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Urban Resilience Action Plan for Kerkennah Archipelago, Tunisia

Planning for climate, urban and biodiversity action

Cover image: Mahdi Makhlouf, Municipality of Kerkennah

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Urban Resilience Action Plan for Kerkennah Archipelago

United Nations Human Settlements Programme

Foreword from Head of UN-Habitat Tunisia Office

The Kerkennah Archipelago, in Sfax Governorate (Center of Tunisia) is increasingly exposed to climate-related hazards, ecosystem degradation, and socio-economic vulnerabilities that threaten its long-term sustainability. Rising sea levels, coastal flooding, habitat loss, and pressure on natural resources require evidence-based, coordinated responses that integrate urban planning, environmental management, and participatory governance.

The Kerkennah Urban Resilience Action Plan (URAP), developed under UN-Habitat's RISE-UP Programme, translates the findings of the Multilayered Vulnerability Assessment (MVA) into actionable, prioritized interventions. The Plan focuses on vulnerability hotspots, including Kellabine, Attaya, and Kraten, and adopts an integrated approach that links climate adaptation, biodiversity conservation, urban growth, and socio-economic development. Kerkennah archipelago is more than a territory under pressure, but also a living laboratory for innovative, nature-based, and community-driven solutions. The URAP not only guides local decision-making but also exemplifies how evidence-based urban planning can safeguard communities, ecosystems, and livelihoods, inspiring similar initiatives across Tunisia and beyond.

Developed through a participatory, multi-level governance process, the URAP engaged municipal authorities, relevant ministries, sectoral institutions, civil society, and local communities, resulting in a shared territorial vision: "Kerkennah, a solidarity-based, liveable and resilient archipelago territory, where communities together protect their archipelago by enhancing their natural and cultural heritage, and by acting collectively in the face of the effects of climate change".

The Plan identifies four strategic objectives operationalized through **33 bankable**, **evidence-based, revenue-generating urban climate resilience project concepts**, including 14 prioritized project concepts validated as high priority by the Municipality of Kerkennah.
Beyond direct outcomes, the URAP has catalyzed broader impacts across Tunisia's urban resilience ecosystem. It has engaged the private sector, mobilized CSR contributions, and strengthened academic collaboration via masterclasses for students and researchers. These efforts build capacities in nature-based solutions, demonstrate the importance of evidence-based planning, and inform investment, programmatic, and policy decisions.

The Soumoud project, part of the RISE-UP flagship program, leverages the Kerkennah MVA and URAP to also provide technical updated support to the Ministry of Equipment and housing, in developing and reviewing the Strategic Development Scheme for vulnerable areas in Tunisia (SDAZS).

Aligned with national strategies and international commitments, including the Paris Agreement, SDGs, Ramsar Convention, National Ecological Transition Strategy and CBD, the URAP provides a practical framework for action, investment, and collaboration.

It positions the Kerkennah Archipelago as a model for climate-resilient, ecosystem-based urban development, demonstrating that vulnerability can be transformed into opportunity through integrated planning, participatory governance, and evidence-based decision-making.

UN-Habitat Tunisia remains committed to supporting local, regional and national partners in implementing this Action Plan, advancing a resilient, sustainable, and inclusive future for the people and ecosystems of the Kerkennah Archipelago and the Governorate of Sfax.

Dr. Aida ROBBANA

Head of Programme

UN-Habitat Tunisia Office

Abbreviations

AFD	French Development Agency
AMP	Marine Protected Area
ANGED	National Waste Management Agency
ANME	National Agency for Energy Management
ANPE	National Environmental Protection Agency
APAL	Coastal Protection and Development Agency
ARRU	Urban Rehabilitation and Renewal Agency
CDN	Nationally Determined Contribution
CITET	International Center for Environmental Technologies in Tunis
CRDA	Regional Commission for Agricultural Development
DGAT	Directorate-General for Spatial Planning
APD	Directorate-General for Fisheries and Aquaculture
DHU	Urban Hydraulics Department
Of the	Urban Planning Department
WEF	Global Environment Facility
FFEM	French Global Environment Facility
FOCTEE	Common Fund for Ecological and Energy Transition
FODEP	Depollution Fund
FTE	Energy Transition Fund
GHG	Greenhouse Gases
IPCC	Intergovernmental Panel on Climate Change
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
INGREF	National Institute for Research in Rural Engineering, Water and Forests
NPI	National Heritage Institute
INRAT	National Institute of Agricultural Research of Tunisia
INSTM	National Institute of Marine Science and Technology
IRA	Arid Regions Institute
MCA	Multi-Criteria Analysis
ODD	Sustainable Development Goals
ONAS	National Office of Sanitation
NGO	Non-Governmental Organization
BY	Resilience Action Plan
PAU	Urban development plan
UNDP	United Nations Development Programme
PV	Voltaic Photo
RAMPAO	Network of Marine Protected Areas in West Africa
RAMSAR	Convention on Wetlands of International Importance
SDAZS	Master Plan for the Development of Sensitive Areas
GIS	Geographic Information System
DCS	National Strategy on Climate Change
SNTE	National Strategy for Ecological Transition
SONEDE	National Water Exploitation and Distribution Company
STEG	Tunisian Electricity and Gas Company
UNESCO	United Nations Educational, Scientific and Cultural Organization

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Executive summary

The Kerkennah archipelago, an archipelago territory off the coast of Sfax, faces growing vulnerabilities linked to the effects of climate change, ecosystem degradation, and fragile socio-economic dynamics. The Kerkennah Urban Resilience Action Plan (URAP) is a structured, integrated, and participatory response to these challenges, developed as part of UN-Habitat's RISE-UP program.

This plan aims to:

1. Reduce urban, climatic, and ecological vulnerabilities affecting local populations;
2. Strengthen the capacity of local institutions to anticipate and adapt;
3. Preserve the archipelago's exceptional biodiversity, while promoting traditional knowledge and practices;
4. Promote sustainable and inclusive development at the local level.

The URAP is based on a "multilayered vulnerability assessment" (MVA) covering urban, climate, and ecological dimensions, and identifying priority areas for intervention (hotspots) such as Kellabine, Attaya, and Kraten.

These areas are affected by rising sea levels, degradation of natural habitats, uncontrolled urbanization, and increased pressure on natural resources.

- A collective vision: "Kerkennah, a solidarity-based, liveable and resilient archipelago territory, where communities together protect their archipelago by enhancing their natural and cultural heritage, and by acting collectively in the face of the effects of climate change" ;
- Four strategic objectives: (i) Understand and prepare, (ii) Involve stakeholders, (iii) Strengthen community resilience, (iv) Protect and enhance ecosystems.

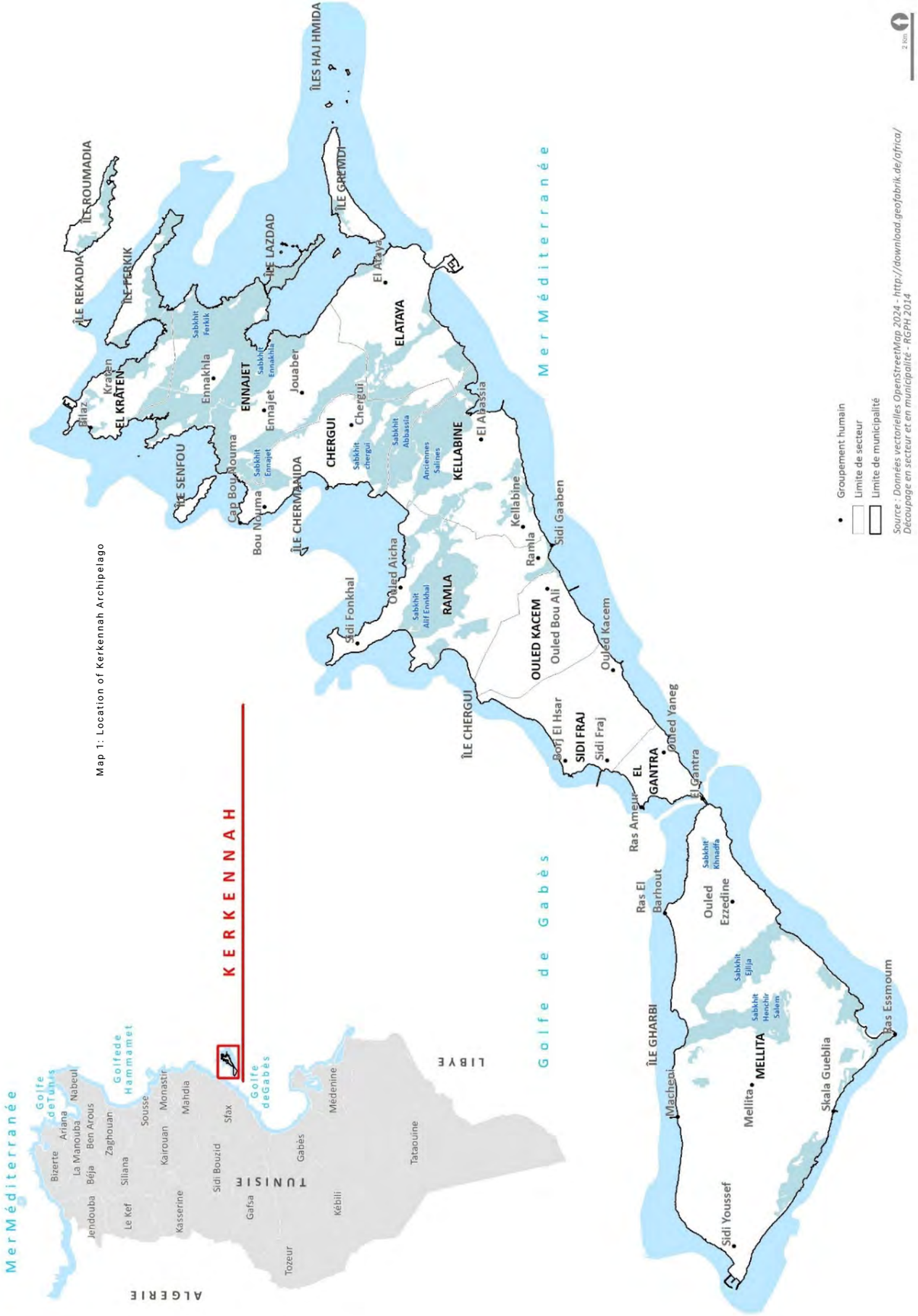
The URAP proposes 33 projects centered around these objectives, including 14 priority actions approved in collaboration with Kerkennah municipality. These projects cover investment, governance, awareness-raising, and ecological restoration initiatives.

Key flagship actions include:

- The development of eco-tourism facilities;
- Integrated management of the RAMSAR site and marine protected area;
- Rehabilitation of palm groves and promotion of sustainable fishing practices (charfias);
- Adaptation of urban planning documents to climate risks;
- Water and energy conservation..

The URAP is in line with national strategies (SNTE, SNCC) and international commitments (SDGs, Ramsar and Barcelona Conventions), and is intended to serve as a foundation for mobilizing climate finance.

It provides Kerkennah with an operational framework to become a pilot territory for archipelago adaptation, rooted in local realities, based on nature-based solutions, and driven by the collective commitment of its community.



Map 1: Location of Kerkennah Archipelago

01

Building urban climate resilience in Kerkennah Archipelago: why this plan matters ?

Kerkennah archipelago faces multiple economic, social, and environmental challenges. Climate change, rapid urbanization, and biodiversity loss interact in concerning ways, amplifying threats to the archipelago's development viability. This section explains why a resilience plan is urgently needed: highlighting the city's climate vulnerabilities, the exposure of its most at-risk communities, and the opportunity to shift toward greener, safer, more sustainable urban development.

01

Building urban climate resilience in Kerkennah Archipelago: why this plan matters ?

Purpose of the Urban Resilience Action Plan

The Urban Resilience Action Plan for the Kerkennah Archipelago, developed as part of the RISE-UP flagship program implemented by UN-Habitat, has the primary objective of structuring an integrated territorial response to the specific vulnerabilities of this archipelago area, which is particularly exposed to the effects of climate change, pressure on natural resources, and fragile socio-economic dynamics.

The document is based on an in-depth assessment of multilayered vulnerabilities (MVA) – urban, climatic, and biodiversity – and identifies high-risk areas, known as "hotspots," which have been the subject of detailed analysis and local consultation.
It proposes a shared strategic vision for the resilient development of the archipelago, translated into areas of intervention and a coherent portfolio of projects, and pursues the following objectives:

- Reduce the vulnerabilities of local populations, particularly those most exposed to climate hazards (floods, sea flooding, drought) and social risks (isolation, unequal access to services, economic insecurity);
- Support the climate resilience of the territory by integrating risks into planning documents, developing appropriate infrastructure, and promoting sober, circular, and sustainable practices;
- Preserve and restore local ecosystems, particularly wetlands, seagrass beds, palm groves, and habitats of emblematic species;
- Promote decentralized environmental governance by strengthening the capacities of local actors, mobilizing communities, and anchoring public action in citizen participation;
- Promote the archipelago's natural, cultural, and intangible heritage, particularly through the revival of traditional agricultural and fishing practices (charfias, agroecology) and the development of sustainable ecotourism.

This report therefore aims at providing an operational framework to guide public action, mobilize local stakeholders, and strengthen Kerkennah's adaptive capacities with a view to ecological transition, territorial justice, and the promotion of local heritage.

Strategic alignment of the resilience action plan

The Kerkennah Urban Resilience Action Plan (URAP) is fully in line with national and local efforts to strengthen the resilience of territories to the effects of climate change, preserve biodiversity, and support equitable and sustainable development. The result of a rigorous MVA process conducted in accordance with UN-Habitat's RISE-UP program standards, this plan is consistent with a two-tiered strategic framework.

- **At the national level,** the Kerkennah URAP is aligned with the 2012 National Climate Change Strategy (SNCC), which calls for proactive adaptation, effective mitigation of GHG emissions, and systematic integration of climate issues into sectoral policies. As an archipelago territory particularly exposed to rising sea levels, desertification, and anthropogenic pressures, Kerkennah is an ideal testing ground for the adaptation tools recommended by the SNCC, particularly in the areas of coastal management, water resource protection, and ecosystem restoration. The PAR also works in synergy with the National Ecological Transition Strategy (SNTE) approved in 2023, which defines an integrated and systemic vision of ecological transition around five axes, including climate resilience, sustainable management of natural resources, and the development of decentralized environmental governance.
- **At the local level,** the action plan strengthens the capacities of the municipality of Kerkennah, which has launched a review of its urban development plans to incorporate the risks identified by the MVA. It also serves as the basis for the master plan for the sensitive area of Kerkennah, currently being developed by the DGAT, thus ensuring consistency between land use planning, climate risk management, and ecosystem preservation.

The shrine of Sidi Fal Nakhla is an important cultural and religious landmark in Kerkennah, deeply connected to the island's history and traditions.

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02

Understanding Kerkennah Archipelago today: Urban, social, and environmental profile

This section provides a snapshot of Kerkennah archipelago's current urban dynamics: its expanding settlements, land-use patterns, key economic functions, and environmental assets and pressures. It highlights the trends shaping the city's development, the condition of critical ecosystems, and the challenges that increase vulnerability to climate risks.

A participant in one of the project workshops scoring the adaptation measures. Kerkennah, Tunisia 2025

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02

Understanding Kerkennah Archipelago today: Urban, social, and environmental profile

The Multilayered Vulnerability Assessment (MVA) conducted in Kerkennah followed the methodological recommendations of the RISE-UP program of the United Nations Human Settlements Program (UN-Habitat). It is based on a methodology that combines urban, climate, and biodiversity analyses, structured around several complementary stages: data collection, spatial modeling, participatory validation, and prioritization of responses.

Stages in the MVA process

Initial diagnosis and data collection

The process began with an in-depth literature review, combined with a spatial analysis incorporating satellite data, socioeconomic and environmental indicators, and official statistics from the INS, CRDA, and other sectoral agencies. Three main dimensions were targeted:

1. Urban: Uncontrolled urbanization and access to services,
2. Climate: Exposure to climate risks (flooding, submersion, drought, erosion),
3. Biodiversity: Degradation of biodiversity and local ecosystems.

Vulnerability modeling and mapping

Remote sensing tools and geographic information systems (GIS) were used to produce vulnerability maps by dimension, followed by summary maps identifying interconnected “multilayered vulnerability hotspots.” These high-risk areas were identified by cross-referencing indicators weighted according to an intensity gradient.

Stakeholders’ approval

Consultation workshops were organized at three levels: local (Kerkennah municipality), regional (relevant regional departments), and national (relevant ministries). The discussions made it possible to:

- Assess the relevance of the indicators and cartographic results,
- Select and validate priority sites,
- Formulate proposals for mitigation and adaptation, actions taking into account local realities, challenges, and opportunities.

Development of the action plan

Based on the results of the MVA, a portfolio of actions was defined and structured in relation to the vulnerabilities identified. The process took place in several phases:

1. Strategic workshop (April 2024): participants set out the vision, levers for change, and strategic priorities.
2. Planning workshop (September 2024): participants formulated, refined, and ranked the actions.
3. Multi-criteria assessment (MCA): each project was rated according to criteria related to expected impacts and feasibility. The municipality was strongly involved in this assessment through its review of the feasibility criteria for each action according to its skills and resources.
4. Institutional validation: the plan was validated by municipal services and presented to key stakeholders: Urbanism Department (DU), Territorial management Department (DGAT), and the Ministry of Planning for inclusion in planning documents.

Borj Lahsar heritage site, Kerkennah.

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03

Context of the Kerkennah archipelago, Tunisia

Ramla's coastline.

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03

Context of the Kerkennah archipelago, Tunisia

A unique archipelago territory, on the margins of national development

Located off the coast of Sfax, about 20 kilometers from the Tunisian coast, the Kerkennah archipelago is an island territory consisting mainly of the two islands of Chergui and Gharbi, accompanied by several islets. With a total area of 160 km², it has an exceptionally low topography, with an average altitude of no more than 2 meters above sea level, making it extremely vulnerable to rising sea levels and marine submersion.

Kerkennah is characterized by a semi-arid environment, a hot and dry climate, limited natural resources, and a strong cultural and economic dependence on the sea. Although blessed with a rich natural and cultural heritage, the archipelago has historically remained on the margins of national development dynamics, partly due to its relative isolation and geographical and climatic constraints.

An economy based on traditional practices under threat

Kerkennah's economy is based mainly on two pillars: small-scale fishing (including the practice of charfia, recognized by UNESCO) and subsistence farming (palm trees, olive trees, figs, cereals). These activities are carried out on a small scale, in challenging environmental conditions. Two new industries are emerging: oil and gas exploitation, and tourism. However, these sectors pose ecological and social risks:

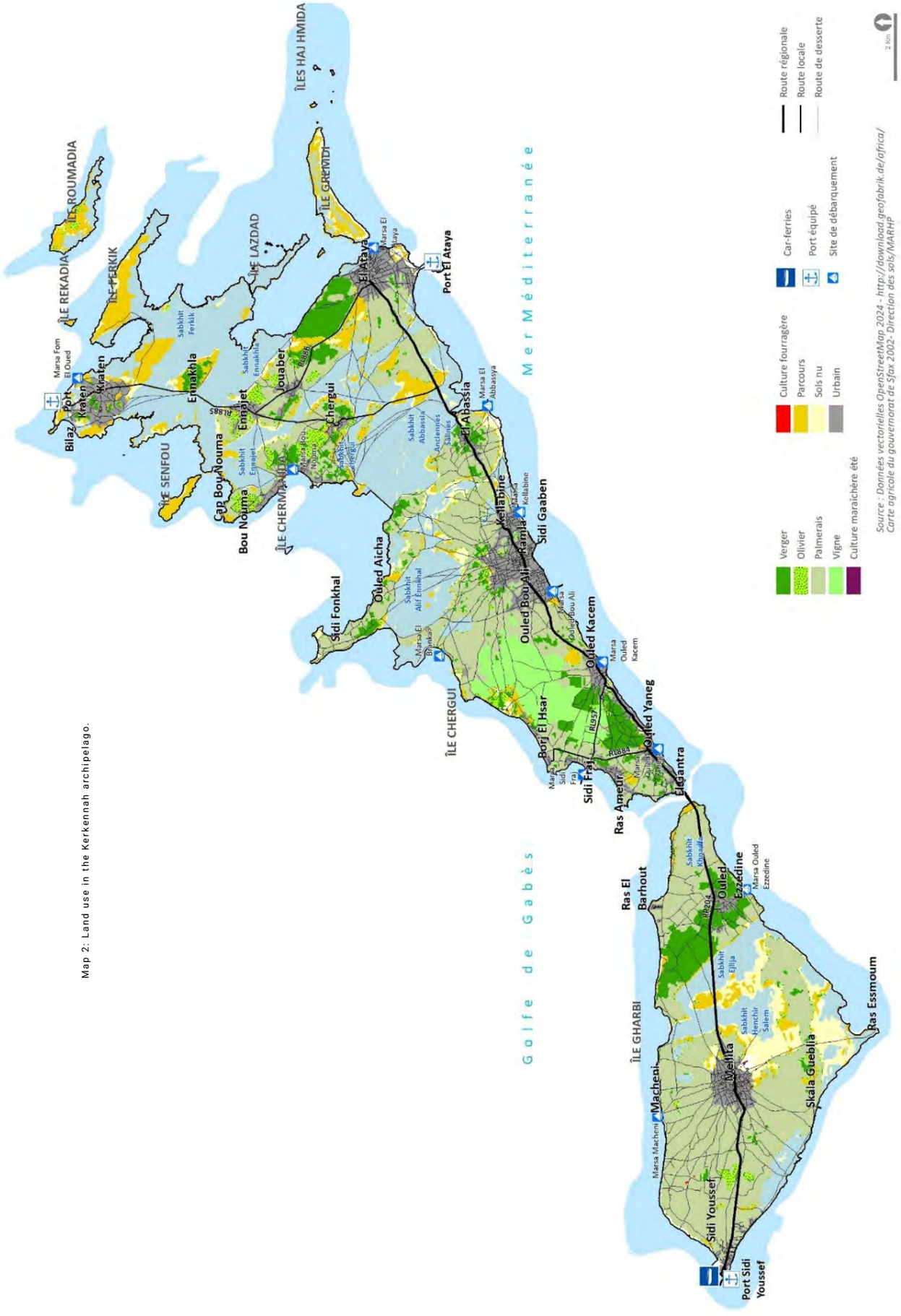
- Hydrocarbon facilities raise concerns about marine pollution.
- Tourism development remains in its infancy, with a high degree of informality and limited accommodation capacity.

The entire economic fabric is therefore extremely sensitive to climate change, pressure on natural resources, and socio-environmental hazards.

An ageing population, marked by exodus and inequality

According to INS data, Kerkennah had a population of 15,382 in 2024. It is characterized by a significant aging population, with more than 45% of residents over the age of 40 and a significant proportion of people over the age of 60 (18%, compared to 11% nationally). Local youth tend to migrate to the mainland or abroad in search of economic opportunities.

In summer, the population temporarily increases due to the influx of visitors and the return of emigrants, revealing seasonal use of the housing stock (less than 50% of homes are occupied year-round). In addition, gender inequalities are marked, with significantly higher rates of illiteracy and unemployment among women, especially older women.



Map 2: Land use in the Kerkennah archipelago.

Increasing climate pressures

The region faces increased climate vulnerabilities. Climate projections predict:

- A rise in average temperatures, especially in summer,
- A decrease in precipitation and an increase in seasonal variability,
- A rise in sea level with increased risks of marine submersion and coastal erosion.

These phenomena increase pressure on water resources (which are already very scarce), degrade wetlands and surface water tables, and compromise the viability of agriculture and coastal habitats. In addition, erosion threatens dykes, roads, and coastal habitats.

Uncontrolled urbanization and insufficient infrastructure

Urbanization in Kerkennah has evolved independently of population growth. The proliferation of informal construction, often in flood-prone or agricultural areas, reflects a lack of land management and planning. Urban sprawl compromises the preservation of arable land and increases the risks associated with flooding and submersion.

Basic infrastructure (water, health, transportation, sanitation) is limited and unevenly distributed. Access to public services is difficult, particularly in peripheral and isolated areas, which increases territorial inequalities.

