on FPIC and no-harm principle
Protection of Natural Habitats	
	Minimal risk - **A complete risk assessment will be conducted at full design** The project is not expected to have negative impacts such as degradation or unjustified conversion on critical natural habitats, including those that are (a) legally protected; (b) officially proposed for protection; (c) recognized by authoritative sources for their high conservation value, including as critical habitat; or (d) recognized as protected by traditional or indigenous local communities. Based on preliminary findings the target areas do not contain natural habitats with such characteristics. At full design stage, the final area selection will be based on a further assessment of any protected and critical natural habitats to ensure no interference. *Risk:* Natural habitats are not correctly acknowledged and impacts of land restoration activities endangers them (Low likelihood). *Impact:* Natural habitats, within and bordering target areas, are threatened and/or put at risk *Mitigation:* Full risk assessment to identify natural habitats correctly and design of project activities to reduce any potential harm, national regulation and international conventions will be monitored and complied with.
Conservation of Biological Diversity	
	Minimal risk – **A complete risk assessment will be conducted at full design** Cabo Verde ratified the Convention on Biological Diversity in 1995 and the Ramsar Convention in 2005. Knowledge on biodiversity advanced consistently between 2009 and 2014, however a significant part of information is not scientifically validated. Gaps in research on forestry resources are particularly evident, while it is recognized that biodiversity is best preserved where functional natural parks exist (3 natural parks established in the country). Ramsar sites exist in the islands of Boa Vista and Santiago, located outside the target areas. At full design stage, the biosecurity framework for Cabo Verde will be further detailed to evaluate eventual linkages with project activities in target areas and ensure they align with national biodiversity targets. *Risk:* Involuntary introduction of non-native and alien floral species through seedling nurseries' activity (Low likelihood) *Impact:* Traditional and local floral species are endangered *Mitigation:* Review of national biodiversity targets and definition of activities aligned to the Cabo Verde biosecurity framework, participation in the national framework of forest management plan and centrally operated monitoring.
Climate Change	
No risk at concept level – **A complete risk assessment will be conducted at full design**. The project concept does not promote any drivers of climate change (energy, transport, heavy industry, building materials, large-scale agriculture, large-scale forest products, and waste management), it will thus not have negative impacts on climate change. Rather, the increased forested areas and vegetation cover are expected to act as net sink of national GHG emission, reinforcing current trends illustrated in the introduction. The increased adaptation potential will be further demonstrated in the full proposal development. *Risk:* N/A	
Pollution Prevention and Resource Efficiency	
	Minimal risk – **A complete risk assessment will be conducted at full design** The project concept aims to contribute to the more efficient and sustainable use of both land and water resources. The installation of monitoring devices for the controlled extraction of groundwater will prevent overexploitation of resources. The introduction of climate-smart practices, moreover, will prevent the release of pollutants for agriculture, while the implementation of water storage capacities and the employment of non-conventional water resources will bring environmental benefits through enhanced efficiency. The project contribution to resource efficiency will be further demonstrated in the full proposal. *Risk:* Poor management of by-products in nurseries (Low likelihood) *Impact:* Ecosystems depleted within and beyond target areas, with eventual negative impacts on livelihoods *Mitigation:* Environmental Management Plan provided, to assess O&M of nurseries and ensure sustainable use of resources and correct disposal of eventual waste/by-products' residuals
Public Health	
	No risk at concept level – **A complete risk assessment will be conducted at full design** The project concept has a positive contribution to the public health through afforestation, groundwater recharge, and facilitated access to water resources. The full proposal will conduct a screening of determinant of health as per the WHO requirements. *Risk:* Potential negative impacts not identified at CN stage prompted by project activities (Very low likelihood) *Impact:* Project beneficiaries and livelihoods in target areas are undermined in their capability to conduct activities *Mitigation:* Full screening of WHO determinant of health and proper consideration in the design of full proposal's activities
Physical and Cultural Heritage	