An exceptional but endangered biodiversity

Kerkennah is home to a rich terrestrial and marine biodiversity:

- Posidonia seagrass beds stabilize the seabed and provide a habitat for a diverse marine fauna (fish, crustaceans, turtles, dolphins).
- The archipelago is an Important Bird Area (IBA), serving as a migratory stopover for thousands of passerines.
- Halophilic plant species have adapted to saline soils and arid conditions.

However, this rich biodiversity is threatened by urban sprawl, human pressure, pollution, and habitat degradation. Despite the designation of part of the archipelago as a RAMSAR site and the establishment of a Marine Protected Area covering part of its waters, protection measures remain fragile and largely ineffective.

Sidi Youssef Port, Kerkennah
@HaithamKhebour-Architect

04

What the Multilayered Vulnerability Assessment reveals? Kerkennah archipelago key vulnerabilities

This section summarizes the main findings of the MVA, highlighting the city's most at-risk areas, major climate hazards such as floods and erosion, and the underlying drivers: including land-use pressures and the degradation of key ecosystems. It identifies where risks are concentrated and why these hotspots require urgent, targeted action.

Port in Kerkennah.

@HaithamKhebour-Architect

04
Urban dimension

Low-density urbanization that is spreading at the expense of natural environments and agricultural land.

The assessment of Kerkennah's urban vulnerability highlights a series of structural weaknesses that compromise the territory's resilience to climatic and socio-economic shocks. Among the current vulnerabilities are uncontrolled urban sprawl, often in contradiction with existing planning documents, leading to the fragmentation of agricultural land and construction in areas at risk (flood-prone or subject to marine submersion). Informal housing and low urban density exacerbate the difficulty of accessing essential public services (health, education, sanitation).

The under-equipment of social infrastructure, particularly sanitation networks, transport routes, and drainage systems, limits the capacity to respond to crises, while the local population is aging and inequalities in access to services persist, particularly in peripheral areas.

If current trends continue, urban pressure is likely to worsen as a result of seasonal urban exodus, and increasing climate hazards (erosion, flooding). In the absence of an operational planning framework and investment in resilient infrastructure, urbanization could exacerbate environmental and social risks. These findings call for a review of urban development plans to incorporate vulnerability data and a refocusing of urban development on structured hubs equipped with facilities and connected to basic networks.

Port of Sidi Youssef, Kerkennah.
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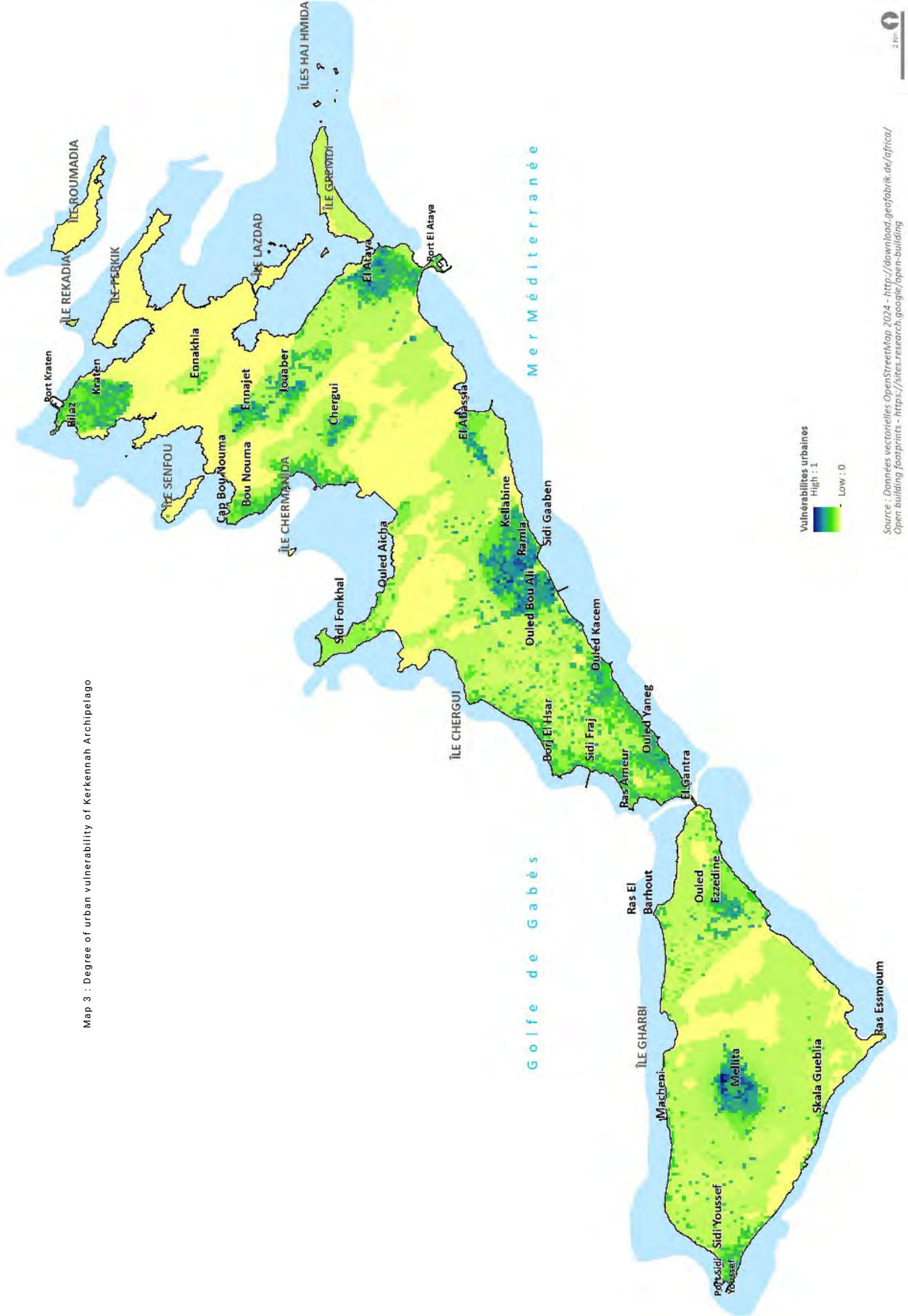


Map 3 : Degree of urban vulnerability of Kerkennah Archipelago

Climate dimension

An archipelago particularly vulnerable to rising sea levels

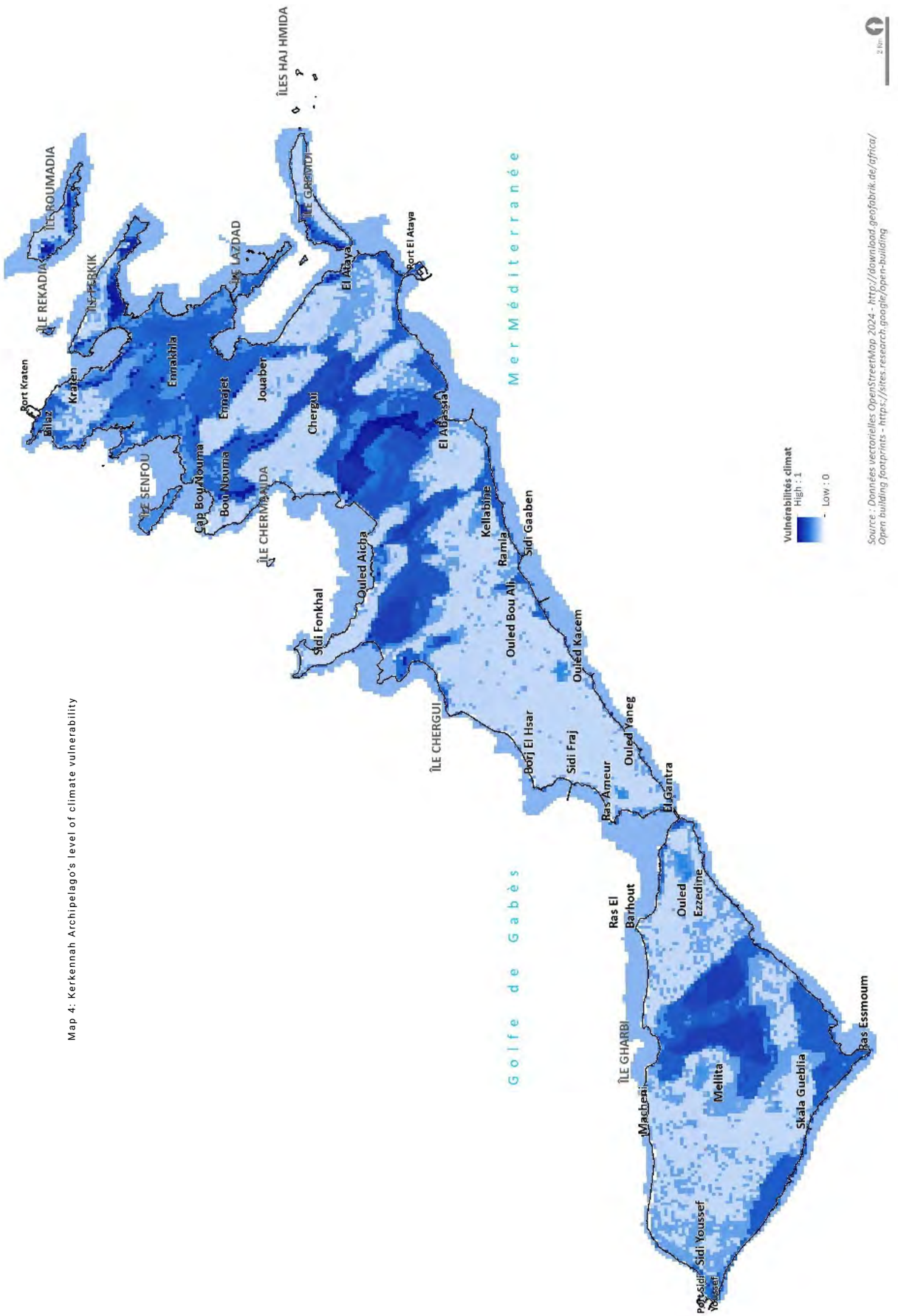
Kerkennah's climate vulnerability assessment reveals critical exposure to the effects of climate change, both now and in the future.

Already today, the archipelago is experiencing a gradual rise in sea level, causing coastal erosion, salinization of soils and aquifers, as well as the regular submersion of low-lying areas. Extreme events, such as seasonal floods (especially in 2013) and prolonged droughts, weaken economic activities, particularly fisheries, agriculture and coastal infrastructure.

In the future, according to IPCC scenarios, Kerkennah is expected to experience higher average temperatures, lower rainfall, and increased climate variability, increasing the risks of desertification and water scarcity. Projections identify areas at high risk of marine submersion, particularly around Mellita, Attaya, Ramla and Kraten, threatening homes, equipment and agricultural land.

These vulnerabilities call for urgent measures in coastal protection, sustainable management of water resources, and the integration of climate data into land use planning. They also reinforce the need for local governance that can anticipate, monitor and mitigate the impacts of climate change. These vulnerabilities call for urgent measures in coastal protection, sustainable management of water resources, and the integration of climate data into land use planning.

Charfia, ancestral fishing tool.
@HaithamKhebour-Architect



Map 4: Kerkennah Archipelago's level of climate vulnerability

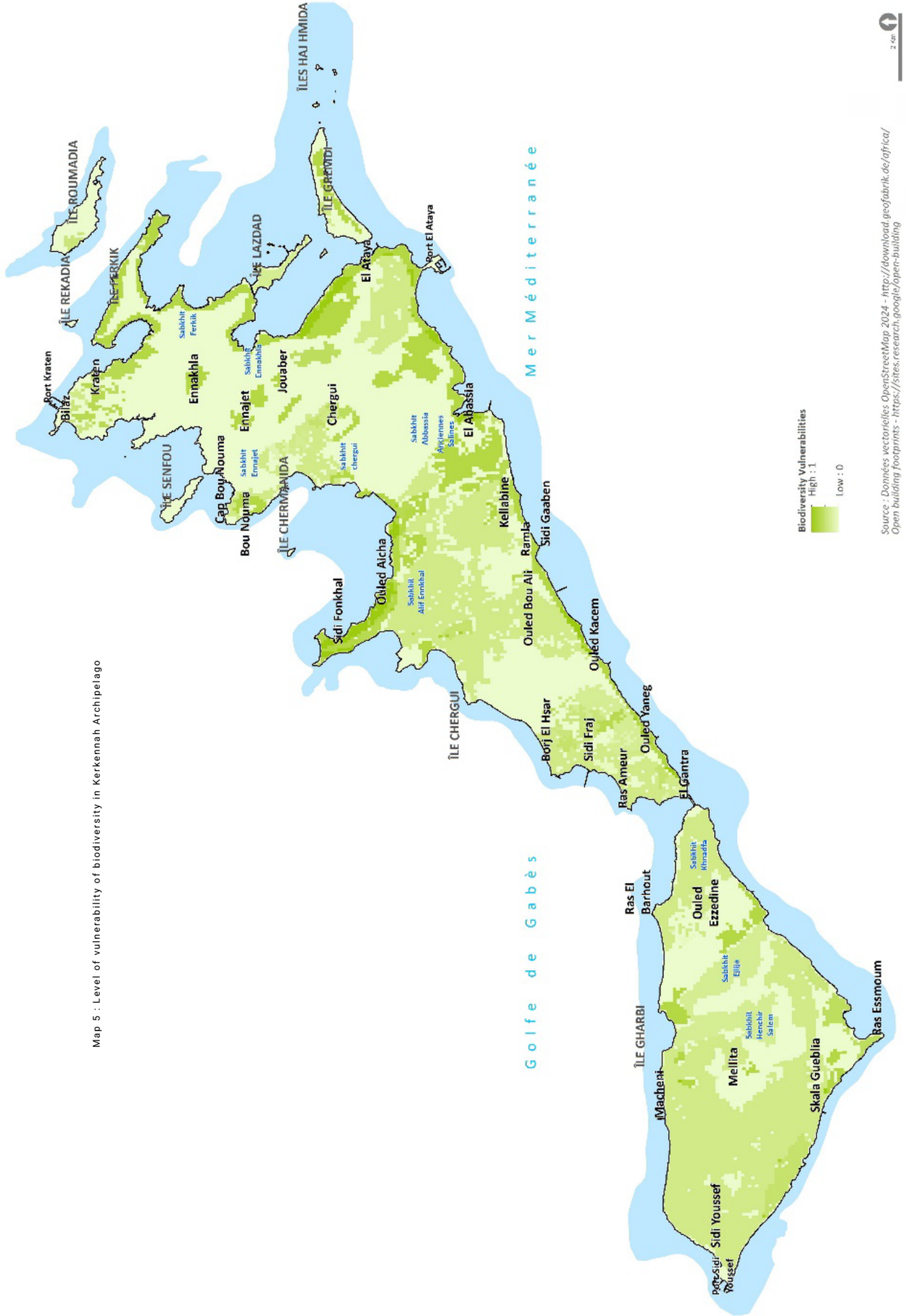
Biodiversity dimension

Biodiversity threatened by climate change and anthropogenic pressure.

The assessment of the vulnerabilities of Kerkennah's biodiversity highlights the increasing fragility of its terrestrial and marine ecosystems, which are essential to the ecological balance and local livelihoods. Currently, Posidonia seagrass beds, which stabilize the seabed and provide habitat for a rich marine fauna (sea bream, grouper, octopus, loggerhead turtles, etc.), are threatened by pollution, uncontrolled anchoring, and rising sea levels. On land, halophilic vegetation, adapted to salinity and poor soils, is under pressure from urbanization, trampling, and the abandonment of sustainable agricultural practices.

In the future, climate change is expected to increase soil salinity, disrupt water regimes, and fragment ecological corridors, reducing the ability of fauna and flora to adapt. Wetlands, lagoons, and sebkhas, which are key habitats for migratory birds (Kerkennah is an IBA), are also declining under the combined effects of human pressure and climate change.

The conclusions call for active protection of sensitive habitats, stricter regulation of land use, ecological restoration of degraded environments, and recognition of Kerkennah as a pilot territory for nature-based solutions and community conservation.



Map 5 : Level of vulnerability of biodiversity in Kerkennah Archipelago

The most vulnerable territories

Based on the above, a multilayered analysis of the vulnerability of the archipelago of Kerkennah reveals that the most vulnerable areas are:

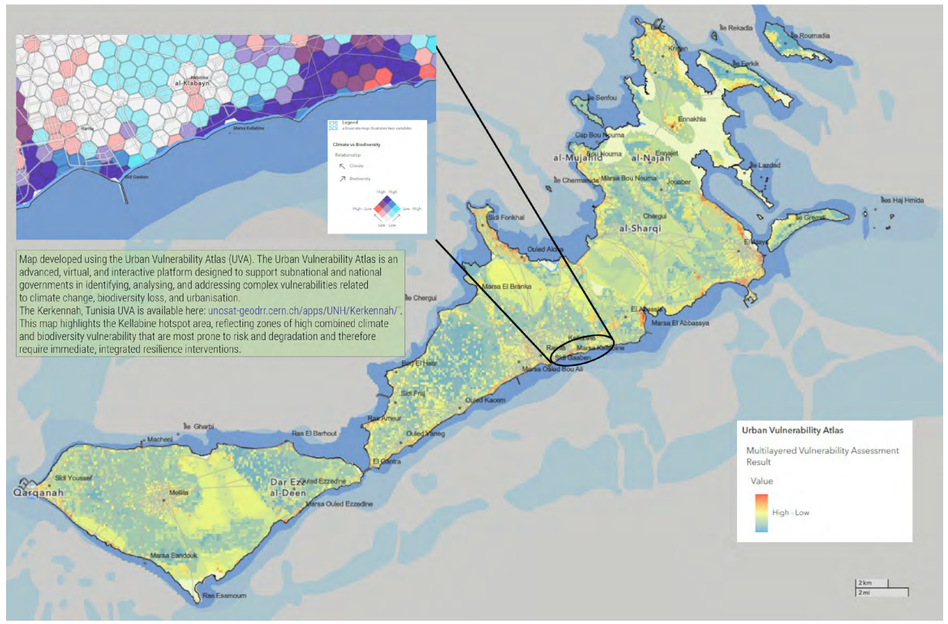
1. ***The southern coast of the archipelago***, where most of the coastal population, facilities, and infrastructure are concentrated. This area, which stretches from El gantra to El Abbassia, is relatively dense in terms of population and activity and is experiencing one of the highest growth rates on the archipelago. It faces the risks of flooding and sea level rise and is home to fragile habitats for local wildlife.

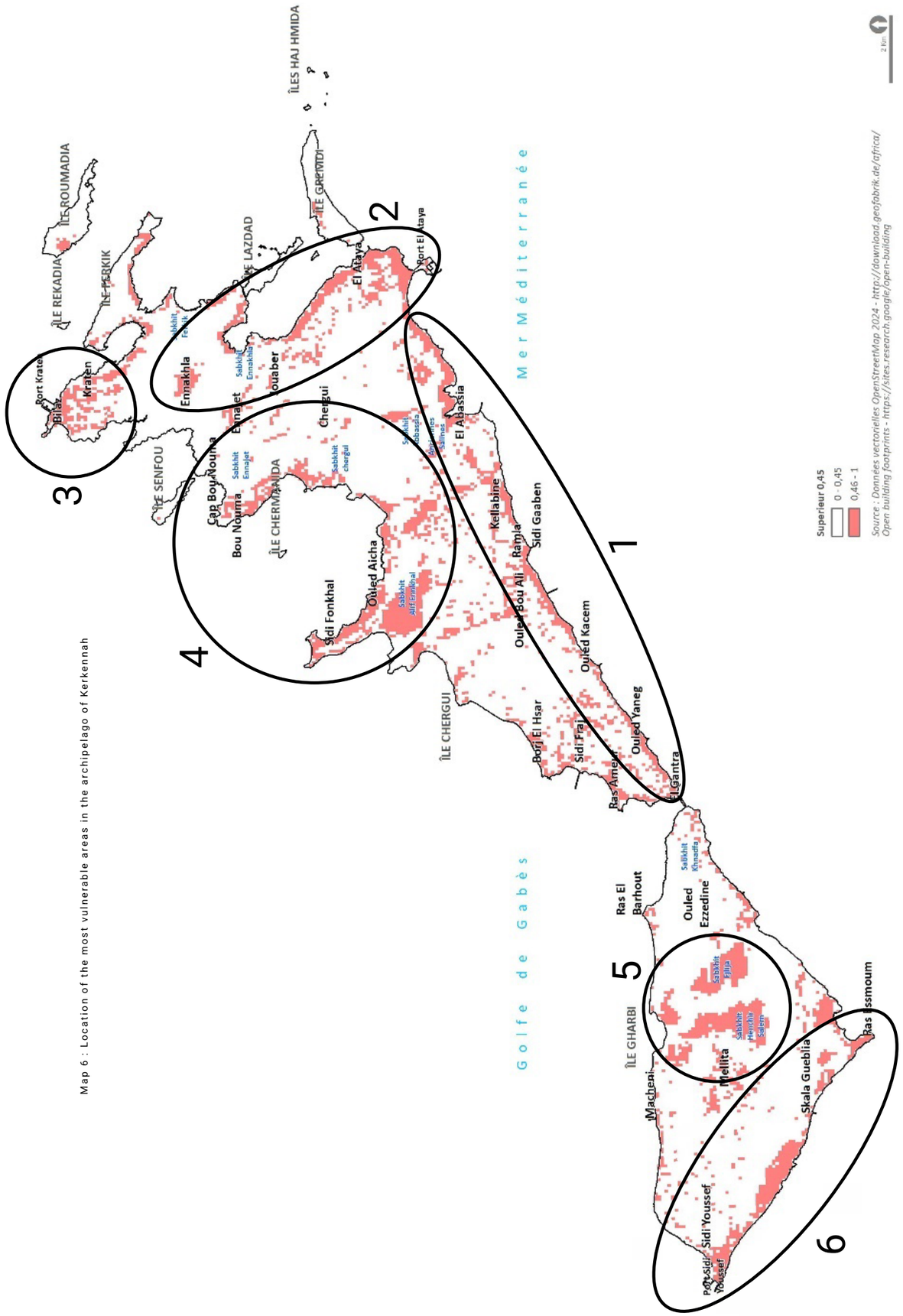
2. ***The east coast of the archipelago, stretching from Ataya in the south to Ennajet in the north.*** Relatively untouched by urbanization, this area is rich in biodiversity but vulnerable to human activity, which has a significant impact on the local ecosystem. The foreshore is particularly affected by eutrophication caused by changes in tidal flow slowed down by the bridge connecting Ennajet to Kraten.

3. ***Kraten, located at the northern tip of the archipelago***, where scattered urbanization has always coexisted with nature (wetlands, agricultural areas, foreshores), has experienced rapid densification of construction and accelerated anthropization in recent years. A relatively isolated area far from public services, social vulnerability is compounded by climate and environmental vulnerability, particularly due to the risk of sea level rise, which affects a large part of the archipelago. The terrestrial habitat of local wildlife is rapidly shrinking under the effect of urbanization.

4. ***The golf course stretching from Cap Bounouma to Sidi Founkhal on the north coast of the archipelago.*** This area, historically unoccupied, has in recent years experienced rapid urbanization (particularly in Bounouma) and the emergence of new tourism projects (the future tourist area of Sidi Founkhal). The golf course is also affected by the landscape and environmental impact of the salt marshes, which have severely disrupted marine currents by closing off the foreshore that connected the sea to the north and south of the archipelago. This area, consisting of palm groves, orchards, and wetlands, is a prime habitat for local flora and fauna.

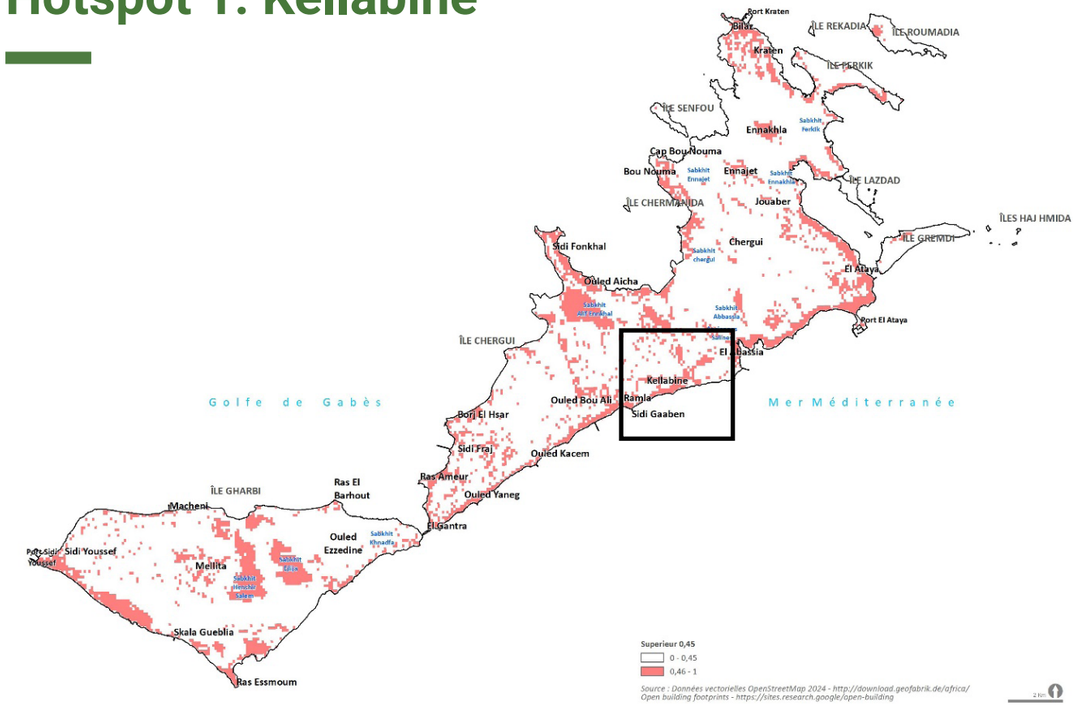
Three areas have been selected by local stakeholders for the action plan. These areas belong to clusters 1, 2, and 3 and combine urban, ecological, and climatic vulnerabilities.

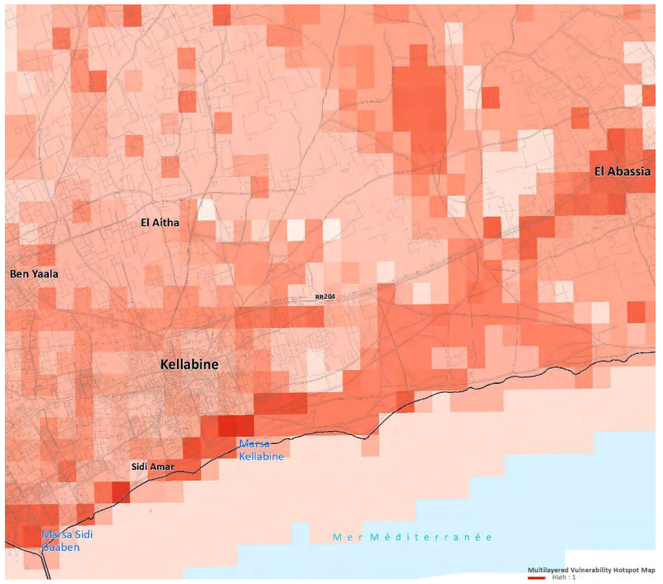




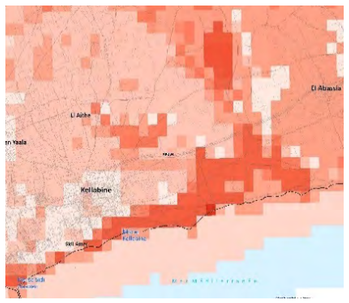
Map 6 : Location of the most vulnerable areas in the archipelago of Kerkennah

Hotspot 1: Kellabine

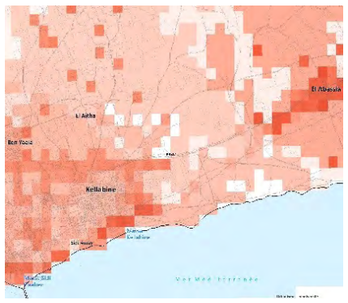




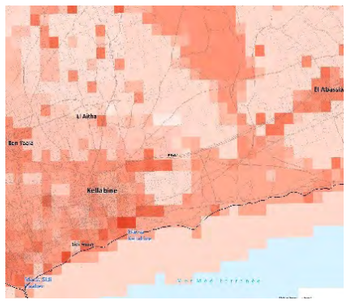
Map 7 : Kellabine Hotspot



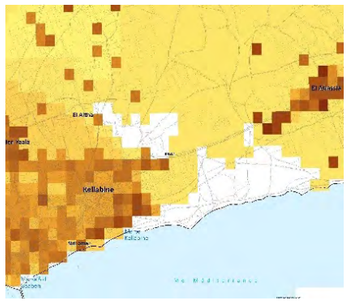
Biodiversity - Climate



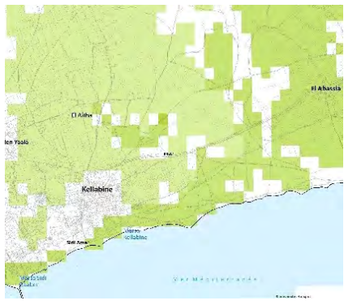
Biodiversity - Urban



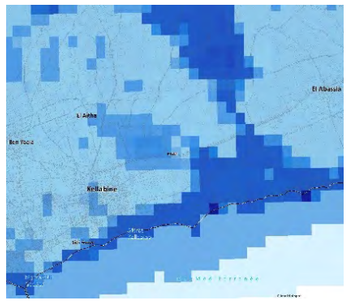
Climate - Urban



Urban



Biodiversity



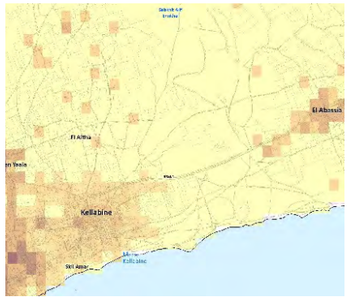
Climate

Kallabine is part of the largest urban area in the archipelago, consisting of the conurbation of Ouled Bouaali, Ramla, and Kellabine. Home to the municipal capital, this area contains most of Kerkennah's administrative and socio-cultural facilities.

Located on the outskirts of the urban area, the Kellabine hotspot consists mainly of wetlands and low-lying areas (land less than 1 m above sea level), making it a particularly climate-sensitive site.

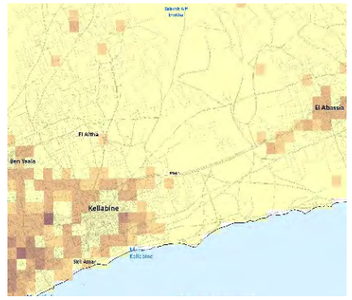
In urban terms, Kellabine, as a suburb of the archipelago's central conurbation, has a low density of buildings but is undergoing gradual densification and diffuse expansion towards agricultural land and wetlands.

WHAT THE MULTILAYERED VULNERABILITY ASSESSMENT REVEALS? KERKENNAH ARCHIPELAGO KEY VULNERABILITIES



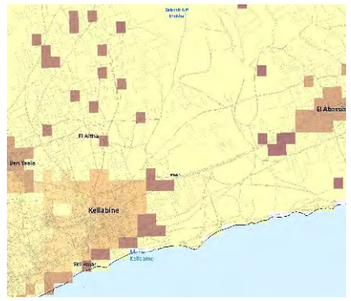
Kellabine Population Density Score

Kellabine is characterized by a low population density



Urban Growth Score in Kellabine

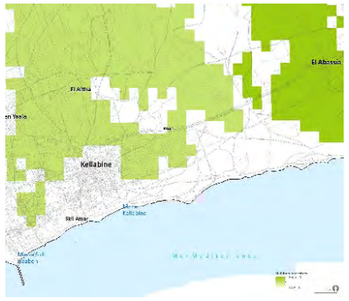
Kellabine is expanding towards the coast and agricultural areas.



Score for Access to Public Services in Kellabine

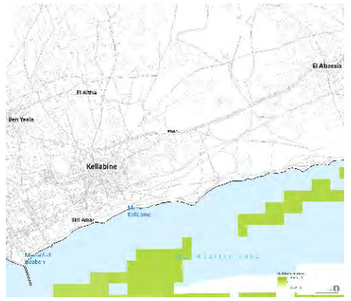
New scattered housing developments are experiencing difficulties in accessing basic public services.

In terms of biodiversity, the wooded area to the north of the agglomeration and the wetland to the east are the habitat of a rich biodiversity threatened in the first place by climate change.



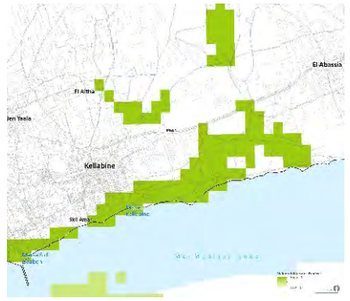
Vulnerability of terrestrial habitats at Kellabine

The wooded areas on the outskirts of the city and the wetlands to the east are home to a rich biodiversity threatened by progressive urbanization.



Vulnerability of marine habitats off the coast of Kellabine

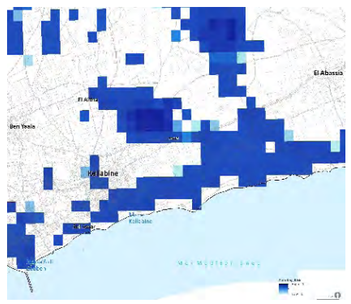
The marine area off Kellabine is home to a rich marine biodiversity threatened by fishing.



Species vulnerability at Kellabine

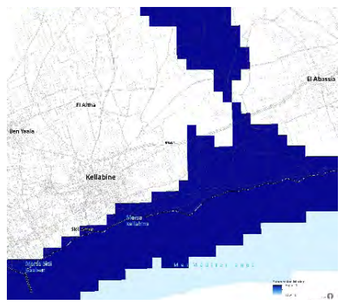
Migratory birds and nesting birds that inhabit wetlands and coastal areas are particularly threatened by climate change and urban expansion.

Finally, in terms of climate, the foreseeable changes will increase the risk of flooding, particularly in wetlands and coastal urban areas. Sea level rise will affect all low-lying natural areas as well as the coastline, which is gradually becoming urbanized.



Kellabine's vulnerability to flooding

The southern coastline of the city and the sebkha to the east are particularly vulnerable to flooding

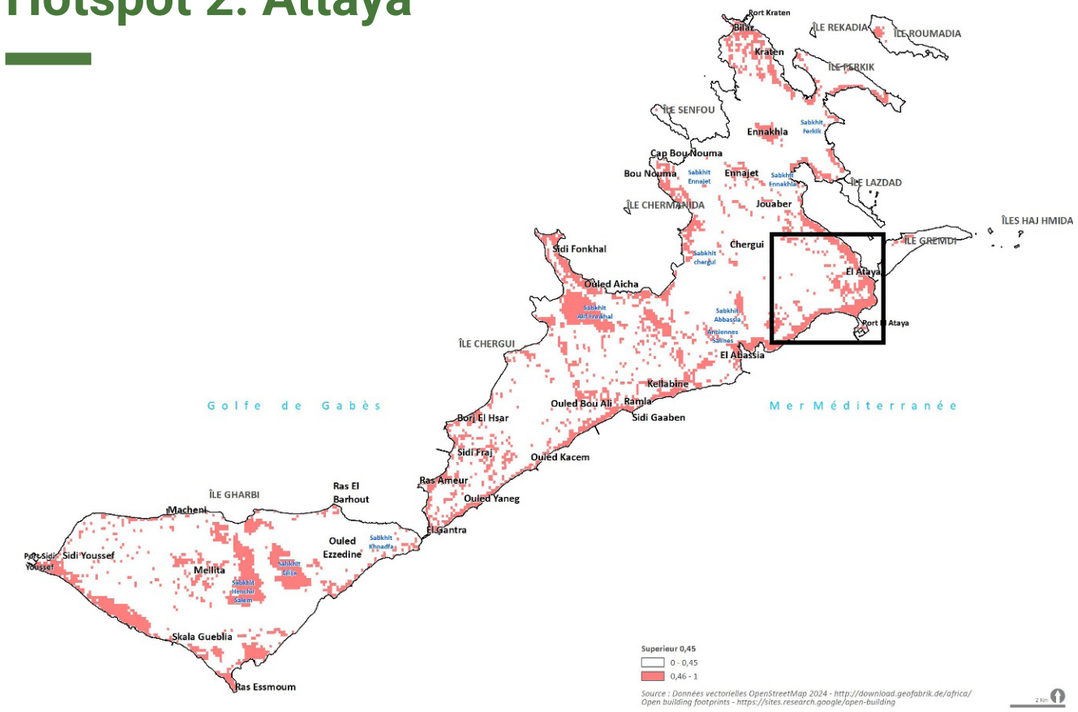


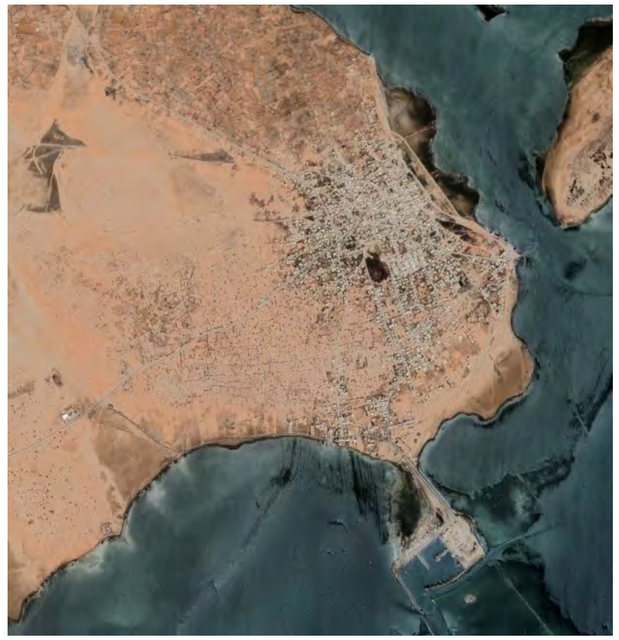
Kellabine's vulnerability to sea level rise

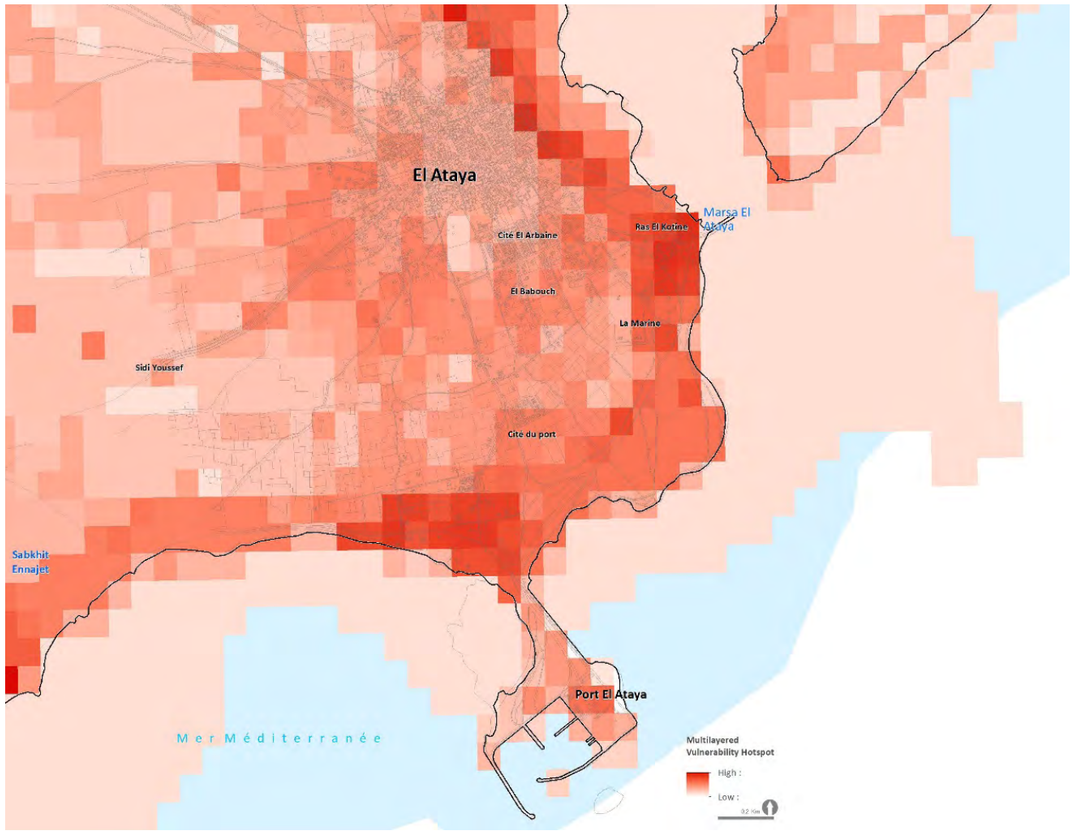
The relatively low levels of kellabine and sebkha are particularly vulnerable to sea level rise.

Thus, in Kellabine, climate vulnerability is coupled with environmental fragility, posing a risk to local biodiversity.

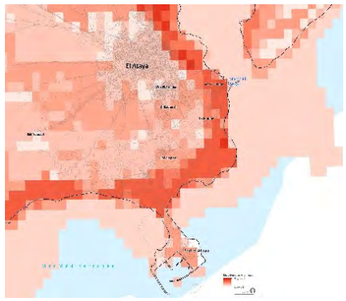
Hotspot 2: Attaya



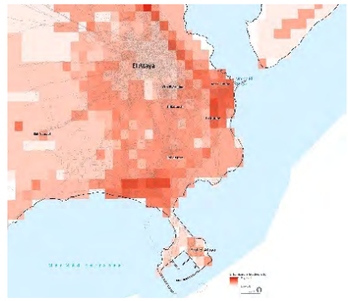




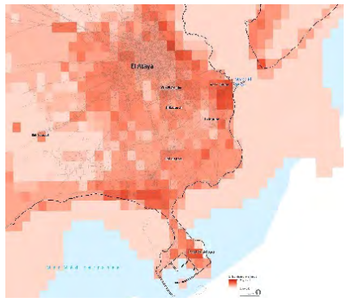
Map 8 : Attaya Hotspot



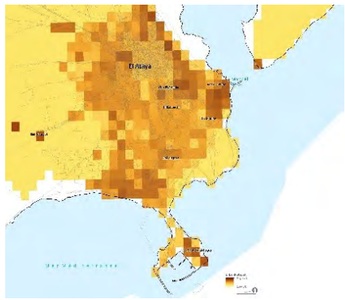
Biodiversity - Climate



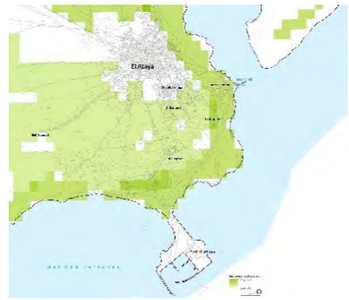
Biodiversity - Urban



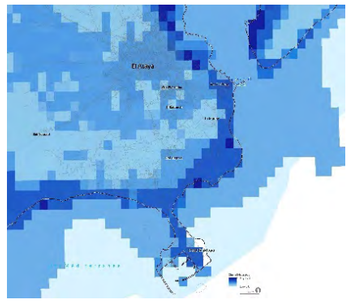
Climate - Urban



Urban



Biodiversity



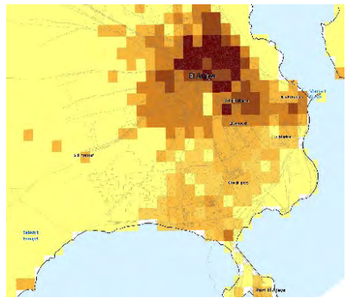
Climate

Attaya is located at the eastern end of the southern coast of Kerkennah Archipelago. In terms of land use, it is characterized by urbanization that spreads like wildfire from the old town center, located at an elevation of +3m, towards the coastline at sea level, particularly towards the port to the south and the “corniche” to the east.

The town belongs to a vast socio-agro-ecological complex that occupies the Ataya-Ennajet-Chergui axis, home to wetlands, agricultural areas, and a relatively fragile coastline.

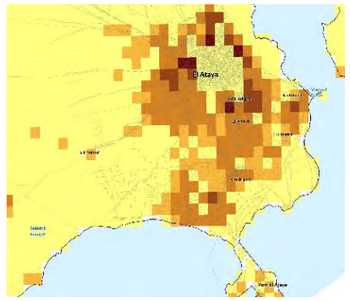
Ataya’s vulnerability is multilayered and linked to the following factors:

In urban terms, the city of Attaya, which is one of the most densely populated on the archipelago (more than 35 inhabitants per hectare in the center), is developing spontaneously and uncontrollably on its outskirts, which are considered unsuitable for urbanization either because they are prone to flooding (low elevations) or because they are agricultural areas that need to be protected (the city, which covered only 24 hectares in 1940, now covers more than 170 hectares). Measures to protect the seafront against flooding have been taken to the east of the city (1,600 meters of dykes have been built), but local stakeholders deplore the negative impact of the infrastructure in terms of hydraulic efficiency and landscape



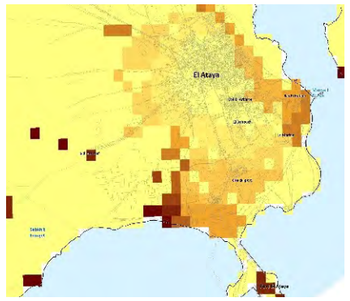
Population density score in Attayay

The centre of Attaya is among the densest in the archipelago



Attaya Urban Growth Score

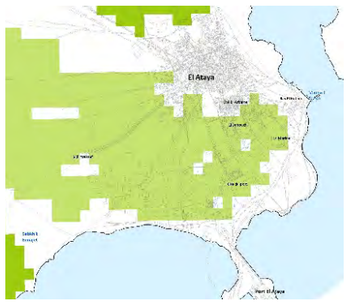
Attaya is expanding rapidly at the expense of wetlands and agricultural areas.



Access to public services in Attaya

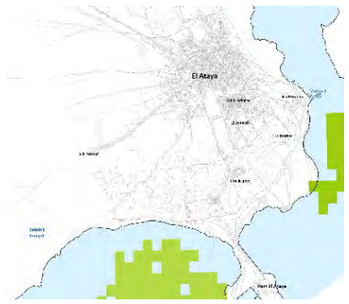
New scattered housing developments are experiencing difficulties in accessing basic public services.

In terms of biodiversity, the coastline around Attaya provides a habitat and nesting site for breeding birds. This coastline is threatened by urbanization and climate change: rising sea levels (coastlines less than 1 m above sea level), rising temperatures (particularly in and around sebkhas), and marine erosion.



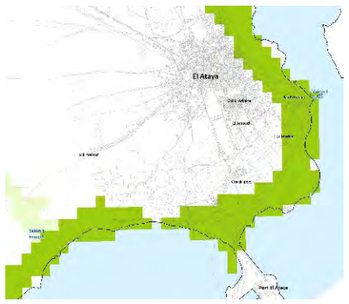
Vulnerability of terrestrial habitats in Attaya

The wooded areas on the outskirts of the city are home to a rich biodiversity threatened by progressive urbanization.



Vulnerability of the Attaya Offshore Marine Habitat

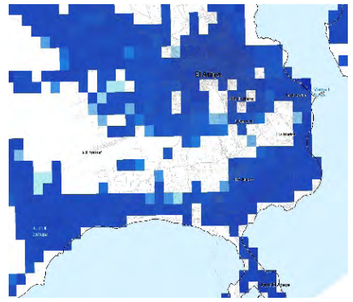
The marine area off the coast of Attaya is home to a rich marine biodiversity that is threatened by intensive fishing.



Vulnerability of species in Attaya

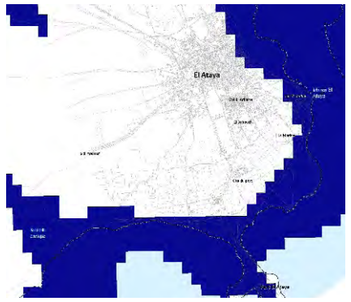
Migratory birds and nesting birds that inhabit wetlands and coastal areas are particularly threatened by climate change and urban expansion.