	Minimal risk – A complete risk assessment will be conducted at full design Cidade Velha is the only UNESCO heritage site in Cabo Verde. Although it is located in one of the target areas on the island of Santiago, project activities will be conducted in rural areas, thus the site will not be included. At full design phase, a further assessment will investigate any potential linkages between also with the Tentative List of sites proposed for nomination to UNESCO by Cabo Verde authorities. *Risk:* Unidentified sites within or in close proximity of target areas *Impact:* Sites locations endangered or harmed by project activities *Mitigation:* Risk assessment at full proposal to identify all the sites of physical and cultural heritage located or in close proximity of target areas
Lands and Soil Conservation	
No risk at concept level – A complete risk assessment will be conducted at full design The project approach outlines improved measures for land management and conservation, to be displayed mainly through afforestation, green cover and climate-smart agricultural practises. No negative impacts on land and soil conservation are thus expected and the positive benefits of the project will be further demonstrated in the full proposal. *Risk:* N/A	

PART IV: ENDORSEMENT BY GOVERNMENT AND CERTIFICATION BY THE IMPLEMENTING ENTITY

A. Record of endorsement on behalf of the government[104]

José Manuel da Veiga Pereira CEO, National Institute for Meteorology and Geophysics (INMG)	Date*: December, 16, 2021*

B. Implementing Entity certification

I certify that this proposal has been prepared in accordance with guidelines provided by the Adaptation Fund Board, and prevailing National Development and Adaptation Plans and subject to the approval by the Adaptation Fund Board, commit to implementing the project/programme in compliance with the Environmental and Social Policy of the Adaptation Fund and on the understanding that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this project/programme.
Maher Salman Implementing Entity Coordinator
Date: December, 22, 2021
Project Contact Person: Maher Salman
Tel. And Email: 0039 0657054718, Maher.Salman@fao.org

[104] Each Party shall designate and communicate to the secretariat the authority that will endorse on behalf of the national government the projects and programmes proposed by the implementing entities.

ANNEX 1: Endorsement letter

INMG

To: The Adaptation Fund Board
c/o Adaptation Fund Board Secretariat
Email:Secretariat@AdaptationFund.org
Fax: 202 522 3240/5

N.Refª 080/GP.INMG/2021

Sal Island, 16 december 2021

Subject: Endorsement for "Increasing the resilience of local communities to climate change through improved watershed management and land restoration"

Endorsement for "Increasing the resilience of local communities to climate change through improved watershed management and land restoration"
In my capacity as designated authority for the Adaptation Fund in Cabo Verde, I confirm that the above national project proposal is in accordance with the government's national priorities in implementing adaptation activities to reduce adverse impacts of, and risks, posed by climate change in Cabo Verde.
Accordingly, I am pleased to endorse the above project proposal with support from the Adaptation Fund. If approved, the project will be implemented by the Food and Agriculture Organization of the United Nations and executed by Cabo Verde Ministry of Agriculture and Environment (Ministério de Agricultura e Ambiente).

Sincerely,

José Manuel da Veiga Pereira
/ President of the Administration Council /

INSTITUTO NACIONAL DE METEOROLOGIA E GEOFÍSICA DIRECÇÃO

Espargos, ilha do Sal, C P 76 Tel (+238) 2411 658 / 276, República de Cabo Verde
josem.pereira@inmg.gov.cv

ANNEX 2: Initial gender assessment

Gender baseline: According to the national statistical institute, the estimated number of 524,833 of Cabo Verdeans are almost equally divided into 262,501 men and 262,334 women. In terms of age, the 3 largest shares of female population are represented in the 20-24 years 26,718), in the 5-9 years (25,764), and in the 10-14 (25,749) age groups (26,718)[105], significantly contributing to the low average age of the overall population. Figures related to the areas of residency show a higher gap between men and women in rural environments, whereby the male population represents 55,5% of the population, against the 35,7 of women. In urban areas, the majority of inhabitants are male (69,8%), while the female population represents the 59%.