Finally, in terms of climate, Attaya and its surroundings are facing all the effects of climate change: rising sea levels, increased risk of flooding, rising temperatures, droughts, etc., which are affecting urban areas (particularly the outskirts), agricultural land (north of the city), and wetlands (coastal areas and edges of the sebkha).



Attaya vulnerability to flooding

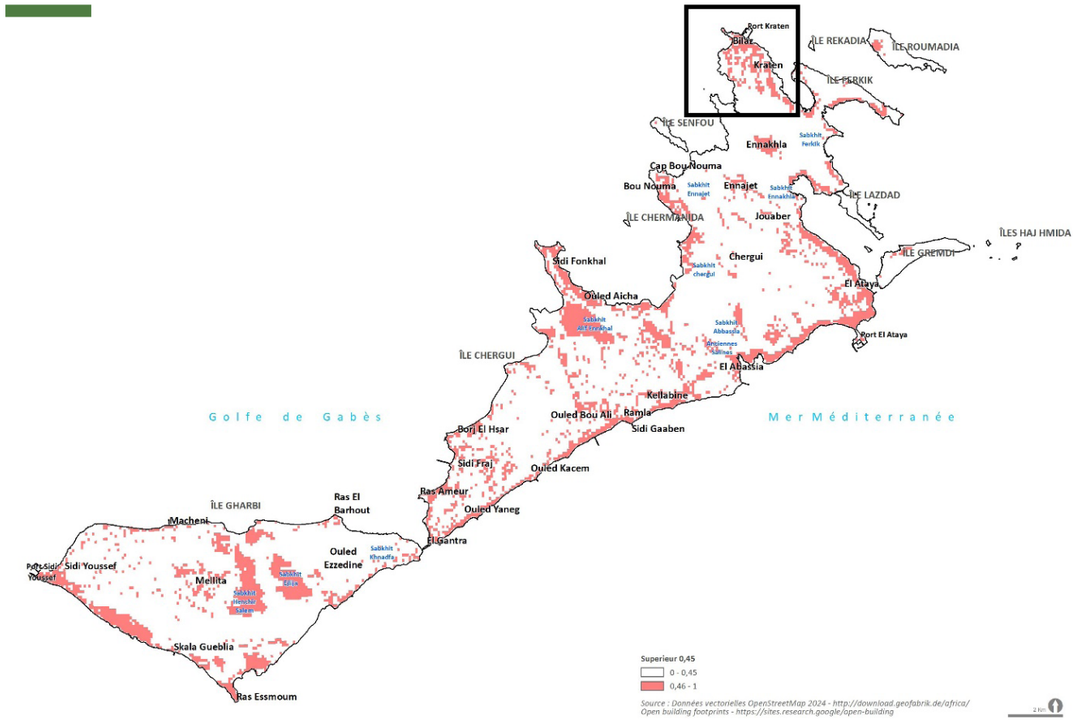
The centre of Attaya and its coastline are relatively vulnerable to flooding

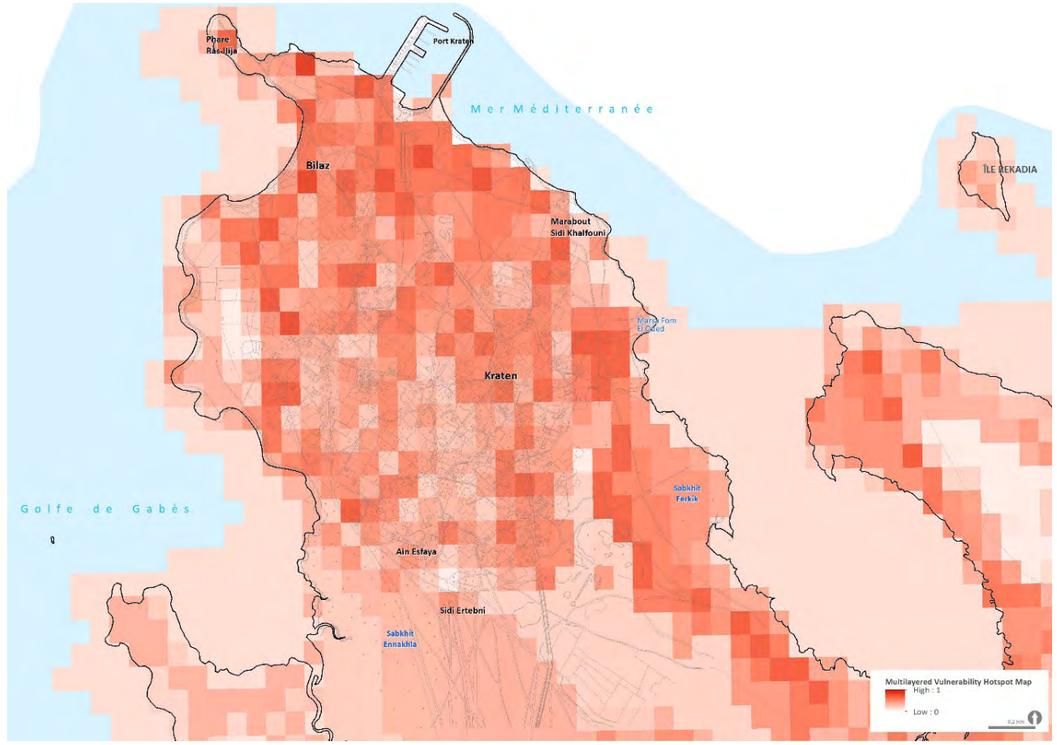


Attaya’s vulnerability to sea level rise

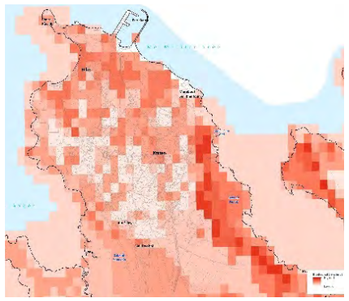
Attaya’s relatively low coastline is vulnerable to the risk of sea level rise.

Hotspot 3: Kraten

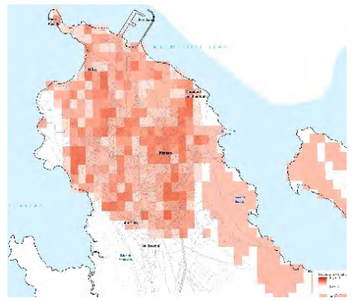




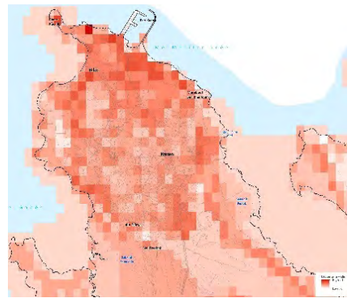
Map 9 : Kraten Hotspot



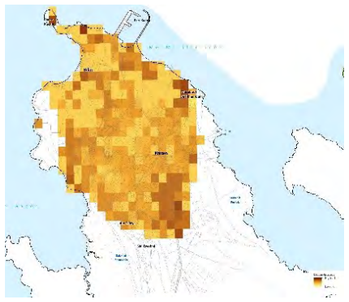
Biodiversity - Climate



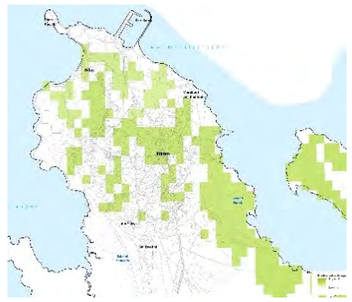
Biodiversity - Urban



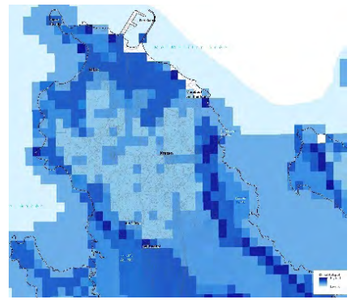
Climate - Urban



Urban



Biodiversity

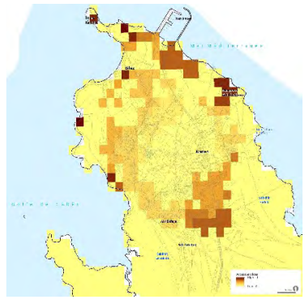


Climate

Kraten is located at the northernmost tip of the Kerkennah archipelago. In terms of land use, it is characterized by the spread of housing across agricultural land inland (a relatively high-lying area). The relatively low-lying coastline, marked by unfavorable conditions (soil salinity, frequent flooding), has remained untouched by urbanization until recent years.

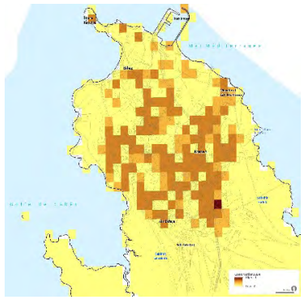
Kraten's vulnerability is multilayered and linked to the following factors:

In urban terms, Kraten is relatively isolated and far from public facilities, services, and infrastructure. The population is scattered (an average of three inhabitants per hectare) across orchards and has difficulty accessing public services (one school, one health center, and one bus station in the center of a residential area covering 236 hectares). The economy is rural (fishing and agriculture) and lacks resilience due to its lack of diversity. The distribution of the population, which is relatively low in density and confined to the most "viable" areas, is beginning to undergo profound changes with the acceleration of agricultural land sprawl and the gradual occupation of the coastal fringe, which had previously been spared. This is evidenced by the evolution of construction observed in recent years through satellite images (a relatively high densification of the rural fabric between 2040 and today) in an area with no urban development plan.



Score access to pulic services in Kraten

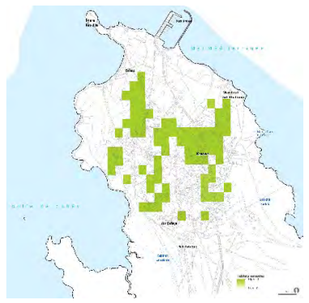
The inhabitants of the outskirts of Kraten suffer from the poor accessibility to public services



Urban Growth Score

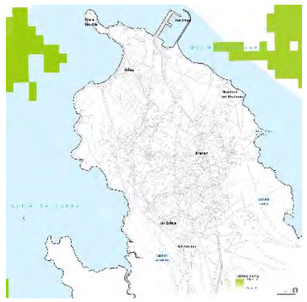
Kraten quickly became denser with a fragmentation of agricultural land and an extension towards the most sensitive areas.

In terms of biodiversity, Kraten is home to terrestrial and marine habitats that are among the most important on the archipelago: wooded areas in the center, wetlands to the south and north around the sebkhas and their surroundings, and Posidonia and Cimodecea offshore. Given its richness and ecological interest, the area is subject to two types of protection and management: it has been designated a RAMSAR site and its shoreline a marine protected area.



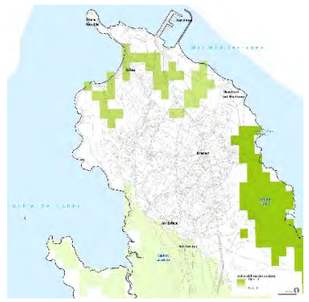
Vulnerability of terrestrial habitats in kraten

The wooded areas in the centre of Kraten are home to a rich biodiversity that has been undermined by gradual urbanisation



Attaya Urban Growth Score

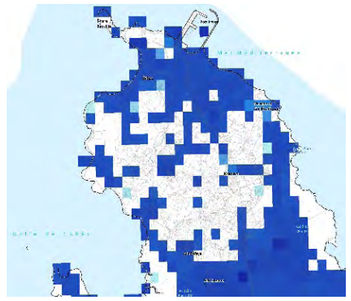
The marine area off Kraten consisting of posedonia and cimodecea is home to a rich marine biodiversity that is threatened by fishing. It is in the process of being classified as a marine protected area



Vulnerability of species in Kraten

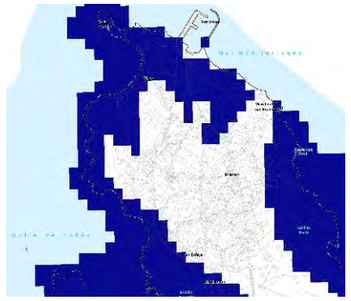
Migratory birds and breeding birds that occupy wetlands and coastlines that are particularly threatened by climate change.

Finally, in terms of climate, Kraten, which is flat and relatively low-lying (1 m above sea level at its highest point), is affected by the risks of flooding (particularly in and around the sebkhas) and sea level rise, especially along its coastline, as well as by marine erosion, particularly on the northern and southern coasts of the area.



Kraten's vulnerability to flooding

Relatively flat, Kraten is vulnerable to the risk of flooding.



Kraten's vulnerability to sea level rise

Kraten's relatively low coastline is vulnerable to the risk of sea level rise.

Urban occupation and changes in agricultural and fishing practices are the main factors contributing to increased risks in Kraten. Indeed, densification in the center and urban expansion towards the coastline are taking place at the expense of natural terrestrial habitats and in the areas most at risk in terms of climate, while the intensification and introduction of unsuitable fishing methods are detrimental to terrestrial habitats.

05

Vision & strategic objectives for a climate resilient Kerkennah Archipelago

This section presents the city's long-term resilience vision and the strategic objectives that guide the URAP. It outlines the priorities for safer, greener, and better-planned urban growth: strengthening flood protection, restoring ecosystems, improving basic services, and enhancing institutional and community capacity to adapt to climate change.

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05

Vision & strategic objectives for a climate resilient Kerkennah Archipelago

The vision statement underlying the action plan is the result of a convergence between the local aspirations expressed during the transformational leadership workshop in April 2024, the main conclusions of the MVA, and the guidelines of the National Strategy on Climate Change (SNCC) and the National Strategy for Ecological Transition (SNTE).
The consensus reached at the workshop anchored the vision in a collective imagination that inspires action, emphasizing the climate emergency, the value of traditional knowledge, and community cohesion.

Vision Statement

In the Workshop, the actors expressed:

- **A dream:** “a sustainable archipelago, more resilient and more pleasant to live in”
- **A slogan:** “Alone I drown, together we protect ourselves and preserve our archipelago”
- **One goal:** “Maintain healthy local community systems and Build resilience to natural hazards caused by climate change by using nature-based solutions and effective sustainable practices to minimise the expected impacts of sea level rise from 2050 to 2070”

The aspirations of the actors, combined with the results of the MVA and the national orientations, are reflected in the following vision:

“Kerkennah, a solidarity-based, liveable and resilient archipelago territory, where communities together protect their archipelago by enhancing their natural and cultural heritage, and by acting collectively in the face of the effects of climate change”.

This vision is part of a long-time frame and a spirit of community mobilization in favor of nature-based solutions, sustainable practices and strengthened local governance. It also reflects the goal formulated by the participants to “maintain healthy community systems and prepare an action plan in the face of natural hazards caused by climate change, using ecological and sustainable solutions to delay the expected impacts of sea level rise from 2050 to 2070”.

Meeting with CRDA Sfax to present the MVA and URAP methodology and results by UN-Habitat Tunisia & Headquarters team, Septembre 2024.

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Strategic Objectives

The vision, expressed in the previous chapter, aims to federate territorial initiatives around four essential objectives that reflect the priorities of the territory in the face of climate and socio-environmental challenges:

Understand and prepare

The MVA highlighted a lack of integrated data on vulnerabilities and a weak local capacity for anticipation. This objective aims to build a culture of risk and decision-making tools and strengthen the territory's capacity to anticipate the climate risks identified in the MVA, for example the increasing salinization of soils, marine submersion and the rise in the level of the water table. To do this, the plan provides, among other things, for the establishment of a salinity monitoring system that will make it possible to monitor the evolution of this threat in agricultural areas and to guide adaptation measures. It is also planned to develop an emergency preparedness plan, including flood and drought scenarios, in conjunction with the municipality, the technical services and the civil protection. In addition, climate change awareness campaigns will be carried out among young people, particularly in schools, in order to develop a culture of risk from an early age.

A resilient community

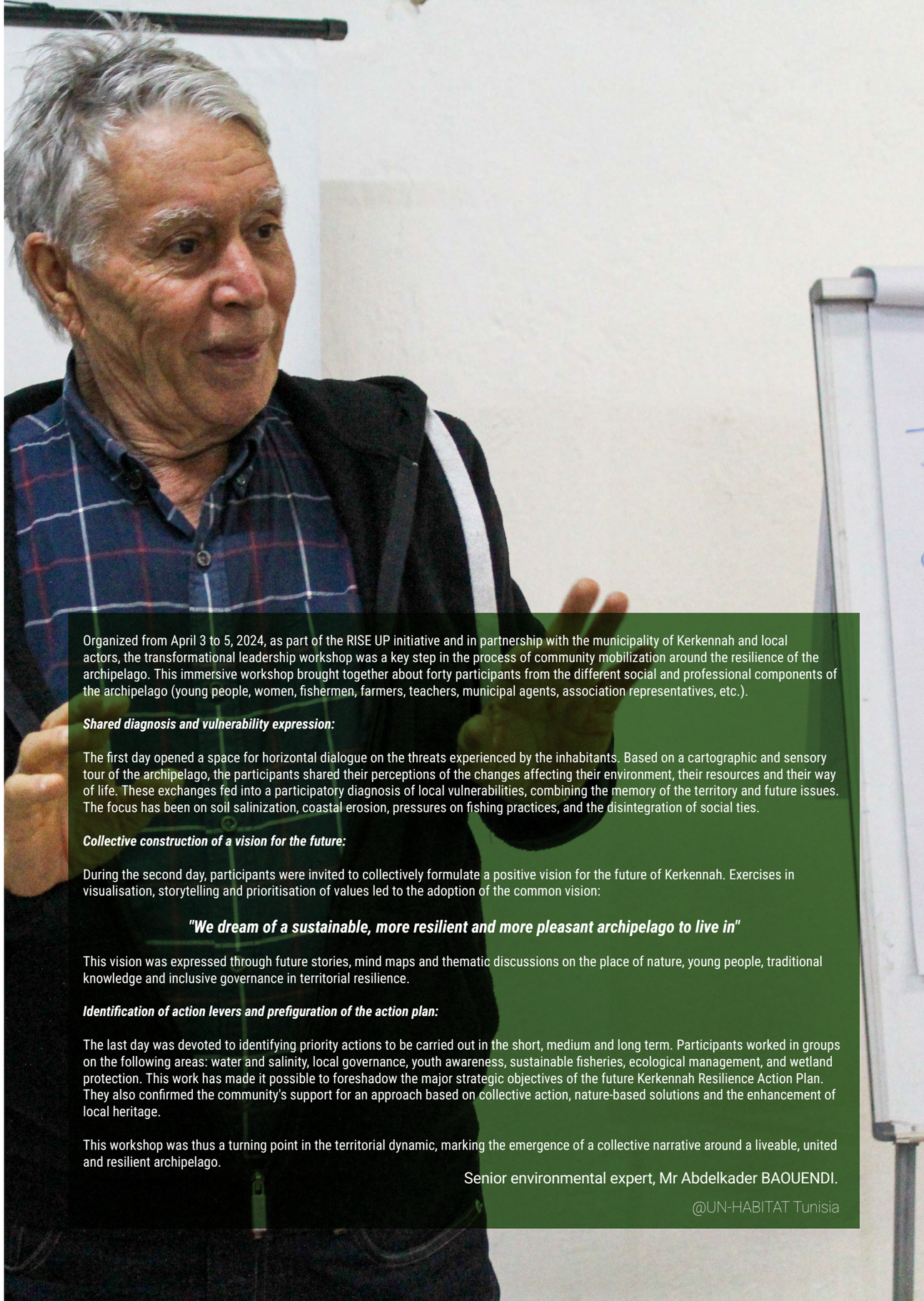
The social vulnerabilities identified by the MVA, in particular unequal access to sanitation, precarious living conditions in some localities, and economic dependence on exposed sectors (fishing, agriculture), require targeted actions to strengthen the autonomy of the population. With this in mind, the plan includes the rehabilitation of traditional wells and freshwater springs, to improve access to a quality resource in the areas most exposed to salinity. Rainwater collection systems will also be installed, particularly in schools, in order to respond to the scarcity of water resources. In addition, the creation of green spaces in urban areas will not only reduce heat archipelagos but also offer residents places to meet, rest and raise awareness of the environment.

Actors involved

The MVA highlighted local governance that is still poorly structured around climate and environmental issues. To address this deficit, the action plan provides for the involvement of the various stakeholders through community awareness-raising actions on environmental protection. These actions will involve the animation of school clubs, the implementation of citizen days, and support for local associations. In addition, communication and advocacy work will be carried out to support coastal protection efforts and the recognition of sustainable fishing practices. As such, support for charfia, a traditional fishing technique already listed as intangible heritage by UNESCO, will serve as a lever to combine cultural preservation and responsible management of marine resources.

Protected and enhanced ecosystems

The ecological assessment of the MVA has highlighted an accelerated degradation of coastal ecosystems, wetlands and marine habitats. To respond to this, the action plan provides for ecological restoration interventions, in particular through the planting of native and halophilic plant species adapted to salinity, such as samphire or marine tigernuts, which make it possible to fight against erosion and revitalize degraded soils. The restoration of lagoons and sebkhas, identified as important habitats for migratory birds, will also help preserve local biodiversity. At the same time, the deployment of artificial coastal reefs will promote the protection of the coastline while supporting fish reproduction, a central element for food security and the local economy. Finally, the enhancement of these ecosystems through ecotourism tours will contribute to visitor awareness while generating alternative income for communities.



Organized from April 3 to 5, 2024, as part of the RISE UP initiative and in partnership with the municipality of Kerkennah and local actors, the transformational leadership workshop was a key step in the process of community mobilization around the resilience of the archipelago. This immersive workshop brought together about forty participants from the different social and professional components of the archipelago (young people, women, fishermen, farmers, teachers, municipal agents, association representatives, etc.).

Shared diagnosis and vulnerability expression:

The first day opened a space for horizontal dialogue on the threats experienced by the inhabitants. Based on a cartographic and sensory tour of the archipelago, the participants shared their perceptions of the changes affecting their environment, their resources and their way of life. These exchanges fed into a participatory diagnosis of local vulnerabilities, combining the memory of the territory and future issues. The focus has been on soil salinization, coastal erosion, pressures on fishing practices, and the disintegration of social ties.

Collective construction of a vision for the future:

During the second day, participants were invited to collectively formulate a positive vision for the future of Kerkennah. Exercises in visualisation, storytelling and prioritisation of values led to the adoption of the common vision:

"We dream of a sustainable, more resilient and more pleasant archipelago to live in"

This vision was expressed through future stories, mind maps and thematic discussions on the place of nature, young people, traditional knowledge and inclusive governance in territorial resilience.

Identification of action levers and prefiguration of the action plan:

The last day was devoted to identifying priority actions to be carried out in the short, medium and long term. Participants worked in groups on the following areas: water and salinity, local governance, youth awareness, sustainable fisheries, ecological management, and wetland protection. This work has made it possible to foreshadow the major strategic objectives of the future Kerkennah Resilience Action Plan. They also confirmed the community's support for an approach based on collective action, nature-based solutions and the enhancement of local heritage.

This workshop was thus a turning point in the territorial dynamic, marking the emergence of a collective narrative around a liveable, united and resilient archipelago.

Senior environmental expert, Mr Abdelkader BAOUENDI.

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06

Priority actions for a climate resilient Kerkennah Archipelago

This section outlines the priority actions selected to reduce climate and environmental risks in Kerkennah Archipelago. It highlights the interventions with the greatest potential impact, showing how each action responds directly to the vulnerabilities identified in the MVA.

Co-elaborating a list of prioritized adaptation measures with the local community of Kerkennah.

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06

Priority actions for a climate resilient Kerkennah archipelago

Expanded list of projects

Based on the previous analyses, which highlighted the vulnerability factors of each hotspot, and on the basis of the results of the consultation workshop that followed, and in line with the strategic framework presented above, a first extended list of projects was proposed.

This list of 33 projects (see table) is structured as an action plan for an operational response to the vulnerabilities identified in the context of the MVA, which highlighted a convergence of urban, climatic and biodiversity risks.

Among the four strategic objectives selected, two emerge as key pillars within the action plan:

1. Understanding and preparing: this strategic objective brings together many foundational actions aimed at improving the production and management of knowledge on climate and biodiversity risks (observatories, maps, management plans, warning platforms). It provides a foundation for anchoring action in anticipation and long-term planning.

2. Protected and enhanced ecosystems: this strategic objective is strongly mobilized in the plan through interventions aimed at ecological restoration, the sustainable management of natural resources, and the deployment of nature-based solutions (artificial reefs, revegetation, requalification of wetlands and lagoons, redevelopment of salt marshes, etc.).

The other two strategic objectives, Actors involved and resilient community, are also taken into account, in particular through awareness-raising, participatory governance, and capacity building actions for local actors.

The plan favours an integrated and complementary approach, by mobilising different types of actions according to the issues:

1. Infrastructure actions (nearly half of the portfolio): hydro-ecological developments, rainwater collection systems, requalification of coastal public space, erosion control devices, municipal nurseries, cisterns, monitoring equipment, etc. These investments target the most exposed areas and combine functional efficiency and ecological integration.

2. Organisational and political actions: management plans for RAMSAR areas and marine protected areas, user agreements, resilient urban planning regulations, institutional partnerships, climate monitoring observatories.

3. Awareness-raising, training and animation actions: educational modules on the climate, enhancement of natural heritage, mobilization of young people and women, participatory workshops, educational ecotourism, revival of traditional agricultural practices adapted to climate change.

This combination ensures a balance between the short term (preparation, implementation, capacity building) and the medium/long term (ecological restoration, transformation of uses, major redevelopments).

The plan therefore gives priority to:

- Adaptation of natural resource management practices (water, biodiversity, soil) to the effects of climate change;
- The rehabilitation of degraded ecosystems as levers of resilience and economic opportunities;
- The integration of climate into urban planning and risk management;
- The territorialization of environmental governance in favor of sustainable local mobilization.

In summary, the Kerkennah Urban Resilience Action Plan proposes a technical, social and ecological response, based on a fine reading of local vulnerabilities. It reflects the ambition to make the archipelago a model territory in terms of island adaptation, through an integrated, progressive approach focused on nature and local knowledge.

Organized in Kerkennah from September 10 to 14, 2024, a second workshop continued the collective dynamic initiated in April and was a decisive step in the planning process. Through field visits, technical workshops and consultation sessions, the participants (municipality, civil society, decentralised services, experts) were able to validate vulnerability profiles, refine spatial analyses and identify priority areas.

The participatory approach adopted made it possible to combine technical expertise and local knowledge to select critical areas such as Kraten, Attaya and Kellabine affected by a combination of urban, climatic and ecological vulnerabilities.

The workshop also resulted in the collective development of an expanded list of resilience projects, integrating nature-based adaptation, resource management, community strengthening and the enhancement of traditional practices. This participatory dynamic has laid the foundations for the action plan for a more resilient archipelago, anchored in local realities and with a sustainable future.

A portrait of Mr. Taher Hached, a local activist

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Table 1: Expanded List of Adaptation and Mitigation Projects

Stock Title	Type of action	Nature	Maturity	Vulnerabilities targeted	Strategic axes concerned
1.Eco-tourism development of wetlands and non-urbanizednatural coasts	Infrastructure	Investment	Medium term (5-10 years)	Tourism pressure, coastal erosion, loss of biodiversity	A Resilient Community / Protected Ecosystems
2.Sustainable waste management	Infrastructure	Investment	Short-term (<5 years)	Pollution, urban pressure, environmental degradation	A resilient community / Actors involved
3.Local urban planning integrating climate risk factors	Political / Organizational	Standards / Regulations	Short-term (<5 years)	Widespread urbanization, informal housing, construction in high-risk areas	Understand and prepare
4.Development of public spaces by promoting soft mobility, greening and sociability	Infrastructure	Investment	Medium term (5-10 years)	Heat archipelagos, urban fragmentation, low social resilience	A resilient community
5.Landscaping, urban and hydraulic design of the urbanized waterfront	Infrastructure	Investment	Medium term (5-10 years)	Marine submersion, coastal erosion, vulnerability of equipment	Understanding and Preparing / A Resilient Community
6.Municipal energy saving programme	Political / Organizational	Awareness / demonstration / training	Short-term (<5 years)	Energy dependence, overconsumption, low local capacity	Actors involved
7.Creation of a municipal nursery for the promotion of adapted plants and crops	Infrastructure	Investment	Short-term (<5 years)	Vegetation regression, loss of endemic species	Protected and enhanced ecosystems
8.Integrated management programme for the RAMSAR area	Political / Organizational	Strategies / Plans / Programs	Medium term (5 - 10 years)	Wetland degradation, biodiversity loss	Protected and enhanced ecosystems
9.Integrated Marine Protected Area Management Program	Political / Organizational	Strategies / Plans / Programs	Short-term (<5 years)	Overexploitation of marine resources, pollution	Protected and enhanced ecosystems
10.Restructuring and urban regeneration of old centres	Infrastructure	Investment	Medium term (5-10 years)	Ageing buildings, lack of public spaces, thermal vulnerability	A resilient community
11.Vulnerability study and local risk management plan	Political / Organizational	Organizational Action	Short-term (<5 years)	Poor ability to anticipate risks, gaps in planning	Understand and prepare
12.Municipal water saving programme	Political / Organizational	Awareness / demonstration / training	Short-term (<5 years)	Water stress, waste, unequal access to water	A resilient community
13.Development and promotion of sustainable and resilient fishing practices	Political / Organizational	Awareness / demonstration / training	Short-term (<5 years)	Overexploitation of fish, precariousness of fishermen	Actors involved / Protected ecosystems
14.Rehabilitation of palm groves	Infrastructure	Investment	Medium term (5-10 years)	Degradation of agricultural landscapes, decline of agrarian biodiversity	A Resilient Community / Protected Ecosystems
15.Marine Habitat Preservation and Rehabilitation Program	Political / Organizational	Awareness / demonstration / training	Medium term (5-10 years)	Degradation of the seabed, pollution, loss of species	Protected and enhanced ecosystems
16.Rainwater harvesting and mobilization practices	Infrastructure	Strategies / Plans / Programs	Short-term (<5 years)	Water stress, lack of storage infrastructure	A resilient community
17.Raising awareness among the local community, especially young women and men	Political / Organizational	Awareness/Training	Short-term (<5 years)	Low risk culture, exclusion of young people and women	Actors involved
18.Enhancement of the production of family vegetable gardens	Political / Organizational	Behavioural measure	Short-term (<5 years)	Food vulnerability, economic dependence	A resilient community
19.Educational promotion focused on turtles and nesting birds	Political / Organizational	Awareness/Training	Short-term (<5 years)	Threats to emblematic species, loss of connection with the environment	Protected ecosystems / Actors involved
20.Real-time risk alert platform	Infrastructure	Tracking/Data Collection	Short-term (<5 years)	Weak responsiveness to hazards, lack of warning tools	Understand and prepare

21.Nature-based hydro-ecological developments for water management and flood protection	Infrastructure	Investment	Medium term (5-10 years)	Flooding, erosion, low infiltration	Understanding and Preparing / Protected Ecosystems
22.Revitalization of ancestral practices, development of sustainable and resilient agricultural practices	Political / Organizational	Awareness / demonstration / training	Short-term (<5 years)	Economic vulnerability, salinization, land degradation	A resilient community / Actors involved
23.Promotion of ecotourism	Political / Organizational	Strategies / Plans / Programs	Medium term (5-10 years)	Pressure on ecosystems, rural precariousness	Protected Ecosystems / A Resilient Community
24.Local Nature-Based Erosion Control Program	Infrastructure	Investment	Medium term (5 - 10 years)	Coastal erosion, habitat destruction	Protected ecosystems
25.Development of coastal reefs for fisheries and reduction of coastal erosion	Infrastructure	Investment	Medium term (5-10 years)	Decline in fish resources, marine submersion	Protected Ecosystems / A Resilient Community
26.Partnerships in academic research programs	Political / Organizational	Organizational Action	Short-term (<5 years)	Fragmentation of knowledge, low synergies	Understanding and preparing / Actors involved
27.Local Nature-Based Soil and Water Salinization Program	Infrastructure	Investment	Short-term (<5 years)	Salinization, loss of fertility, water stress	Protected Ecosystems / A Resilient Community
28.Neighbourhood protection structures, infrastructure and equipment exposed to flooding	Infrastructure	Investment	Medium term (5-10 years)	Flooding, submersion, vulnerability of equipment	Understand and prepare
29.Local observatory of climate change effects and risks	Political / Organizational	Tracking / Data Collection / Analysis	Short-term (<5 years)	Low data availability, lack of anticipation	Understand and prepare
30.Project for the restoration of hydrographic functioning and the rehabilitation of lagoons and wetlands	Infrastructure	Investment	Long-term (10-15 years)	Ecosystem dysfunction, loss of biodiversity	Protected ecosystems
31.Redevelopment of salt marshes taking into account ecological considerations	Infrastructure	Investment	Long-term (10-15 years)	Degradation of wetlands, saline pollution	Protected Ecosystems / A Resilient Community
32.Relocation of equipment from risk areas and ecological rehabilitation of low-lying areas	Infrastructure	Investment	Long-term (10-15 years)	Marine submersion, loss of land use	Understanding and Preparing / Protected Ecosystems
33.Establishment of a soil and water salinity monitoring system	Infrastructure	Tracking / Data Collection / Analysis	Short-term (<5 years)	Increasing salinization, loss of land quality	Understand and prepare

Detailed action sheets for a climate resilient Kerkennah Archipelago

A shortlist of projects was selected on the basis of a prioritisation exercise carried out with the municipal services by mobilising an evaluation grid scoring each action according to its expected impacts and feasibility (see grid in the appendix).
The 14 projects selected to strengthen the territorial resilience of the Kerkennah archipelago are based on an integrated, multisectoral and territorialised approach, taking into account both the local priorities expressed by the actors and the vulnerabilities identified in the MVA. They target the structural, climatic, environmental and socio-economic challenges specific to the archipelago.

Table 2: Shortlist of mitigation and adaptation projects

Rank	Project title	Detailed Description
1	Eco-tourism development through wetlands and natural coasts rehabilitation	Development of light and reversible infrastructures (observatories, marked trails, signage) to enhance natural areas while preserving their biodiversity; promotion of ecotourism as a lever for local resilience.
2	Sustainable waste management	Upgrading of pre-collection and source sorting systems, recovery of organic waste (composting), management of plastics, awareness campaigns and support for reduction and reuse practices.
3	Strengthen urban planning through updated zoning and standards based on climate risks and vulnerabilities	Revision of the UAPs to integrate climatic constraints (submersion, erosion, heat), identification of unbuildable areas, adaptation of urban standards and strengthening spatial planning based on vulnerabilities.
4	Development of public spaces by promoting soft mobility, greening and sociability	Requalification of public spaces into spaces of thermal comfort, inclusion and soft mobility: greening, shaded benches, solar lighting, pedestrian paths, community activity areas.
5	Waterfront landscaping, urban and hydraulic design	Redevelopment of the seafront of urban localities against marine submersion and runoff, via soft vegetated dikes, permeable surfaces, halophilic plantings, resilient street furniture, continuous pedestrian paths.
6	Launch a Municipal energy saving programme	Energy audit of municipal buildings and equipment, transition to LED lighting, installation of solar panels, optimised energy management practices and training of municipal staff in economical gestures.
7	Create a communal nursery to grow and distribute climate-resilient plants and crops adapted to the archipelago's climatic conditions	Establishment of a production unit for halophilic, tree or ornamental plants adapted to the archipelago's dry and salty climate, intended to feed urban reforestation, ecological restoration and sustainable food production projects.
8	Establish an Integrated management of the RAMSAR wetland area	Implementation of a RAMSAR wetland management plan including zoning, ecological restoration, community monitoring, environmental education and development of compatible activities (ecotourism, handicrafts).
9	Develop a Marine Protected Area (MPA) Management Plan	Creation of a management plan for the MPA with the involvement of fishermen, buoyage, ecological monitoring, reinforced protection areas, development of marine ecotourism, support for sustainable fishing.
10	Revitalisation and urban regeneration of old centres to enhance soft mobility, preserve heritage and build climate resilience	Redevelopment of historic centres by favouring pedestrianisation, archipelagos of freshness, the reuse of traditional materials, the revitalisation of community life and local economic activities.
11	Establish a municipal water saving programme	Implementation of a plan to reduce drinking water consumption in public buildings, rainwater recovery, sober greening, change in irrigation practices and awareness raising among citizens.
12	Promotion of sustainable fishing practices	Support for traditional artisanal fishing (charfias), intergenerational transmission, fishermen's organization, improvement of equipment, local commercial enhancement and heritage recognition.
13	Rehabilitation of palm groves	Inventory, maintenance and replanting of date palms, agroecological practices, valorization of by-products (fiber, compost), integration into urban and tourist landscapes.
14	Preservation and rehabilitation of marine habitats	Mapping, protection and restoration of Posidonia meadows, benthic habitats, fight against destructive anchors, involvement of fishermen and young people in awareness and monitoring.

The selected projects, presented above, directly target the characteristic fragilities of the archipelago: increased exposure to natural hazards (marine submersion, coastal erosion, drought, salinization), scarcity of water resources, energy dependence, degradation of natural environments, vulnerability of the agricultural and fisheries sectors, as well as a lack of appropriate territorial planning. This list testifies to a desire to transition to a more sober, resilient, inclusive and sustainable development model.

The internal coherence of the projects is based on their articulation around three major complementary dynamics: the adaptation of urban systems and infrastructures to climatic constraints; the protection, restoration and enhancement of terrestrial and marine ecosystems; and the structuring of a sustainable local economy, based on adapted traditional practices and sober innovations. Each project is designed in a logic of territorial integration, in connection with the ecological and social specificities of the sites concerned, and according to an approach based on nature-based solutions (NBS).

Several projects are committed to redeveloping public spaces, old centres and coastal fronts, with an emphasis on greening, permeability, thermal comfort, soft mobility and conviviality. Others are moving towards the sustainable management of resources, through water and energy saving programs, waste recovery, or the creation of a municipal nursery for resilient plants. Structuring projects also target ecological governance (management of the Marine Protected Area, the RAMSAR area), climate-sensitive urban planning, and the implementation of a local risk management plan.

The programme places particular emphasis on the revival of traditional production systems, including artisanal fisheries (charfias), palm groves and agroecology, while strengthening local value chains and socio-economic inclusion. This dynamic is driven by a logic of systemic resilience, which values local knowledge, participatory governance mechanisms, and resource-efficient practices.

The selected projects ensure a balanced territorial coverage, between urbanized environments, coastal areas, agricultural areas and marine ecosystems, and are fully in line with national and international standards: National Strategy for Ecological Transition (SNTE), Climate Strategy, NDC, SDGs, RAMSAR and Barcelona Conventions. This compatibility is an essential lever for access to climate and environment financing, through national programmes (FODEP, FTE, FOCTEE) and technical cooperation (AFD, GIZ, UNDP, GEF, FFEM, etc.).

This shortlist thus offers a robust, modular and coherent strategic base. It embodies a vision of Kerkennah as a pilot archipelago territory, committed to the ecological and social transition, capable of combining adaptation to climate change, enhancement of its heritage, local innovation and collective mobilization.

Each project on the shortlist is developed in a specific sheet in the following chapter.

01: Eco-tourism development through wetlands and natural coasts rehabilitation

Description and rationale	This action stems from the results of the local workshops held in September 2024, which highlighted challenges related to the accelerated degradation of these sensitive areas due to inappropriate developments and land use, as well as the limited visibility and awareness among the population regarding the ecological role of these spaces. This action aims to enhance the natural wetlands and coastal areas of Kerkennah through eco-tourism developments that respect ecosystems. The focal point will be a cycle and walking path that integrates many key environmental, ecological and social/historic sites in Kerkannahs such as wetlands for bird watching, and coastal communites for heritage and sustainable fishing activites. It includes the creation of: *1. Interpretation Trails* Interpretation trails are specially designed pedestrian or cycling routes which include strategic stops equipped with educational signage. These signs provide visitors with information about: Local wildlife and vegetation (fauna and flora), pointing out what species are present and why they matter for biodiversity. Unique ecological roles of each site along the trail, for example explaining that a given area is crucial for bird nesting, fish reproduction, or supports rare plant communities. Cultural and traditional knowledge, sometimes linking natural features to local history, agricultural practices, or community stories. The objective of this activity is to foster awareness and appreciation for the natural and cultural heritage of the area, while encouraging responsible behavior and community stewardship. *2. Reversible Micro-Infrastructures* Reversible micro-infrastructures refer to lightweight, removable facilities such as wooden observation decks, temporary boardwalks, portable viewing towers or benches, compost toilets, and pop-up shelters. these are designed for easy assembly and disassembly without concrete footings, heavy machinery, or permanent changes to the landscape. Their materials and footprint are selected to minimize ecological disruption and visual impact, allowing the area to be restored to its initial state if required. The objective of this activity is to provide necessary visitor amenities (e.g., places to rest, observe, or learn) without damaging natural cycles, changing habitats, or introducing lasting environmental disturbance. These two elements are mutually reinforcing and form core components of a nature-based, low-impact visitor strategy: -Interpretation trails guide visitors safely through ecologically sensitive areas, channeling foot traffic to minimize trampling or disturbance. Educational signs and guided stops ensure that each visit builds understanding of local challenges and the value of biodiversity protection. -Along these trails, reversible micro-infrastructures are deployed to support the visitor experience (e.g., wildlife observation, learning, rest) only in the least sensitive spots. Their reversible nature guarantees that ecosystems can fully recover if visitation patterns change, or if restoration is needed after a period of use. 3. Livelihoods such as bike rental, tour guiding, sustainable accommodation and other environmental jobs could be created. To make the initiative inclusive and accessible, electric bikes could be incorporated, with charging stations and rental opportunities ensuring opportunities for private enterprises to support the project as well. This approach allows ecotourism to function as a tool for conservation, generating local economic benefits from responsible tourism while maintaining and even enhancing, the archepelago's ecological integrity. These designing and implementation of these activities are selected and sited via participatory workshops with local communities and technical experts to balance access, education, and protection. Integrated with other soft infrastructure (e.g., mobile apps for additional info, managed waste bins), and with the broader aims of sustainable livelihoods and climate change adaptation. The approach emphasizes the resource efficiency of the project, their integration into the landscape and their low carbon footprint..		
Status	New project	***Action Owner***	Municipality of Kerkennah, in partnership with APAL and the Ministry of Environment

Type	Capital Investment (green and blue infrastructure)	***Location***	Non-urbanised coastal areas of high ecological value in Kraten (Hotspot 3) and Kellabine (Hotspot 1)
Vulnerabilities Addressed	Loss of coastal biodiversity Urban pressure on natural areas Risk of submersion and coastal erosion Economic vulnerability of local communities dependent on seasonal tourism	***Related Actions***	Strengthen urban planning through updated zoning and standards based on climate risks and vulnerabilities (Action 03) Strengthening Territorial Governance (strategic priority across actions) Sustainable Development of Ecosystems (strategic priority across actions) Development of the Waterfront: Landscape, Urban and Hydraulic Design (Action 05) Integrated Management of the RAMSAR Site (Action 08) Integrated Management of the Marine Protected Area (MPA) (Action 09)
Strategic Alignment	SNTE: Pillar 3 (preservation and restoration of ecosystems), Pillar 4 (green and blue economy) Vision Tunisia 2035: inclusive ecological transition NDC 2021 & NAP Tunisia 2021–2030: supports the adaptation and resilience of coastal territories and archipelagos through integrated climate risk management, ecosystem protection, and sustainable development measures.		
Co-benefits	Environmental		Preservation and enhancement of natural habitats Reduction of anthropogenic pressures Contribution to ecological connectivity
	Social		Creation of local jobs in eco-tourism Awareness and community appropriation of natural heritage Cultural enhancement of sites
	Economic		Diversification of local economic activities Increased income from sustainable tourism Indirect promotion of local products

Implementation Steps

Month	Stage	Key activities	Delivrables
1	Ecological diagnosis and site selection	-Conduct ecological and socio-environmental assessments of wetlands and coastal areas. - Identify and map key habitats, biodiversity zones, and heritage sites. -Assess degradation pressures, access, and sensitivity. -Validate selected priority sites with local authorities and communities.	Baseline ecological and social assessment report. Site selection and sensitivity map.
3	Participatory co-design with local stakeholders	-Organize participatory workshops to co-design trail routes, observation points, and interpretive themes. -Integrate biodiversity, local traditions, and cultural narratives. -Identify potential livelihood activities (bike rentals, guiding, eco-lodging). -Validate trail alignment and infrastructure locations on-site.	Co-design report and concept maps. List of local partners and enterprises engaged.
6	Prepare development plan	-Finalize eco-trail and infrastructure designs (interpretation signage, observation decks, rest points). -Conduct environmental and social impact assessment (ESIA). -Develop visitor management, waste management, and maintenance protocols. -Prepare detailed cost estimates, timeline, and management plan.	Comprehensive Eco-tourism Development and Management Plan. ESIA summary and budget.
8	Mobilizing Funding	-Prepare investment brief and funding proposals. -Engage donors, private sector, and government agencies. -Explore public-private partnerships for facilities (e-bikes, solar charging). -Secure funding commitments and define implementation roles.	Funding proposal package. Signed partnership agreements and financing plan.
12	Implementation of the Construction and development works	-Install interpretation trails, reversible micro-infrastructures (boardwalks, viewing decks, compost toilets). -Conduct wetland and coastal habitat restoration (native planting, erosion control). -Establish solar-powered e-bike charging stations. -Train local guides and entrepreneurs in eco-tourism services.	Completed eco-trail infrastructure. Restoration and training completion report.
24	Communication and launch of the Interpretation Trails	-Organize official launch with community, media, and partners. -Produce communication materials (maps, brochures, videos). -Promote through local schools, tourism boards, and social media. - Highlight local stewardship and conservation benefits.	Launch event and media coverage. Communication and outreach package.
24+	Monitoring, maintenance and impact assessment	Establish community-based monitoring for visitor flow, habitat recovery, and biodiversity indicators.- Conduct annual ecological and socio-economic impact reviews.- Maintain and adapt infrastructure as needed.- Report on conservation and livelihood outcomes.	Monitoring and evaluation framework. Annual maintenance and impact assessment reports.