The active female population presents a valuable level of employability, with 83,546 women, or the 46% of the working population, currently employed. In terms of gender gap index, according to the World Economic Forum Global Gender Gap Report 2021[106], the country ranks at the 68th position with a score of 0.716. Although the report showcases a rather equal access to the labour market for both genders, it also reveals a significant gap in gender balance in leadership in the private sector where firms with female top managers represent only the 16,7%. In general, women find it more difficult to develop and grow their own businesses including access to finance, markets and entrepreneurship

[105] Cabo Verde 2015 Statistical Yearbook: http://ine.cv/wp-content/uploads/2017/02/statistical-yearbook-cv-2015_en.pdf.
[106] World Economic Forum (2021) Global Gender Gap Report: http://www3.weforum.org/docs/WEF_GGGR_2021.pdf

assistance. The WEF Report indicates that firms with female majority ownership in Cabo Verde account only for the 33,1% and Cape-Verdean women tend to occupy either domestic or informal jobs (e.g. low income trade activities)[107].

Women with disabilities, those living in rural areas and young women have less opportunities to reach labour market and decent working conditions due to discriminatory social norms, geographical isolation and the lack of acknowledgement of their role as economic actors. Women and girls are also underrepresented in the technological and scientific areas (female STEM attainment reaches only the 10,60%), traditionally considered of male competence. This condition is of particular concern considering the need for such capacities in the priority areas identified by the government to leverage the socio-economic and productivity potential of the country: renewable energy sectors, the blue economy, digital economy, agricultural value chains, etc.).

The lack of effective actions to reduce and close such gap will have longer-terms effects in level of employability of female population and risk to confine them to less-paid jobs and households' care. The 2015 Family Expenses and Income Survey (IDRF III) demonstrated that poverty affects women (53%) and families represented by women (60, 5%) mostly[108]. The reason behind the harsher conditions endured by the female population is linked to the higher responsibility that women share in care tasks (2.5 times more than men[109]) and to the burden of unpaid work, more widespread among working women. The additional responsibility in domestic work, moreover, reduces women's time availability, increasing their time poverty, a material factor that affects women's opportunities to being active in the labour market and with capacity to generate income and wealth.

Additionally, women are still at a disadvantage in terms of participation in influential positions and decision-making processes. Only the 11% of NGOs and community-based associations are headed by women[110], while in 2021 WEF Report women in ministerial positions account only for the 14,3%. The Parity Law for Gender Equity and Human Dignity, adopted in 2019, reaffirmed the principles safeguarded by the Constitution of the Cape Verdean Republic, and strengthened measures promoting de facto equality between men and women in access and exercise of decision positions, highlighting in particular the parity in political participation. The entry into force of the parity law contributed to the 40.6% of newly-elected women at the municipal elections in 2020 and 37% of women as members of the National Cape Verdean Parliament in 2021. Nevertheless, the change of discriminatory attitudes and practices require substantive and continued efforts of awareness and training.

Gender-Water-Agriculture-Forest Nexus – National level: The general low presence of women in the agricultural sector (24.1% of female employed in agriculture as compared to 78.9% of men[111]) and particularly in the higher-paid activities related to agriculture and agri-business is an unresolved issue. Most farms operating to in commercial activities are headed by men, 76.1% against the 23.9% run by women. In Cabo Verde, women have reduced access to land, water resources, irrigation technology and modern farming and livestock skills. Women lead 43% of farms, distributed across the 47% of the least profitable land, while only the 29% of the rainfed and irrigated lands are occupied by female-headed farms. Women have access to smaller and less profitable lands, with poor access and control over productivity factors such as water, land, clean energy, technological solutions and livestock. Such challenges not only limit women's opportunities to participate in and benefit from agricultural value chains, but also undermine the overall performance of value chains themselves and generate distortions in the labour market, financial losses and inefficiencies (such as the high food imports rate). Despite the vast experience of women in product processing and marketing (e.g. fruit processing, products selection, packaging at post-harvest periods), essentially in informal setting, they lack of tools to recognize opportunities for commercialisation and as such, they are involved in small and medium-sized transactions with men managing the more profitable transactions.