Financing

Indicative Cost	10,000,000USD		
Potential Financing Instruments	Ministry of Invironment – under the SNTE funds mobilization plan	***Revenue Opportunities***	Yes: entrance fees, visits, local crafts, ecological accommodation

Risks and Mitigation Options

Risk		***Mitigation Measure***
Economic	High or unsustainable cost, difficulty in mobilizing public funds or generating direct revenues.	Diversify funding sources Prepare detailed financial plan and strategy Explore public-private partnerships
Technical	Inadequacy of development techniques, poor integration into the landscape, or unintended ecological impact.	Aquire technical support from APAL and CITET for green design Conduct appropriate assessments, including Environmental Impact Assessments and Flood Risk Assessments to minimise negative impacts Select native species
Social	Resistance or misunderstanding of local communities, exclusion of beneficiaries, conflicts of use.	Co-development with the inhabitants, information and training Launch an awareness raising campaign
Environmental	Paradoxical effect of overcrowding of tourists, damage to biodiversity, trivialization of the landscape.	Impact studies, choice of reversible infrastructure, sustainable materials Ongoing Monitoring, Evaluation and Learning to identify risks and apply measures

02: Sustainable waste management

Description and rationale	The assessment conducted with local stakeholders revealed that the current waste management system is one of the main drivers of the degradation of the island's natural environments and landscapes. Natural sites and wetlands have turned into informal dumpsites for all types of waste, calling for urgent management action. The growing pressure from tourism and urban expansion has intensified the generation of household and commercial waste, further threatening fragile coastal and wetland ecosystems that are vital for biodiversity, fisheries, and the island's identity. This action seeks to enhance the management of solid waste in the Kerkennah archipelago through an integrated, circular, and resilience-oriented approach. It will link environmental protection with sustainable livelihoods by promoting waste reduction, recovery, and reuse within local value chains. By integrating climate and environmental considerations into waste management, the initiative also contributes to adaptation goals—reducing contamination of soils and water, improving health outcomes, and strengthening the resilience of local ecosystems to climate shocks. The project encompasses the modernization and optimization of pre-collection and sorting systems at the source (households and establishments), the valorization of organic waste via composting, selective collection of recyclables, and community engagement through awareness-raising campaigns. The objective is to reduce environmental pollution, improve living conditions, and reinforce the resilience of local communities against health and climate-related risks. This will be achieved through: – Upgrading and modernising door-to-door pickup and temporary storage points (e.g. intermediate containers or bins) and collection infrastructure; – Implementing a source-sorting system at household and institutional levels; – Developing a feasibility study on opportunities for organic waste recycling; – Promoting the recovery of organic waste through composting; – Introducing selective collection for plastics and other recoverable materials; – Conducting community awareness and education campaigns on waste reduction and environmental stewardship.		
Status	New project.	***Action Owner***	Municipality of Kerkennah, in partnership with ANGED, ONAS and local associations.
Type	Capital Investment ('investment – organization).	***Location***	The whole archipelago with a focus on dense urban areas.
Vulnerabilities Addressed	Soil and groundwater pollution Degradation of natural and coastal landscapes. Health risks related to the proliferation of waste. Social vulnerability linked to a failing public service.	***Related Actions***	Eco-tourism development through wetlands and natural coasts rehabilitation (action1) Development of public spaces to promote soft mobility, greening and sociability (action4) Waterfront landscaping, urban and hydraulic design (action5) Revitalisation and urban regeneration of old centres to enhance soft mobility, preserve heritage and build climate resilience (action10)
Strategic Alignment	SNTE: Pillar 2: adaptation and resilience of populations. Pillar 3: Preservation and rational management of resources Pillar 4: promotion of the circular economy NDC Tunisia: waste sector is set as a priority for mitigation and adaptation. Vision 2035: Improved essential services and urban sustainability.		
Expected benefits	Environmental	Reduction of illegal dumping and air, water and soil pollution Reduced emissions from waste degradation Improved aesthetics and reduced odours	
	Social	Improvement of the living environment Creation of local green jobs (recycling, collection) Improved acceptability of the urban environment Improved access to waste collection services	
	Economic	Development of local sectors (compost, recycling) Reduction of remediation and curative treatment costs	

Implementation Steps

Month	Stage	Key activities	Delivrables
1	Conduct a waste generation assessment and waste characterisation studies	-Assess current waste generation rates, composition, and collection coverage. -Map informal dumpsites and evaluate their environmental impact on wetlands and coastal zones. -Identify key waste sources (households, tourism, fisheries, markets). -Establish baseline data for monitoring.	• Waste generation and characterization report. • Baseline dataset and mapping of waste flows.
6	Conduct Feasibility Studies to identify suitable disposal and recycling technologies	-Evaluate options for composting, recycling, and waste-to-value initiatives. -Assess site suitability for transfer and treatment facilities. -Analyze potential for integrating circular economy solutions (organic composting, plastic recycling). -Estimate investment, operational costs, and environmental benefits.	• Signed partnership agreements. • Financing plan and stakeholder engagement framework.
12	Identify and establish PPPs and financial partners	-Identify potential private sector and institutional partners for financing and operations. -Develop partnership models (collection, recycling, composting enterprises). -Negotiate PPP agreements and define cost-sharing arrangements. -Secure co-financing or donor support for infrastructure.	• Signed partnership agreements. • Financing plan and stakeholder engagement framework.
12	Participatory design and planning of systems (sorting, collection, recovery)	-Conduct co-design workshops with local authorities, community representatives, and waste operators. -Define sorting systems and collection routes. -Plan composting, recycling, and temporary storage facilities. -Integrate gender and social inclusion considerations.	• Community-validated waste management plan. • Detailed system layout and operational model
18	Acquisition of equipment and training of staff	-Procure collection vehicles, bins, sorting containers, and composting units. -Train municipal and community staff in collection, segregation, and safety procedures. -Develop operational manuals and maintenance protocols.	• Equipment delivered and installed. • Trained personnel and operational guidelines.
18	Launch awareness campaigns (schools, households)	-Conduct education and communication campaigns on waste sorting and recycling. -Partner with schools, youth groups, and local associations. -Distribute communication materials and incentives for proper sorting.	• Awareness and education materials. • Community participation reports.
24	Commissioning and construction of infrastructure and devices	-Construct composting sites, recycling stations, and improved collection points. -Test and commission systems for operation. -Integrate renewable energy and water-efficient designs where feasible. -Officially launch improved waste management services.	• Functional waste management infrastructure. • Commissioning report and system launch event.
24+	Monitoring and evaluation, adjustments, extension of recovery channels	-Monitor waste quantities, recycling rates, and environmental indicators. -Conduct user satisfaction and performance assessments. -Adjust operational models and expand recovery channels (e.g. plastics, organics, glass). -Document lessons learned and prepare scale-up strategy.	• Monitoring and evaluation reports. • Updated management plan and scale-up proposal.

Financing			
Indicative Cost	85,000USD		
Potential Financing Instruments	Ministry of Environment ANGed Embassy of Japan Kerkennah municipality FNCT – Fédération Nationale des Communes Tunisiennes	***Revenue Opportunities***	Yes – compost recovery, recycling of plastics and metals, creation of ancillary activities (recycling-based crafts, local circular economy)

Risks and Mitigation Options		
Risk		***Mitigation Measure***
Economic	Risk of project failure due to lack of funding or budgetary unsustainability	Staggering the phases of the project, prioritizing actions with a high impact and low initial cost, seeking co-financing. Explore PPP opportunities
Technical	Risk of technical inefficiency or mismatch of solutions with the local context	Mobilize ANGED's technical assistance, use proven technologies, adapt equipment to the specificities of Kerkennah (landlocked areas, insularity) Conduct appropriate strudies to design a context specific waste system
Social	Risk of social rejection or non-adherence of users to new practices Site selection for disposal could cause air or noise pollution for nearby residents	Involve citizens from the planning phase, introduce incentive mechanisms for sorting (discounts, rewards), targeted awareness campaigns An EIA and an ESIA will be conducted to ensure there are no adverse impacts for vulnerable or poor groups from the selected site.
Environmental	Risk of persistent pollution, environmental inefficiency or transfer of impacts to natural environments	Promote sorting at source, guarantee closed collection systems, ecologically validate treatment sites, set up environmental monitoring

03: Strengthen urban planning through updated zoning and standards based on climate risks and vulnerabilities

Description	The planning modalities and instruments implemented to guide land use and territorial development in Kerkennah are highly standardized and do not allow for the effective integration of the archipelago's specific vulnerability challenges. The island's fragile ecosystems, low-lying topography, and exposure to sea level rise, coastal erosion, and salinization demand planning approaches that are sensitive to both environmental limits and community livelihoods. Current spatial planning practices often overlook the interactions between natural systems and human activities, resulting in developments that increase long-term risks. This action aims to adapt the territorial and urban planning frameworks of the Kerkennah archipelago particularly the Urban development Scheme for vulnerable Areas – Schéma Directeur d'Aménagement des Zones Sensibles (SDAZS) and the Master plan of Kerkennah archipelago – Plan d'aménagement Urbain (PAU) to explicitly integrate climate risks, biophysical and social vulnerabilities, and the principles of resilient development. It will promote a shift from reactive, standardized land-use regulation toward proactive, risk-informed, and ecosystem-based spatial planning. The revision process will be participatory, combining technical analysis with local knowledge to ensure that planning standards respond to community needs while safeguarding the natural resource base. The current planning modalities and instruments remain highly standardized, limiting their capacity to address the archipelago's specific vulnerability context. This action therefore seeks to align local planning tools with adaptive, inclusive, and risk-informed approaches. It also supports institutional capacity building for local authorities and planners, enabling them to apply resilience principles and climate data in zoning and building regulations. The updated planning documents will serve as reference tools for future development approvals, guiding sustainable investments and protecting sensitive ecosystems. This includes: -The revision of urban perimeters in the light of risk areas (erosion, submersion, salinization), -The integration of regulatory zoning prohibiting construction in sensitive areas, -The introduction of standards favourable to the reduction of energy and water consumption, soil permeability, and land sobriety, as well as the promotion of green and blue infrastructure that enhances natural buffers and supports biodiversity.		
Status	Committed project	***Promising player***	Municipality of Kerkennah, with the support of the DU and the DGAT.
Type	Organizational / Normative / Behavioral Standards and Guidelines	***Location***	The entire territory of the archipelago with a focus on existing and planned urban areas
Vulnerabilities addressed	Unregulated urbanisation in exposed areas (coastal, low-lying areas) Risks of submersion and coastal erosion Increased vulnerability of informal settlements	***Related activities***	Eco-tourism development through wetlands and natural coasts rehabilitation (action1) Development of public spaces to promote soft mobility, greening and sociability (action4) Waterfront landscaping, urban and hydraulic design (action5) Revitalisation and urban regeneration of old centres to enhance soft mobility, preserve heritage and build climate resilience (action10)
Strategic alignment	SNTE: Pillar 1 (territorial governance), Pillar 2 (urban resilience), Pillar 3 (soil preservation). Tunisia Climate Strategy (SNCC): integration of climate into regional planning. Vision 2035: sustainable, sober and inclusive cities.		

Co-benefits	 Environmental	Mitigation of possible future climate impacts. reducing land surface sealing to promote water infiltration, preserve ecosystem functions, and mitigate climate-related risks. Protection of coastal and agricultural ecosystems. Protection of sites of ecological sensitivity and biodiversity hot spots.
	 Social	Reduced population exposure to climate hazards. Improved quality of life through the planning of suitable public spaces. Inclusion of the needs of vulnerable groups in urban planning.
	 Economic	Fewer future costs related to the rehabilitation of informal settlements or disaster management. Better urban and land attractiveness. Integration of sustainable construction sectors.

Implementation steps

Month	Stage	key activities	Deliverables
3	Launch of the municipal and regional consultation	-Organize consultation workshops with municipal authorities, regional planners, community representatives, and technical experts. -Identify priority planning challenges and gather local knowledge on climate risks and vulnerabilities. -Establish participatory mechanisms for continued engagement throughout the planning revision process.	• Consultation reports and stakeholder feedback. • Engagement framework for ongoing participation.
9	Conduct spatial climate risk assessment and integrated mapping	-Collect and analyze climate, hydrological, and geomorphological data. -Map flood-prone, erosion-prone, and salinization-sensitive zones. -Integrate social, economic, and infrastructure vulnerability layers. -Produce GIS-based risk maps to guide planning revisions.	• Spatial risk and vulnerability maps. • Technical assessment report on climate hazards and sensitive areas.
20	Revision of development documents with integration of climatic constraints	-Update SDAZS and PAU documents to incorporate climate risks, regulatory zoning, and resilience standards. -Define building, infrastructure, and land-use regulations that reduce exposure and increase adaptive capacity. -Review revised documents with stakeholders for validation.	• Draft updated SDAZS and PAU integrating climate and vulnerability considerations. • Stakeholder validation summary.
24	Regulatory adoption of the new documents	-Submit revised planning documents for formal approval and legal adoption. -Publish and disseminate updated zoning regulations and planning standards. -Ensure alignment with national urban and environmental regulations.	• Legally adopted SDAZS and PAU. • Publicly available planning and zoning documents.
24	Training of technical services and local professionals	-Conduct capacity-building sessions for municipal planners, engineers, architects, and private sector professionals. -Train staff in risk-informed planning, climate adaptation measures, and resilient design principles. -Provide technical guidance and operational manuals for implementation.	• Training materials and manuals. • Trained personnel ready to implement updated planning standards.
24+	Monitoring of implementation and support for resilient urban planning pilot projects	-Monitor the application of new zoning and planning standards in ongoing and new developments. -Support pilot projects demonstrating resilient urban planning solutions (e.g., green/blue infrastructure, adaptive building designs). -Evaluate outcomes and update guidance as necessary.	• Monitoring and evaluation reports. • Lessons learned and recommendations for replication. • Pilot project documentation.

Financing			
Indicative cost	350 000USD		
Potential sources of funding	Multilateral Climate and Development Funds Green Climate Fund (GCF) Global Environment Facility (GEF) - World Bank / IFC Programs – Provides loans, technical assistance Bilateral Development Agencies Agence Française de Développement (AFD) – Funds sustainable urban development, Germany (GIZ / KfW) – Offers financing and technical support National Funding Programmes Tunisia National Energy Transition Fund (or other national programmes) – Provides subsidies, low-interest loans, and technical support Private Sector and Innovative Financing Private firms fund Blended Finance / Green Bonds – Combines grants, concessional loans, and private investment	***Potential revenue***	Indirect – sustainable land revaluation, , better tax mobilization.

Risks and Mitigation Options		
Risk		***Mitigation Measure***
Economic	Risk of budget blockage or non-completion of documents.	Prioritise revisions with a limited scope, mobilise external technical assistance, phasing reforms.
Technical	Risk of error in zoning, misinterpretation of vulnerabilities.	Support from the CRDA, ANPE, DGAT for climate/soil/zoning expertise; participatory mapping. Procure external technical support as required Conduct regular consultations throughout project
Social	Risk of local rejection, land conflicts or loss of support.	Broader consultation process, transparency, integration of residents' concerns. Conduct social impact assessments ahead of finalising new zoning or standards.
Environmental	Risk of urbanization being transferred to ecologically sensitive areas. Localised pollution in sites concentrating industry and businesses.	Integration of impact studies, zoning for the protection of sensitive areas (coastline, sebkhas, agricultural land). Ongoing environmental impact assessments and monitoring to identify any polluting industries or businesses.

04: Development of public spaces to promote soft mobility, greening and sociability

Description	During meetings with the municipality staff, the request of fostering green public spaces in the urban areas was communicated and justified by the very few existing public spaces in the archipelago of Kerkennah for the profit of the local community and tourists. The lack of accessible, safe, and climate-resilient urban spaces has limited opportunities for recreation, social interaction, and environmental education, particularly for vulnerable groups such as women, youth, and the elderly.The municipality staff has expressed the need of financial and technical support to implement public green spaces and their will to provide all possible support from their side. This action aims to implement new public inclusive spaces and transform the existing public spaces of Kerkennah into resilient, inclusive and fauna and flore restoration hubs, adapted to future climatic conditions. The project will integrate ecological restoration, climate adaptation, and social cohesion objectives, creating multifunctional areas that are both environmentally sustainable and socially engaging. It includes: -The creation of shaded, green, and permeable spaces will mitigate urban heat, enhance air quality, and allow rainwater infiltration, while also improving the comfort and accessibility of public areas for all users. These areas will also act as microclimate refuges and contribute to urban ecological connectivity. -The development of a network of soft paths (pedestrians, bicycles) linking neighborhoods, public spaces, and key environmental or cultural sites; -The creation of an indigenous and climate resilient plants' hub for educational and biodiversity restoration reasons (to also host migrant birds) This hub will serve as a living classroom for local schools and visitors to learn about native flora and ecological restoration techniques; -The integration of climate-sensitive street furniture (fountains, shaded benches, solar lighting) ensuring energy efficiency and inclusivity for all ages and abilities.; and -The adoption of a participatory approach promoting the appropriation of the place by the inhabitants, fostering community stewardship and a sense of ownership over public spaces. This project will allow the local community and tourists, especially women, youth, and elders, to learn more about the importance and techniques of biodiversity restoration and preservation. By providing safe, attractive, and multifunctional spaces, it will encourage outdoor activities, social interaction, and environmental education. It will also offer them a safe public space to exercise, walk, or simply engage in people-watching, all of which have great positive impacts on the moral status of both groups and individuals. Overall, the action contributes to climate adaptation, urban resilience, and the promotion of sustainable, livable urban environments in Kerkennah.		
Status	New.	***Promising player***	Municipality of Kerkennah, in collaboration with local associations.
Type	Capital Investment Green Infrastructure.	***Location***	Villages (El Attaya, Kellabine and Kraten) with a focus on the surroundings of the community facilities.
Vulnerabilities addressed	Urban heat archipelago effect. Lack of functional and inclusive public spaces. Low active mobility, car dependence. Increased social isolation of vulnerable groups. Loss of biodiversity in urban areas	***Related activities***	Eco-tourism development through wetlands and natural coasts rehabilitation (action1) Sustainable waste management (Action2) Strengthen urban planning through updated zoning and standards based on climate risks and vulnerabilities (Action 3) Waterfront landscaping, urban and hydraulic design (action5) Launch a Municipal energy saving programme (action6) Create a communal nursery to grow and distribute climate-resilient plants and crops adapted to the archipelago's climatic conditions (action7) Revitalisation and urban regeneration of old centres to enhance soft mobility, preserve heritage and build climate resilience (action10) Establish a municipal water saving programme (action12)
Strategic alignment	SNTE: Pillar 2 (resilience of populations), Pillar 3 (renaturation of spaces), Pillar 4 (circular economy – sustainable materials). SNCC: urban adaptation to climate change. Vision Tunisia 2035: inclusive, green, and low-carbon city.		

Co-benefits	Environmental	Reduction of urban heat archipelagos. Improvement of soil permeability and structure. Enhancement of endogenous plants and local landscapes. Air and water quality improvements. Supporting wildlife corridors and green corridors.
	Social	Creation of convivial intergenerational spaces. Improved quality of life and well-being. Community ownership of the place.
	Economic	Land value improvements in surroundings areas near upgraded public spaces. Development of micro-economic activities (crafts, small shops). Reduction of long-term healthcare costs. Better urban and land attractiveness. Integration of sustainable construction sectors.

Implementation steps

Month	Stage	Key activities	Deliverables
1	Participatory selection of priority sites.	- Conduct consultations with the municipality, residents, and local stakeholders to identify priority public spaces for greening and rehabilitation.- Assess accessibility, ownership, and existing vegetation to ensure equity and inclusiveness in site selection.	• Participatory site selection report. • List and map of selected priority sites.
3	Climate risk assessments and urban resilience diagnostics wit biodiversity net gain assessments. User assessments.	- Carry out localized assessments of exposure to heat, flooding, salinization, and erosion.- Conduct biodiversity net gain assessments and user perception surveys to understand community needs.- Identify opportunities for ecological restoration and climate adaptation.	• Climate and biodiversity diagnostic report. • User needs assessment summary.
6	Co-design and planning workshops with residents, schools, and local craftsmen.	- Organize participatory workshops with residents, schools, and local craftsmen to co-design the layout, planting schemes, and street furniture.- Integrate accessibility, cultural identity, and gender-responsive design principles.- Finalize landscape plans and technical drawings.	• Validated co-design plans and technical documents. • Workshop reports and community feedback summary.
12	Progressive implementation of works.	- Execute landscaping, planting, and installation works in stages to minimize disruption and ensure adaptive learning.- Establish shaded, green, and permeable areas; soft mobility paths; and solar-powered lighting.- Set up indigenous plant hubs and educational signage.	• Completed green and inclusive public spaces. • Photo documentation and construction progress reports.
18	Commissioning of the upgraded spaces and launch of community-led activities.	- Officially inaugurate the upgraded public spaces with local authorities and community members.- Launch community-led activities such as biodiversity clubs, school programmes, and stewardship groups for space maintenance.	• Commissioned and functional public spaces. • Launch event and activity records.
18+	Ongoing monitoring, evaluation, maintenance, and adaptive improvements.	- Monitor vegetation growth, user satisfaction, and biodiversity indicators.- Conduct regular maintenance with community participation.- Implement adaptive improvements based on performance and feedback.	• Monitoring and evaluation reports. • Maintenance and adaptive management plan.

Financing			
Indicative cost	1 700 000USD		
Potential sources of funding	Multilateral Climate and Development Funds Green Climate Fund (GCF) Global Environment Facility (GEF) - World Bank / IFC Programs – Provides loans, technical assistance Bilateral Development Agencies Agence Française de Développement (AFD) – Funds sustainable urban development, Germany (GIZ / KfW) – Offers financing and technical support National Funding Programmes Tunisia National Energy Transition Fund (or other national programmes) – Provides subsidies, low-interest loans, and technical support Private Sector and Innovative Financing Private firms fund Blended Finance / Green Bonds – Combines grants, concessional loans, and private investment	***Potential revenue***	Indirect – commercial attractiveness, Leasing fees, and taxes for the use of public space by commercial activities.

Risks and Mitigation Options		
Risk		***Mitigation Measure***
Economic	Risk of underfunding or suspension of the project.	Planning in stages, search for co-financing, Mitigation through community participation and use of local materials.
Technique	Risk of using non-native species unsuited to the climate of the archipelago.	Mobilization of experts in urban climate, choice of adapted species/plants to the local context.
Social	Insufficient community ownership may increase the likelihood of asset deterioration.	Co-design workshops, appropriation by young people, awareness campaigns.
Environmental	Risk of unsustainable water loss from watering or ecological maladaptation.	Select vegetation adapted to the dry climate, utilise rainwater harvesting, undertake water conservation measures, utilise permeable soils.

05: Develop the urbanized seafront using coastal nature-based solutions, vegetative landscaping and drainage systems

Description	In the past, the waterfronts of the urban centers of the archipelago were equipped with infrastructures and protective works against flooding and erosion. However, these 'dyke-type' developments proved ineffective, degraded the landscape, and generated multiple inconveniences for the local population. They often disrupted natural sediment flows, reduced the ecological connectivity between land and sea, and diminished the aesthetic and recreational value of the seafront areas. As climate risks intensify, these rigid structures are no longer viable solutions for the long-term resilience of Kerkennah's coastal settlements. This action aims to redesign the urbanised seafront of Kerkennah (particularly in centres such as Kellabine and El Attaya) in order to make it resilient to climatic hazards (submersion, erosion, salinisation), while improving the living environment and local attractiveness. The approach integrates ecosystem restoration and low-impact infrastructure to enhance both ecological function and urban livability. It seeks to restore natural coastal dynamics, create multifunctional public spaces, and promote a balanced coexistence between human activity and marine ecosystems. The action articulates: -Coastal resilience measures including landscaping to stabilise soils using native, salt tolderant species; Installation of drainage systems, flood management systemsand soft protection against the sea (shoreline ridges, natural sea dikes); -Urban redevelopment including paths, lighting, benches, pedestrian infrastructure. -Rehabilitation of wetland and dune ecosystems as natural buffers against sea-level rise, while reconnecting people to the coastal environment through safe, accessible public spaces. -By regenerating wetland ecosystems and reintroducing into urban areas halophilic and endemic plant species adapted to local conditions of salinity, aridity, and erosion. Among these are sea rush (Juncus maritimus), esparto grass (Lygeum spartum), white bean-caper (Zygophyllum album), and white wormwood (Artemisia herba-alba), which contribute to stabilizing sandy soils and withstanding increasing salinity. Ultimately, this action will demonstrate how coastal urban development can be both protective and regenerative, improving community and ecosystemic resilience to climate hazards while enhancing biodiversity, social well-being, livelihoods, and local and international tourism appeal.		
Status	New.	***Promising player***	Municipality of Kerkennah, with APAL and the Directorate of Urban Hydraulics.
Type	Capital Investment Green Infrastructure.	***Location***	Seafront of El Attaya and Kellabine.
Strategic alignment	SNTE: Pillar 2: adaptation of urban environments and infrastructure Pillar 3: Integrated management of natural resources Pillar 4: transition to a resource-efficient economy. SNCC: adaptation of coastal and urbanized areas to climate change. Vision Tunisia 2035 : reclaiming coastal fronts and sustainable urban requalification.		
Co-benefits	Environmental	Improved water infiltration Coastallood mitigation. Soil stabilization and reduced coastal erosion. Habitat restoration and biodiversity improvements	
	Social	Better accessibility and safety of coastal areas. Improvement of the living environment and urban quality. Creation of attractive and inclusive public spaces.	
	Economic	Preservation of existing investments in coastal areas. Tourist enhancement of the seafront. Development of micro-activities (catering, crafts).	

Implementation steps

Month	Stage	Key Activities	Deliverables
1-6	**Coastal Vulnerability, Ecological, and Social Impact Assessments**	-Conduct integrated assessments of erosion, flooding, and salinization risks. -Map coastal habitats, biodiversity hotspots, and social usage patterns. -Identify ecosystem restoration opportunities.	• Coastal vulnerability and ecosystem diagnostic report.• GIS-based mapping of risk and ecological zones.
9	**Participatory Diagnosis of Uses and Expectations**	-Hold community and stakeholder consultations to identify needs, preferred uses, and cultural values. -Define shared vision for multifunctional coastal spaces integrating resilience and recreation.	• Participatory diagnosis report.• Agreed-upon vision and functional zoning framework.
12	**Landscape Design and Technical Development Planning**	-Develop detailed landscape and drainage designs based on nature -Based and ecosystem -Based adaptation principles. -Select plant species and design shoreline stabilization techniques. -Prepare environmental and social management plan.	• Detailed landscape and engineering design.• Environmental management plan.
15	**Phased Work Planning and Prioritization**	-Define priority intervention zones and phasing strategy. -Prepare procurement, budgeting, and implementation schedule. -Secure necessary permits and approvals.	• Phased implementation and investment plan.• Regulatory and technical clearances.
24	**Construction and Installation of Coastal Infrastructure**	-Implement drainage, soil stabilization, and soft protection systems. -Develop pedestrian paths, lighting, benches, and native landscaping. -Restore wetlands and vegetated dunes using halophilic plants.	• Completed resilient seafront sections.• Photo documentation and completion report.
24+	**Maintenance, Adjustments, and Performance Monitoring**	-Monitor vegetation growth, shoreline stability, and ecosystem performance. -Conduct user satisfaction and tourism impact assessments. -Make adaptive improvements to enhance functionality and resilience.	• Monitoring and evaluation report.• Maintenance and adaptive management plan.

Financing

Indicative cost	220 000USD		
Potential sources of funding	Multilateral Climate and Development Funds Green Climate Fund (GCF) Global Environment Facility (GEF) - World Bank / IFC Programs – Provides loans, technical assistance Bilateral Development Agencies Agence Française de Développement (AFD) Germany (GIZ / KfW) – Offers financing and technical support National Funding Programmes Tunisia National Energy Transition Fund (or other national programmes) – Provides subsidies, low-interest loans, and technical support Blended Finance / Green Bonds – Combines grants, concessional loans, and private investment	***Potential revenue***	Indirect – enhancing tourism, increasing commercial activity, Leasing of public services

Risks and Mitigation Options

Risk category	***Risk***	***Mitigation measures***
Economical	Risk of delays due to insufficient financial resources.	Construction in phases, search for co-financing, optimisation of technical solutions.
Technical	Risk of unsuitable or ineffective solutions in the face of hazards.	Technical support from APAL, CRDA, integrated hydraulic and landscape modelling. Conduct a thorough coastal vulnerability assessment to accurately spatialise risks and measures.
Social	Risk of rejection by the population or misappropriation.	Upstream consultation, universal accessibility of spaces, enhancement of local uses.
Environmental	Risk of coastal destabilization or negative ecological impact.	Use of soft techniques (plant dikes, permeable soils), choice of native species.

Vulnerabilities addressed	Risk of marine submersion and rainwater flooding. Degradation of the urban coastal line. Lack of water resilience infrastructure. Socio-economic vulnerability of urbanized coastal areas.	***Related activities***	Eco-tourism development through wetlands and natural coasts rehabilitation (action1) Strengthen urban planning through updated zoning and standards based on climate risks and vulnerabilities (Action 3) Development of public spaces to promote soft mobility, greening and sociability (Action4) Create a communal nursery to grow and distribute climate-resilient plants and crops adapted to the archipelago's climatic conditions (action7) Revitalisation and urban regeneration of old centres to enhance soft mobility, preserve heritage and build climate resilience (action10)

06: Launch a municipal energy saving programme

Description	The municipal energy-saving program aims to address the high energy vulnerability of Kerkennah, exacerbated by its isolation, reliance on fossil fuels, and the impacts of climate change. Frequent power outages, rising energy costs, and climate-driven disruptions have highlighted the need for efficient, resilient, and renewable energy solutions to maintain essential municipal services and ensure the well-being of residents. By reducing the energy consumption of public buildings and infrastructure, and promoting renewable energy, this project contributes to mitigating greenhouse gas emissions, strengthening the resilience of urban services, and alleviating municipal costs. It also demonstrates the municipality's leadership in ecological transition and climate justice, encouraging broader adoption of sustainable practices among citizens and local businesses. It will align with national priorities for a green and just transition and climate justice. This project aims to reduce the energy consumption of the municipality of Kerkennah, through a structured energy management program in municipal buildings, equipment and services. It includes: -Conducting a municipal energy audit covering administrative buildings, public lighting, pumping stations, and school facilities to identify the main sources of consumption and vulnerability. This baseline analysis will guide investment priorities and identify quick wins for energy savings; -Implementing energy efficiency measures, including replacing conventional lamps with LED lighting, light thermal retrofitting of buildings, and installing photovoltaic solar panels to meet basic needs, particularly for essential services. The approach combines low-cost efficiency improvements with renewable energy deployment to maximize impact; -Adopting lean and resilient energy management practices, including preventive maintenance, optimization of equipment use, and establishing energy consumption monitoring. This ensures sustained performance, rapid detection of inefficiencies, and cost-effective operation.; -Strengthening municipal energy resilience by installing backup power systems (solar or hybrid generators) in strategic, high-footprint public buildings (town hall, schools, health centers, transport hubs) to ensure minimal functioning during prolonged outages or climate-related shocks and stress. This supports service continuity during extreme weather events or grid failures.; -Raising awareness and training municipal staff on sustainable energy management and planning for service continuity during crises. This will build institutional capacity and encourages staff engagement in long-term energy efficiency efforts. Overall, the programme aims to improve energy security, reduce emissions, increase cooling in heat-stressed buildings, lower operational costs, and demonstrates a replicable model for resilient municipal energy management in Tunisian island and coastal community contexts.		
Status	ongoing	***Promising player***	Municipality of Kerkennah, in partnership with ANME and STEG.
Type	investment.	***Location***	The entire municipal territory (public lighting) with a focus on municipal buildings and services.
Vulnerabilities addressed	Energy dependence and rising costs. Greenhouse gas emissions. Low efficiency of municipal equipment. Vulnerability of public services in the event of an energy crisis.	***Related activities***	Development of public spaces to promote soft mobility, greening and sociability (action4) Revitalisation and urban regeneration of old centres to enhance soft mobility, preserve heritage and build climate resilience (action10)
Strategic alignment	SNTE: Pillar 2: Reduction of carbon intensity. Pillar 4: promotion of the green and resource-efficient economy. SNCC: mitigation in the building and energy sectors. CDN Tunisia : strengthening local energy governance.		
Co-benefits	Environmental	Reduced GHG emissions. Reduced pressure on the national electricity grid.	
	Social	Improved comfort in public buildings. Promoting eco-responsible practices. Community awareness of energy usage.	
	Economic	Reduction in municipal energy bills. Creation of local opportunities (maintenance, PV installation).	

Implementation steps

Month	Stage	Key Activities	Deliverables
1	**Energy Audit of Buildings and Services**	- Conduct comprehensive energy audits of administrative buildings, schools, pumping stations, and public lighting. -Identify main energy consumption sources, inefficiencies, and vulnerabilities. -Collect baseline consumption and cost data.	• Municipal energy audit report. • Baseline energy consumption and cost assessment.
3	**Development of Energy Action Plan**	-Prepare short- and medium-term energy efficiency action plan. -Prioritize interventions based on cost-effectiveness, resilience benefits, and feasibility. -Identify funding needs and technical solutions.	• Municipal Energy Action Plan. • Investment and implementation roadmap.
6	**Launch of Pilot Projects**	-Implement first energy efficiency measures: LED lighting upgrades, insulation, and photovoltaic systems in key buildings. -Test energy monitoring systems and performance tracking.	• Completed pilot interventions. • Early performance reports and lessons learned.
12	**Monitoring and Evaluation of Savings**	-Track energy consumption and costs post-intervention. -Evaluate savings and resilience improvements. -Adjust operations for optimal performance.	• Energy consumption monitoring report. • Assessment of achieved savings.
12	**Awareness-Raising and Staff Training**	-Conduct training sessions for municipal staff on energy management, preventive maintenance, and crisis response. -Promote good practices across departments and facilities.	• Training materials and sessions completed. • Staff engagement report.
12+	**Scale-Up to Other Public Buildings**	-Expand energy efficiency and renewable measures to additional municipal buildings, schools, sports facilities, and health centers. -Integrate lessons from pilot phase to optimize implementation.	• Scaled-up interventions across municipal facilities. • Consolidated performance and impact report.

Financing			
Indicative cost	***115 000USD***		
Potential sources of funding	Multilateral Climate and Development Funds Green Climate Fund (GCF) – Financing for energy efficiency, renewable energy, and resilience projects in small island contexts. Global Environment Facility (GEF) – Supports municipal energy efficiency, renewable energy, and environmental sustainability initiatives. World Bank / IFC Programs – Provides loans, technical assistance, and co-financing for municipal building retrofits and renewable energy deployment. Bilateral Development Agencies Agence Française de Développement (AFD) – Funds sustainable urban development, municipal energy efficiency, and renewable energy projects. Germany (GIZ / KfW) – Offers financing and technical support for energy efficiency, climate resilience, and municipal capacity building. National Funding Programmes Tunisia National Energy Transition Fund (or other national programmes) – Provides subsidies, low-interest loans, and technical support for municipal energy efficiency and renewable energy projects. Private Sector and Innovative Financing Energy Service Companies (ESCOs) – Private firms fund upfront retrofits (LEDs, PV systems) and are repaid from verified energy savings. Blended Finance / Green Bonds – Combines grants, concessional loans, and private investment to scale municipal energy efficiency and renewable energy initiatives.	***Potential revenue***	Yes – direct budget savings, potential for resale of solar electricity

Risks and Mitigation Options		
Risk category	***Risk***	***Mitigation measures***
Economical	Excessive upfront costs	Gradual roll-out, prioritization of measures with a quick return on investment Create a robust financial plan including diverse finance sources
Technique	Risk of poor performance or inefficiency of equipment	Support from ANME, specifications in accordance with Tunisian standards
Social	Risk of continued poor energy practices among municipal staff and service users	Involvement of municipal agents, internal awareness campaigns
Environmental	Risk of impact transfer or overall program ineffectiveness	Monitoring of impacts (discharges, recycling of equipment), promotion of renewable energies

07: Create a communal nursery to grow and distribute climate-resilient plants and crops adapted to the archipelago's climatic conditions

Description	In response to the increasing ecological vulnerabilities identified in the archipelago, particularly soil degradation, loss of plant biodiversity, and heightened exposure to droughts, the establishment of a municipal nursery represents a strategic nature-based solution to strengthen both urban and agricultural resilience. By producing and distributing plant species and crops resilient to local climate conditions, this initiative aims to strengthen the adaptive capacity of both agricultural and urban ecosystems, support food security, and green public spaces. It will also serve as a knowledge hub for sustainable agriculture and biodiversity restoration, promoting community engagement and capacity building in climate-resilient practices. It will also help restore threatened local species, diversify cultivated varieties, and promote sustainable agricultural practices better suited to future climate stresses. This project consists of creating a communal nursery dedicated to the propagation, conservation and distribution of climate-resilient native plant varieties adapted to arid, saline and windy conditions of Kerkennah. It will support: -Development of a strategic plan for the creation and management of a municipal nursery, including the identification of priority species (endemic, drought-resistant, or halophilic plants), planning of production cycles, and definition of infrastructure and technical staff requirements. The plan will also incorporate seed sourcing, and monitoring of growth performance under local conditions.; -Establishment of a local supply chain for the production, storage, distribution, and monitoring of seedlings, in partnership with farmers, schools, local associations, and municipal technical service. This supply chain will enable efficient dissemination of resilient species and strengthen local capacity for ecosystem-based adaptation.s; Implementation of targeted re-vegetation campaigns in public spaces, degraded coastal areas, and fallow agricultural lands using climate-adapted species, within an ecological landscaping and ecosystem restoration approach; -Support for agroecology through the provision of resilient seedlings and seeds, promotion of traditional climate-resilient practices, and creation of demonstration plots or micro-pilot parcels accessible to the community. These demonstration plots in key strategic locations within the archipelago will serve as educational and research spaces to test and showcase best practices.; -Awareness-raising and education on local biodiversity and nature-based solutions through workshops, educational trails, and partnerships with schools. This will foster community ownership, citizen science, and long-term stewardship of local biodiversity. This initiative will simultaneously strengthen ecological resilience, enhance food security, promote urban green space development and maintainence, and engage local communities in climate-adaptive practices, making Kerkennah more resilient to current and future climate stresses and environmental challenges.		
Status	New.	Action Owner	Municipality of Kerkennah, in partnership with the CRDA, INRGREF, environmental associations and schools
Type	Green Infrastructure / Environmental Education	Location	Communal land to be identified – proximity to agricultural or peri-urban areas of kellabine.
Vulnerabilities addressed	Loss of plant biodiversity. Vulnerability of green spaces to drought and salinity. Erosion of local knowledge. Dependence on unsuitable imported plants.	Related actions	Development of public spaces by promoting soft mobility, greening and sociability (action4) Waterfront landscaping, urban and hydraulic design (action5)
Strategic alignment	SNTE: Pillar 2: Building resilience to climate change Pillar 3: Preservation and restoration of ecosystems Pillar 5: environmental education and promotion of local knowledge. CNS: ecosystem-based adaptation. Ramsar Convention and the NDC Objectives on Nature-based Solutions		

Co-benefits	 Environmental	Restoration of fragmented, damaged and expised ecosystems. Habitat restoration and promotion and protection of native biodiversity. Reduction of the need for irrigation, fertilizers and treatments.
	 Social	Intergenerational educational and awareness activity. Promotion of sustainable agricultural practices. Possible community involvement in the establishment and/or management of the municipal nursery
	 Economic	Reduction in the costs of purchasing seedlings for the municipality. Potential development of a resilient crop production micro-sector. Marketing opportunities to farmers and individuals.

Implementation steps

Month	Stage	Key Activities	Deliverables
6	**Site Identification and Preliminary Assessments**	- Identify suitable land for the nursery considering accessibility, water availability, and soil conditions. - Conduct ecological, social, and technical assessments. - Engage stakeholders and local partners to define site requirements.	• Site selection report. • Preliminary feasibility assessment.
12	**Strategic Planning and Operational Design**	- Develop detailed nursery strategic plan including priority species, production cycles, infrastructure needs, and staffing. - Plan seed sourcing, storage, and propagation protocols. - Define partnerships for distribution and monitoring.	• Nursery strategic and operational plan. • Partnership and supply chain framework.
14	**Land Development and Infrastructure Setup**	- Prepare the site: fencing, irrigation systems, storage, shading, and lighting. - Build propagation beds, greenhouses, and seedling areas. - Recruit and train nursery staff.	• Prepared nursery site and operational infrastructure. • Staff trained on nursery operations.
24	**Pilot Cultivation and Propagation**	- Start cultivation and propagation of selected climate-resilient species. - Monitor growth performance, soil adaptation, and survival rates. - Document lessons learned for scaling up.	• First batch of resilient seedlings. • Cultivation monitoring reports.
30	**Launch Outreach and Initial Dissemination**	- Distribute seedlings to public spaces, farmers, schools, and community gardens. - Conduct workshops on planting and maintenance. - Promote community engagement and citizen stewardship.	• Distributed seedlings. • Community engagement reports. • Educational materials.
36	**Integration into Municipal Greening and Education Programs**	- Incorporate nursery outputs into municipal urban greening and restoration initiatives. - Establish demonstration plots and school programs. - Monitor ecological and social impact of plantings.	• Integration plan with municipal programs. • Demonstration plots operational.
36+	**Extension of Activities**	- Expand nursery operations to supply local markets and additional public projects. - Strengthen educational and training functions as an incubator for agroecology and biodiversity. - Conduct continuous monitoring and adaptive management.	• Expanded nursery operations. • Reports on impact, production, and community engagement. • Long-term management plan.

Financing			
Indicative cost	30 000USD		
Potential Financing Instruments	Bilateral Development Agencies Agence Française de Développement (AFD) Germany (GIZ / KfW) National Funding Programmes Tunisia National Energy Transition Fund (or other national programmes)	Revenue Opportunities	Yes – sale of suitable plants, training, services from other municipalities or individuals.

Risks and Mitigation Options

Risk category	***Risk***	***Mitigation measures***
Economical	Risk of complete non-implementation due to lack of budget	Modular launch, mobilization of external financing
Technique	Risk of high plant mortality or ineffectiveness	Support from the CRDA and experts in adapted plants, controlled irrigation
Social	Risk of disinterest or abandonment of the site	Involvement of schools, farmers and associations in management
Environmental	Risk of ecological disturbance or trivialization of vegetation	Choice of non-invasive local species, respect for ecological cycles

08: Establish an Integrated Management Programme for the RAMSAR Wetland Area

Description	This project aims to set up an integrated, concerted and sustainable management programme for the RAMSAR wetland of the Kerkennah archipelago. This area, rich in biodiversity and essential to the local ecological balance, is threatened by artificialisation, pollution, overexploitation and the effects of climate change. The program will include: -The delimitation, characterization and ecological mapping of the RAMSAR area, -The establishment of a local multi-stakeholder management committee, -The development and implementation of a management plan including conservation, education, ecotourism, ecological restoration and monitoring, -Raising awareness and involving users (fishermen, farmers, residents, young people).		
Status	New.	***Action Owner***	Municipality of Kerkennah, in partnership with APAL, the Ministry of the Environment, the CRDA, associations and local users.
Type	Organizational, Plans, Strategy, Guidelines, Awareness Raising .	***Location***	RAMSAR wetland around the islet of Chergui (including sebkhas, lagoons, seagrass beds).
Vulnerabilities addressed	Loss of biodiversity and degradation of wetland habitats. Overexploitation of natural resources. Weak governance of uses in the coastal and wetland zone. Vulnerability to the effects of climate change (salinization, submersion, erosion).	***Related actions***	Eco-tourism development through wetlands and natural coasts rehabilitation (action1) Sustainable waste management (action2) Strengthen urban planning through updated zoning and standards based on climate risks and vulnerabilities (action3) Development of public spaces by promoting soft mobility, greening and sociability (action4) Waterfront landscaping, urban and hydraulic design (action5) Develop a Marine Protected Area (MPA) Management Plan (action9) Establish a municipal water saving programme (action12)
Strategic alignment	SNTE: Pillar 2: Resilience of ecosystems to climate change Pillar 3: Preservation and restoration of wetlands and coastal areas Tunisia Biodiversity Strategy, NDC, Ramsar Convention SDG Targets 6 (water), 13 (climate), 14 (sea), 15 (life on land).		
Co-benefits	Environmental	Maintenance of natural regulatory functions (filtration, water regulation, carbon sinks). Preservation of threatened migratory, halophilic and benthic species.	
	Social	Environmental awareness of local communities. Strengthening the role of residents in resource management. Improvement of the quality of life and the relationship with the territory.	
	Economic	Development of ecological tourism (guided tours, observatories). Sustainable development of resources (crafts, fishing, plants). Reduction of costs related to environmental degradation (erosion, flooding).	

Implementation steps

Month	Stage
6	Conduct cartographic delimitation and participatory ecological mapping
6	Establish local multi-stakeholder management committee
12	Develop the integrated management plan with stakeholders
18	Launch of priority actions (monitoring, restoration, ecological trails)
24	Awareness, environmental education, training of young eco-guides
24+	Monitoring of ecological and usage indicators – adjustment of the management plan

Financing			
Indicative cost	350 000USD		
Potential sources of funding	Multilateral Climate and Development Funds Green Climate Fund (GCF) Global Environment Facility (GEF) World Bank / IFC Programs – Provides loans, technical assistance Bilateral Development Agencies Agence Française de Développement (AFD) Germany (GIZ / KfW)	***Potential revenue***	Yes – ecotourism, training, sustainable plant production, enhancement of natural heritage

Risks and Mitigation Options

Risk category	*Risk*	*Mitigation measures*
Economical	Risk of complete non-implementation due to lack of budget.	Phasing of the management plan, targeted fundraising, multi-stakeholder co-financing.
Technique	Risk of management errors or negative impacts on the environment.	Support from APAL and RAMSAR experts, participatory ecological monitoring.
Social	Risk of conflicts of use and poor environmental practices by users	Inclusive local management committee, user awareness, conflict mediation.
Environmental	Risk of degradation despite protection (poaching, overcrowding).	Continuous ecological monitoring, clear rules of access and use.

09: Develop a Marine Protected Area (MPA) Management Plan

Description	The Kerkennah archipelago hosts a unique mosaic of coastal and marine ecosystems that are under increasing pressure from climate change, overfishing, and unsustainable development. The Multilayered Vulnerability Assessment (MVA) has highlighted the degradation of seagrass beds (posidonia), increased coastal erosion, and declining fish stocks as critical ecological vulnerabilities, particularly around the Mellita–Ramla corridor and the southern coast near Kraten. These areas exhibit a convergence of climate, biodiversity, and socio-economic vulnerabilities, making them priority zones for integrated marine protection. In response, the development of a Marine Protected Area (MPA) Management Plan is proposed to provide a strategic and operational framework for conservation, surveillance, participatory governance, and sustainable use of marine resources. This action directly addresses the MVA findings by aiming to restore ecosystem services, enhance marine biodiversity resilience, and secure the livelihoods of artisanal fishers who depend on these fragile ecosystems. This action aims to structure an integrated, participatory and sustainable management programme for the Marine Protected Area (MPA). The program will include: -The precise delimitation and ecological characterization of the MPA, -The implementation of a multi-year management plan articulating conservation, sustainable exploitation, monitoring and awareness, -The creation of a multi-stakeholder local governance body including fishermen, local authorities and scientists, -The development of sustainable development systems: underwater trails, breeding areas, scientific partnerships.		
Status	In progress.	***Action Owner***	Municipality of Kerkennah, in partnership with the Ministry of Agriculture, the Ministry of the Environment, the INSTM, the APAL, the National Maritime Guard, fishermen and local NGOs
Type	Environmental governance, marine conservation, sustainable local development.	***Location***	Coastal marine area (defined area north of the archipelago)
Vulnerabilities addressed	Overexploitation of fishery resources. Degradation of Posidonia meadows, benthic habitats, seabed. Low resilience of small-scale fishing practices. Increased risks related to climate change (acidification, sea level rise).	***Related actions***	Eco-tourism development through wetlands and natural coasts rehabilitation (action1) Sustainable waste management (action 2) Strengthen urban planning through updated zoning and standards based on climate risks and vulnerabilities (action3) Waterfront landscaping, urban and hydraulic design (action5) Establish an Integrated management of the RAMSAR wetland area (action8) Preservation and rehabilitation of marine habitats(action15)
Strategic alignment	SNTE: Pillar 3: Preservation of marine ecosystems Pillar 2: adaptation of productive practices (fishing, tourism) Tunisia Biodiversity Strategy and Sustainable Fisheries Strategy International conventions: Barcelona Convention, Convention on Biological Diversity, RAMPAO		
Co-benefits	Environmental		Restoration and protection of sensitive marine habitats. Maintenance of sustainable fish stocks. Improving the resilience of ecosystems to climate change.
	Social		Active participation of fishermen in the management of maritime space. Strengthening local surveillance and observation capacities. Sharing sustainable practices to younger generations.
	Economic		Maintaining income from small-scale fishing. Creation of economic activities related to marine ecotourism. Enhancement of certified sustainable fish products.

Implementation steps

Month	Stage
6	Participatory ecological characterization.
6	Establishment of a management committee of the MPA.
12	Development of a management plan (zoning, rules of use, indicators).
12	Establishment of a community-based monitoring and surveillance system.
18	Launch of sustainable development activities (fishing, tourism, science).
18+	Annual evaluation, adjustment of the plan, possible extension.

Financing			
Indicative cost	70 000USD		
Potential sources of funding	Multilateral Climate and Development Funds Green Climate Fund (GCF) Global Environment Facility (GEF) World Bank / IFC Programs National Funding Programmes Tunisia National Energy Transition Fund (or other national programmes)	***Potential revenue***	Yes – sustainable fisheries, marine ecotourism, scientific services, academic partnerships.

Risks and Mitigation Options

Risk category	***Risk***	***Mitigation measures***
Economical	Risk of delays due to lack of stable funding.	Multi-source co-financing, promotion of high value-added activities.
Technique	Risk of errors in zoning or ecological management. enforcement and encroachment	Support from the INSTM and marine experts, database and marine GIS. implementation of real-time monitoring of fishing activity
Social	Risk of conflict of use or local rejection of MPA	Structured participation of fishermen, awareness-raising, sharing of benefits.
Environmental	Risk of failure of MAP due to cumulative effects or negligence.	Continuous monitoring, active ecological restoration (seagrass beds, reefs).