In the forest sector, the gender gap is less evident and there is an increasing awareness on the beneficial role of women in forest resources management[112]. The positive, multifaceted impacts of women's contribution in the forestry sector, is growingly evident not only on the profitability of forest resources but also on the improvement of firewood supply techniques, the introduction of perennial crops such as the Congo bean (Cajanus Cajan) and enhanced supply of forage material, with positive effects also on the practice of family livestock.

Spotlight on the targeted municipalities

Santa Catarina, São Miguel and Ribeira Grande de Santiago

The majority of the households in Santiago target areas are headed by women, mainly due to significant rate of male outmigration[113]. The incidence of poverty is above the national average of 35%, and all the three municipalities have a high literacy rate[114].

Agricultural and livestock are the main economic and employment activities. Women and girls in Santa Catarina are the main responsible for unpaid work and are often responsible for the work of care of families' dependent members and for collecting firewood and fetching water (52,2% of women in Santa Catarina, 65% in São Miguel and 68,6% in Ribeira Grande de Santiago[115]).

In the Ribeira of Charco, in the municipality of Santa Catarina, women have been traditionally involved in sand harvesting, an activity that not only has negative effects on women's health, but is considered responsible for land degradation and subsequent damage to the development of tourism sector. Some forestry activities, (i.e. production of firewood and collection and use of medicinal herbs) have been carried out mainly by women (organized by Community Development Associations - ADC), granting them fixed incomes[116]. The male population is not involved as it has access to more profitable work. The consultations have proved that there exists a significant experience of tree planting campaigns with a strong participation of women.

Ribeira Brava, São Nicolau Island

The municipality of Ribeira Brava, in São Nicolau, has a predominantly male population with 54% of the population being men and 46% women, with an average age of population of 34,5 years, 5 more than Cabo Verde average age. The majority of the households are single-headed and led by men (57.7%). The literacy rate of female population is significantly high (89.6%)[117].

In Ribeira Brava, the incidence of poverty is 35%[118], quite aligned to the national average. The municipality has a strong agricultural vocation, with both rainfed and irrigated systems. Of the arable areas, a significant majority are located on slopes and small plots on finds and

[107] Labour Market, IMC 2020
[108] INE, IDRF 2015: https://www.humanitarianresponse.info/en/operations/cabo-verde/document/iii-inqu%C3%A9rito-%C3%A0s-despesas-e-receitas-familiares-%E2%80%93-idrf-2015
[109] INE, Time Use Module, IMC 2012
[110] Factos e Números Homens e Mulheres em Cabo Verde, Instituto Nacional de Estatísticas de Cabo Verde (INECV) 2015
[111] Cabo Verde – Recenseamento General Agricultura 2015 (RGA). Available at: http://www.fao.org/fileadmin/templates/ess/ess_test_folder/World_Census_Agriculture/Country_info_2010/Reports/Methodology_6/CPV_POR_MET_2015.pdf
[112] Gender analysis of agriculture sector and rural development in Cape Verde, FAO July 2018
[113] Condicoes de Vida- Inquerito Multiobjectivo (IMC), INECV 2019
[114] IDRF, INECV 2015
[115] IMC, INECV 2019
[116] Technical Fiche (Summary), November 2020: Social and Gender Diagnosis in Communities for the project: Strengthening the Adaptation and Resilience of the Forestry Sector in Cape Verde - REFLOR-CV
[117] IMC, INECV 2019
[118] IDRF, INECV 2015

streambeds. Irrigated crops are cultivated in small plots, and across horticultural spaces. In irrigation, sugar cane (which generally occupies about 2/3 of the cultivated area), banana, root vegetables and tubers are cultivated. In Ribeira Brava men and boys are the main responsible for water fetching.

Ribeira Brava's economy is characterized by structural dysfunctions closely linked to the scarcity of natural resources, unclear vocation in terms of development, weak concentration of capital, and lack of qualified human resources. This latter feature is highly due to the peripheral status of the island and existing migratory trends.

The consultations in the island of São Nicolau have verified the significant experience with tree plantation campaigns, especially among the female population of the consulted municipality. Women expressed a strong desire of participation in plant production and plantation activities. Additionally, the consultations reported the willingness of the female population to participate in commercial, transformation, marketing and business activities as well as agricultural and livestock production, soil conservation, plant production, and plantation activities.

ANNEX 3: List of consulted stakeholders

National level

Organisation	Name	Contact details
Agência Nacional de Água e Saneamento (ANAS)	Marize Gominho	marize.gominho@anas.gov.cv
Agência Nacional de Água e Saneamento (ANAS)	Cláudio Lopes	Claudio.l.santos@anas.gov.cv
Agência Nacional de Água e Saneamento (ANAS)	Vital Fernandes Tavares	vital.f.tavares@anas.gov.cv
Investigador do Instituto Nacional de Investigação e Desenvolvimento Agrária (INIDA)	Jacques Tavares	jacques.tavares@gmail.com/ jacques.tavares@maa.gov.cv
Investigador do Instituto Nacional de Investigação e Desenvolvimento Agrária (INIDA)	Nora Helena Ramos Silva	nora.silva@inida.gov.cv
Investigador do Instituto Nacional de Investigação e Desenvolvimento Agrária (INIDA)	Samuel Gomes	Samuel.Gomes@inida.gov.cv
Investigador do Instituto Nacional de Investigação e Desenvolvimento Agrária (INIDA)	Angela Moreno	angela.moreno@inida.gov.cv
Ministério da Agricultura e Ambiente (MAA)	Alexandre Centeio Ribeiro	Alexandre.Centeio@maa.gov.cv
Ministério da Agricultura e Ambiente (MAA)	Ester Brito	ester.brito@maa.gov.cv
Direção Geral da Agricultura Silvicultura e Pecuária (DGASP) do Ministério da Agricultura e Ambiente (MAA)	Ilídio Furtado	ilidio.furtado@maa.gov.cv
Direção Geral da Agricultura Silvicultura e Pecuária (DGASP) do Ministério da Agricultura e Ambiente (MAA)	Leopoldina Varela Furta	leopoldina.furtado@maa.gov.cv
Direção Geral da Agricultura Silvicultura e Pecuária (DGASP) do Ministério da Agricultura e Ambiente (MAA)	Eneida Rodrigues	eneida.rodrigues@maa.gov.cv
FAO Cabo Verde (soil and water conservation)	Oumar Barry	oumar.barry@fao.org
FAO Cabo Verde (gender)	Claudia Rodrigues	Claudia.Rodrigues@fao.org
NGO (women)MORABI	Maria Aleluia Rodrigues Barbosa Andrade	andrademariaaleluia@gmail.com
NGO (women) OMCV	Eloisa Cardoso	eloisa.cardoso@omcv.org.cv

Watershed level

SANTIAGO

Entities
MAA Delegation
Head of Municipal Chamber - Ribeira Grande de Santiago
Head of Municipal Chamber- Charco/Santa Catarina
Head of Municipal Chamber-Flamengos
Municipal counsellors of targeted watersheds in the areas of areas of environment, agriculture, forestry and rural development
Community Development Associations (ACDs)

Watersheds	Total number of participants	Men	Women
Ribeira Grande de Santiago	10	5	5
	24	16	8
	6	5	1
Charco	57	17	40
	21	9	12
Flamengos	36	25	11
Total	**154**	**77**	**77**

SÃO NICOLAU

Entities
MAA Delegation
Head of Ribeira Brava Municipal Chamber
Association of Community Friendship of Vale do Bravo
Hotel – Pensão Santo António
AJS
SN Firefighters
SN- Turismo
Sport Athletic Club
Ribeira Brava Sports Club
Autonomous Water Service
Delegation of the Ministry of Education
Monte Gordo Protected Area
Community Development Associations (ACDs)

Total number of participants - MEN	Total number of participants - WOMEN
47	**28**