10: Urban regeneration and valorisation of old centres

Description	The historic centres of the Kerkennah archipelago, including key urban cores such as Remla, El Attaya, and Mellita, are distinguished by a rich architectural and cultural heritage but face growing challenges related to climate change, underinvestment, and fragmented urban development. The MVA identified these urban nuclei as areas of socio-economic fragility and high exposure to climate risks, including heat stress, limited water management infrastructure, and increasing reliance on private vehicles. This initiative aims to revitalise and regenerate these historic centres through context-sensitive urban interventions that promote walkability and soft mobility, highlight vernacular architecture, and integrate nature-based solutions to improve microclimates and reduce climate vulnerability. By linking heritage preservation with functional and environmental upgrades, the project contributes to strengthening community adaptive capacity, enhancing urban liveability, and lowering emissions, directly addressing the cross-dimensional vulnerabilities identified by the MVA. This approach aims to make old centres resilient, attractive and integrated into the social and territorial fabric.		
Status	New	***Action Owner***	Municipality of Kerkennah, in coordination with the Urban Rehabilitation and Renewal Agency (ARRU), the INP, and local associations
Type	Capital Investment Plans, Strategies and Guidelines	***Location***	Heartlands of old centres – example of Ouled Yaneg town
Vulnerabilities addressed	Physical and functional deterioration of old centres. Urban thermal vulnerability. Lack of public spaces adapted to current uses. Decline in social life and living heritage.	***Related actions***	Sustainable waste management (action2) Strengthen urban planning through updated zoning and standards based on climate risks and vulnerabilities (action3) Development of public spaces by promoting soft mobility, greening and sociability (action4) Launch a Municipal energy saving programme (action 6) Establish a municipal water saving programme (action12) Promotion of sustainable fishing practices (action13) Rehabilitation of palm groves (action14)
Strategic alignment	SNTE: Pillar 2: adaptation of urban environments. Pillar 3: preservation of natural and urban heritage. Pillar 5: environmental culture and citizen participation. Vision Tunisia 2035: compact, lively and sober cities. SDG 11: Sustainable cities and communities.		
Co-benefits	 Environmental	Reducing urban heat archipelagos. Enhanced vegetation cover, improved permeability and infiltration. Reduced traffic and improved air quality.	
	 Social	Reappropriation of old centres by the inhabitants. Improvement of the living environment and pedestrian safety. Enhancement of cultural and architectural heritage.	
	 Economic	Real estate and commercial revaluation. Development of cultural and craft activities. Reduced health and urban maintenance costs.	

Implementation steps

Month	Stage
1	Conduct technical assessments including urban, architectural and climate risks of old centres
3	Conduct consultations with residents, shopkeepers and associations
6	Develop designs for new urban spaces, incorporting integrated facilities
12	Roll-out phased construction stages (pedestrianisation, greening, street furniture)
18+	Organize cultural and community activities on the sites
18++	Post-intervention follow-up, readjustment and possible extension to other centres

Financing

Indicative cost	700 000USD		
Potential sources of funding	Bilateral Development Agencies Agence Française de Développement (AFD) – . Germany (GIZ / KfW) – Offers financing and technical support National Funding Programmes Tunisia National Energy Transition Fund (or other national programmes) Private Sector and Innovative Financing Energy Service Companies (ESCOs) – Private firms fund upfront retrofits (LEDs, PV systems) and are repaid from verified energy savings. Blended Finance / Green Bonds – Combines grants, concessional loans, and private investment	***Potential revenue***	Yes – commercial attractiveness, cultural tourism, local events

Risks and Mitigation Options

Risk category	***Risk***	***Mitigation measures***
Economical	Risk of budget delays.	Implementation in phases, mobilization of subsidies, involvement of local operators.
Technique	Risk of technical or architectural incompatibility	Support from the ARRU, the INP and specialized offices, compliance with heritage and climatic constraints.
Social	Risk of rejection or exclusion of local populations.	Participatory process, maintaining accessibility for all, socio-cultural programming.
Environmental	Risk of ecological maladaptation or overconsumption of resources.	Use of local and sustainable materials, adapted greening, rainwater management and conduct appropriate technical assessments (which may include flood risk assessments etc).

11: Establish a municipal water saving programme

Description	The Multilayered Vulnerability Assessment (MVA) of Kerkennah has identified critical exposure to water stress across the archipelago, driven by increasing salinity, low rainfall, and rising temperatures. These climatic pressures are further compounded by inefficient water use in public facilities, poorly maintained networks, and limited local awareness of conservation practices. In response, this initiative proposes the establishment of a municipal water-saving programme targeting both institutional and community levels. The programme will focus on auditing and improving water efficiency in municipal buildings, schools, and public spaces; promoting the use of water-saving devices; encouraging behavioural change through awareness campaigns; and exploring low-cost rainwater harvesting and greywater reuse systems. By directly addressing the vulnerabilities highlighted by the MVA, this programme contributes to enhancing Kerkennah's resilience, reducing pressure on fragile water resources, securing essential services, and strengthening the municipality's capacity to serve as a model for sustainable water management.		
Status	New.	***Action Owner***	Municipality of Kerkennah, in partnership with SONEDE, ANPE, CRDA and local associations.
Type	Organizational / Behavioral / Infrastructure	***Location***	The entire territory of the Kerkennah archipelago: Municipal buildings, schools, public spaces, pilot districts.
Vulnerabilities addressed	Chronic water stress. Increased vulnerability of uses in periods of drought. Misuse or waste of the resource.	***Related actions***	Eco-tourism development through wetlands and natural coasts rehabilitation (action1) Sustainable waste management (action2) Strengthen urban planning through updated zoning and standards based on climate risks and vulnerabilities (action3) Development of public spaces by promoting soft mobility, greening and sociability (action4) Waterfront landscaping, urban and hydraulic design (action5) Create a communal nursery to grow and distribute climate-resilient plants and crops adapted to the archipelago's climatic conditions (action7) Establish an Integrated management of the RAMSAR wetland area (action8) Develop a Marine Protected Area (MPA) Management Plan (action9) Revitalisation and urban regeneration of old centres to enhance soft mobility, preserve heritage and build climate resilience (action10) Rehabilitation of palm groves (action14)
Strategic alignment	SNTE: Pillar 2: adaptation to climate change. Pillar 3: efficient management of natural resources. National Water Strategy 2050. SDG 6 : Clean water and sanitation. NDC Tunisia : sobriety in resource management.		
Co-benefits	 Environmental	Reduced drinking water consumption. Protection of limited water resources. Reduced pollution from untreated discharges. Reduced energy usage from desalinisation and carbon savings.	
	 Social	Increased awareness of water scarcity and value of water. Improved hygiene in public places at a lower cost. Accessibility to resource-efficient solutions for vulnerable populations.	
	 Economic	Reduced water costs for the municipality and public entities. Lower investment needs for water infrastructure. Creation of local opportunities (crafts, maintenance).	

Implementation steps	Month	Stage	
	1	Conduct a water resources diagnostic to characterise municipal water consumption, understand non-revenue water losses and physical losses, and prioritization of uses	
	6	Develop a municipal water saving plan (including action sheets by site)	
	6+	Procure and install water saving and recycling devices (dry toilets, tanks, energy-saving taps)	
	12	Train municipal agents	
	12+	Awareness raising in schools and neighbourhoods	
	24	Monitoring and evaluation of ongoing water consumption, use and loss and dissemination of good practices	
	24+	Systematic integration into future projects (urban planning, buildings, green spaces)	
Financing			
Indicative cost	115 000USD		
Potential Financing Instruments	Multilateral Climate and Development Funds Green Climate Fund (GCF) Global Environment Facility (GEF) World Bank / IFC Programs – Provides loans, technical assistance Bilateral Development Agencies Agence Française de Développement (AFD) Germany (GIZ / KfW) – Offers financing and technical support Private Sector and Innovative Financing Energy Service Companies (ESCOs) – Private firms Blended Finance / Green Bonds – Combines grants, concessional loans, and private investment	***Revenue Opportunities***	Yes – budget savings, training, scientific services, academic partnerships.

Risks and Mitigation Options		
Risk category	***Risk***	***Mitigation measures***
Economical	Risk of additional costs or budget delays.	Prioritization of sites with high savings returns, cross-financing.
Technique	Risk of malfunction or maladjustment.	Use of simple, local and proven technologies.
Social	Risk of limited adoption of water-saving measures by municipal staff and the community	Targeted awareness campaigns, community involvement.
Environmental	Risk of contamination or negative environmental consequences.	Verification of the quality of reused water, ecological management of discharges.

12: Development and promotion of sustainable and resilient fishing practices to revitalize traditional practices

Description	Traditional fishing practices in Kerkennah, such as the charfia, are not only a vital element of the archipelago's cultural identity but also exemplify ecological balance and sustainable resource use. However, the MVA has highlighted that these practices are sharply declining due to multiple pressures: climate change impacts on marine ecosystems, decreasing fish stocks, and the increasing prevalence of unsustainable techniques. The erosion of traditional knowledge systems, coupled with limited regulatory support, further accelerates this decline. In response, this initiative aims to revitalize resilient artisanal fisheries by promoting sustainable practices, rehabilitating traditional gear and techniques, and strengthening both institutional and community-based management systems. The programme will also include capacity-building activities for fishers, awareness campaigns, and integration of these practices into local planning and conservation strategies. By aligning with the MVA findings, this action seeks to enhance ecological resilience, safeguard livelihoods, and preserve the intangible heritage of Kerkennah's fishing communities.		
Status	New.	***Action Owner***	Municipality of Kerkennah, in partnership with the CRDA, the DGPA (General Directorate of Fisheries and Aquaculture), fishing cooperatives, the INSTM, and local associations
Type	Economic, heritage, environmental	***Location***	Coastal areas historically exploited by fixed fishing on the coasts of Chergui and Gharbi.
Vulnerabilities addressed	Increasing pressure on fisheries resources. Gradual disappearance of traditional fishing knowledge and techniques. Socio-economic vulnerability of small-scale fishers. Dependence on intensive or unsuitable practices.	***Related actions***	Eco-tourism development through wetlands and natural coasts rehabilitation (action1) Sustainable waste management (action2) Strengthen urban planning through updated zoning and standards based on climate risks and vulnerabilities (action3) Waterfront landscaping, urban and hydraulic design (action5) Develop a Marine Protected Area (MPA) Management Plan (action9) Preservation and rehabilitation of marine habitats (action15)
Strategic alignment	SNTE: Pillar 2: adaptation of coastal production systems. Pillar 4: transition to sustainable economic practices. National strategy on the blue economy and Strategy for the promotion of local product practices. Conventions on the Intangible Cultural Heritage (UNESCO).		
Co-benefits	 Environmental	Reduced pressure on fishery resources from exploitative fishing practices. Healthy fish stocks and improved marine ecosystem health through fixed and selective fisheries. Preservation of benthic ecosystems.	
	 Social	Transfer of knowledge between generations. Strengthened archipelago identity and community cohesion. Enhancement of the role of fishermen as marine environmental stewards.	
	 Economic	Securing the incomes of artisanal fishermen. Development of high value-added sectors (labelled products, short circuits). Synergies with cultural and gastronomic tourism.	

Implementation steps	Month	Stage	
	6	Participatory inventory of traditional fishing techniques: Conduct fieldwork and interviews with elder fishers and community leaders to document traditional gear (e.g. charfia, dellala, zkar), seasonal calendars, and customary rules; map historical and current fishing zones using participatory GIS tools.	
	12	Support for small-scale fishers' organization and training: Facilitate the creation or strengthening of local fishers' associations or cooperatives; provide tailored training sessions on sustainable fishing, climate adaptation, and co-management approaches.	
	12	Co-development of a local action plan for traditional fixed fisheries: Organize co-design workshops with fishers, municipal actors, and environmental agencies to define shared priorities, identify constraints (e.g. zoning, resource access, transmission of knowledge), and formulate an operational plan with short- and medium-term actions.	
	12+	Provision of logistical and material support: Distribute adapted and locally-sourced materials (e.g. palm wood, biodegradable ropes, tools), support the rebuilding of fishing structures (charfia), and provide hands-on technical guidance for maintenance and sustainable installation.	
	18	Development of valorisation and marketing channels: Create a cultural and ecological label for traditional products; produce storytelling content (video, oral history, exhibitions); and set up local marketing outlets (e.g. fish markets, eco-tourism circuits, school programmes).	
	24	Integration into Marine Protected Area (MPA) governance and monitoring: Define protocols for ecological and socio-economic monitoring of traditional fisheries within MPA zones; formalize the participation of local fishers in decision-making and surveillance activities (e.g. through co-management committees).	
Financing			
Indicative cost	70 000USD		
Potential Financing Instruments	Multilateral Climate and Development Funds Green Climate Fund (GCF) Global Environment Facility (GEF) –World Bank / IFC Programs – Provides loans, technical assistance Bilateral Development Agencies Agence Française de Développement (AFD) Germany (GIZ / KfW) – Offers financing and technical support	***Revenue Opportunities***	Yes – diversification of income (direct sales, heritage development, fisheries eco-tourism).

Risks and Mitigation Options

Risk category	***Risk***	***Mitigation measures***
Economical	Lack of economic viability in the short term.	Targeted and progressive support for cooperatives, diversified financial package.
Technique	Risk of lack of technical loss or inadequacy of old methods.	Support from specialized institutions (INSTM, DGPA), transfer of know-how.
Social	Risk of lack of disinterest or intergenerational conflict.	Involvement of young fishermen and elders in the same system.
Environmental	Risk of lack of overexploitation or poorly regulated localized pressure.	Strict ecological supervision of fishing areas, participatory surveillance.

13: Rehabilitation of palm groves

Description	Traditional fishing practices in Kerkennah, such as the charfia, are not only a vital element of the archipelago's cultural identity but also exemplify ecological balance and sustainable resource use. However, the Multilayered Vulnerability Assessment (MVA) has highlighted that these practices are sharply declining due to multiple pressures: climate change impacts on marine ecosystems, decreasing fish stocks, and the increasing prevalence of unsustainable techniques. The erosion of traditional knowledge systems, coupled with limited regulatory support, further accelerates this decline. In response, this initiative aims to revitalize resilient artisanal fisheries by promoting sustainable practices, rehabilitating traditional gear and techniques, and strengthening both institutional and community-based management systems. The programme will also include capacity-building activities for fishers, awareness campaigns, and integration of these practices into local planning and conservation strategies. By aligning with the MVA findings, this action seeks to enhance ecological resilience, safeguard livelihoods, and preserve the intangible heritage of Kerkennah's fishing communities.		
Status	New.	***Action Owner***	Municipality of Kerkennah, in partnership with the CRDA, INRAT, IRA, local farmers, environmental associations.
Type	Agroecological development / landscape restoration / heritage action.	***Location***	Former palm groves and peripheral agricultural areas.
Vulnerabilities addressed	Decline of traditional agro-systems. Erosion of biodiversity and soils. Loss of resilience of agricultural production. Increased vulnerability to heat, wind, salinity.	***Related actions***	Eco-tourism development through wetlands and natural coasts rehabilitation (action1) Strengthen urban planning through updated zoning and standards based on climate risks and vulnerabilities (action3) Development of public spaces by promoting soft mobility, greening and sociability (action4) Waterfront landscaping, urban and hydraulic design (action5) Create a communal nursery to grow and distribute climate-resilient plants and crops adapted to the archipelago's climatic conditions (action7) Establish an Integrated management of the RAMSAR wetland area (action8) Develop a Marine Protected Area (MPA) Management Plan (action9) Revitalisation and urban regeneration of old centres to enhance soft mobility, preserve heritage and build climate resilience (action10) Establish a municipal water saving programme (action12) Promotion of sustainable fishing practices (action13)
Strategic alignment	SNTE: Pillar 2: adaptation of agroecosystems to climate change. Pillar 3: restoration of terrestrial and agricultural ecosystems. National Strategy for the Adaptation of Agriculture and Ecosystems to CC. SDGs 2, 13 and 15 : food security, climate, terrestrial ecosystems.		
Co-benefits	 Environmental		Soil protection, erosion and salinization control. Creation of microclimates and improvement of water infiltration. Conservation of cultivated and wild biodiversity.
	 Social		Rehabilitation of a local identity heritage. Creation of intergenerational agricultural redevelopment activities. Transfer of traditional know-how (grafting, irrigation, pruning).
	 Economic		Revival of date and by-product production sectors (palm, fibre, compost). Reduced importation of unsuitable plant varieties. Development of agrotourism and short distribution circuits.

Implementation steps	Month	Stage	
	1	Conduct a participatory census and mapping of target palm groves	
	3	Develop an agroecological restoration plan by site	
	6	Launch of work (maintenance, replanting, irrigation, creating windbreaks)	
	6+	Train farmers and young people on sustainable practices	
	12+	Monitoring of agronomic, ecological and landscape performance	
	24+	Integration of rehabilitated palm groves into ecotourism and agricultural development projects	
Financing			
Indicative cost	180 000USD		
Potential sources of funding	Multilateral Climate and Development Funds Green Climate Fund (GCF) Global Environment Facility (GEF) –World Bank / IFC Programs – Provides loans, technical assistance National Funding Programmes Tunisia National Energy Transition Fund (or other national programmes) Private Sector and Innovative Financing – Private firms Blended Finance / Green Bonds – Combines grants, concessional loans, and private investment	***Potential revenue***	Yes – promotion of agricultural and handicraft products, integration into sustainable tourism, returns on agroecological investments.

Risks and Mitigation Options

Risk category	***Risk***	***Mitigation measures***
Economical	Risk of additional costs or abandonment during the rehabilitation phase.	Progressive assembly in batches, recovery of co-products. Having a strong and diverse finance/ resource plan
Technique	Risk of planting failure or poor crop management.	Support from agricultural research institutes (IRA, INRAT), soil-adapted practices and climate.
Social	Risk of disengagement of operators or conflicts of use.	Active participation of farmers, land mediation if necessary.
Environmental	Risk of pressure on resources or loss of biodiversity.	Choice of local varieties, reasoned irrigation, plant rotations.

14: Marine Habitat Preservation and Rehabilitation Program

Description	This project aims to protect, restore and sustainably manage marine habitats that are critical to the biodiversity and resilience of the Kerkennah coastal ecosystem. In particular, the Posidonia meadows which are sandy-muddy bottoms, nursery and spawning areas, as well as habitats associated with traditional fisheries. The program includes: -Fine mapping and ecological monitoring of key marine habitats, -Ecological restoration activities (replanting of Posidonia, stabilization of seabeds, tackling marine litter), -The monitoring and enforcement of human uses (fishing, anchoring, navigation), -Raising awareness among users (fishermen, boaters, young people) of the ecological value of the seabed.		
Status	New.	***Action Owner***	Municipality of Kerkennah, in partnership with the INSTM, APAL, DGPA, environmental associations and fishermen
Type	Environmental / Conservation / Awareness	***Location***	Seagrass beds and benthic areas along the coasts of Chergui and Gharbi, in synergy with MPA and RAMSAR areas
Vulnerabilities addressed	Degradation of sensitive marine habitats. Erosion of marine biodiversity and ecosystem services. Anthropogenic impacts (anchoring, nets, pollution). Increased vulnerability of fish stocks and small-scale fisheries.	***Related actions***	Eco-tourism development through wetlands and natural coasts rehabilitation (action1) Sustainable waste management (action2) Waterfront landscaping, urban and hydraulic design (action5) Establish an Integrated management of the RAMSAR wetland area (action8) Develop a Marine Protected Area (MPA) Management Plan (action9) Promotion of sustainable fishing practices (action13) Rehabilitation of palm groves (action14)
Strategic alignment	SNTE: Pillar 2: adaptation of coastal systems to climate effects. Pillar 3: preservation and restoration of marine ecosystems. CDN Tunisia : adaptation based on marine ecosystems. International conventions: RAMSAR, Barcelona Convention, SDG 14.		
Co- benefits	Environmental	Restoration of marine biodiversity Improved coastal water quality Increased coastal resilience to climate change	
	Social	Better cohabitation between marine uses (fishing, tourism, navigation). Valorization of local knowledge in ecosystem management. Outreach to youth and maritime communities.	
	Economic	Securing resources for artisanal fishermen. Development of marine ecotourism (guided tours, scuba diving). Avoidance of costs related to the loss of ecological services (erosion, depletion of stocks).	

Implementation steps

Month	Stage
6	Stakeholder engagement and planning: Organize workshops with fishers, local authorities, NGOs, and marine experts to co-design the rehabilitation strategy, define roles, and secure commitments for co-management.
12	Design of site-specific restoration protocols: Develop technical guidelines for restoration (e.g. transplantation of seagrasses, installation of artificial reefs or exclusion zones), based on ecological characteristics and threats identified.
18	Pilot rehabilitation works: Implement restoration activities in priority sites, with community participation; monitor initial ecological responses and adjust methods accordingly.
18+	Monitoring system set-up: Establish a long-term ecological and socio-economic monitoring programme to track habitat recovery, biodiversity indicators, and local benefits (e.g. fish stocks, coastal protection).
12+	Awareness and capacity-building: Develop and deliver training for local stakeholders on marine habitat conservation, biodiversity monitoring, and sustainable practices; launch education and outreach campaigns.
12+	Institutional integration and upscaling: Embed the programme within MPA or municipal frameworks; explore replication in other parts of the archipelago; develop funding partnerships for long-term sustainability.

Financing			
Indicative cost	35 000USD		
Potential sources of funding	Multilateral Climate and Development Funds Green Climate Fund (GCF) Global Environment Facility (GEF) – World Bank / IFC Programs – Provides loans, technical assistance Bilateral Development Agencies Agence Française de Développement (AFD) Germany (GIZ / KfW) – Offers financing and technical support	***Potential revenue***	Indirect – improvement of fisheries productivity, scientific and marine tourism, etc.

Risks and Mitigation Options

Risk category	***Risk***	***Mitigation measures***
Economical	Risk of not being fully implemented due to lack of budget. costs and challenges in effectively conducting the data collaction and mapping	Cross-financing mobilization, phased planning.
Technique	Risk of failure of restoration interventions.	Support from the INSTM and specialized partners, validated methods.
Social	Risk of conflict of use or local rejection.	Involvement of fishermen in the choices and monitoring.
Environmental	Risk of unintentional habitat disturbance.	Monitoring of impacts, experimentation on micro-sites, non-intrusiveness.

Appendix: List of the local steering committee members

Lead of the local steering committee: Kerkennah Municipality

Abdennacer BARKIA
Secretary general
Municipality of Kerkennah

Mahdi MAKHLOUF
Principal architect
Municipality of Kerkennah

Faycel MECHRI
Chief technician
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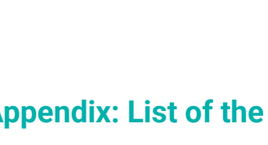
Members:



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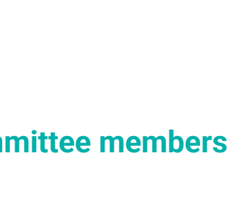

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Appendix: Multi-criterea analysis matrix

ACTION CHARACTERISTICS		ACTION SCORING / SHORTLISTING SUMMARY					Category	ACTION IMPACT											ACTION FEASIBILITY						
							Sub-category	Aligns with Strategic Goals				Resilience Benefit			Gender and Social Inclusion				Technical Feasibility			Financial Feasibility			
No.	Action Title *(Use 'verb-noun-location-purpose' formulation as far as possible)*	RANK BASED ON TOTAL SCORE	TOTAL SCORE	ACTION IMPACT SCORE	ACTION FEASIBILITY SCORE	PROPOSED FOR SHORTLISTING? *(Based on the scoring for the action, shortlist no more than 8-10 actions (Discuss with HQ Focal Points if you wish to include more actions)*	Weighting	100%				100%			100%				100%			100%			
								25%	25%	25%	25%	33%	33%	33%	25%	25%	25%	25%	33%	33%	33%	25%	25%	25%	25%
							Criteria	Comprendre et se préparer	des acteurs impliqués	une communauté résiliente	des écosystèmes protégés et valorisés	Directly addresses a vulnerability hotspot	Improves ecosystem health	Good longevity	Reduces Gender Inequality	Targets people living in informal settlements	Community ownership	Promotes integration of refugees	Aligns with existing policy/regulatory framework or existing strategies in the sector	Aligns with technical and administrative capabilities of the city	Possible to begin implementation within 10-15-yr urban resilience action plan timeframe	Affordable to implement within city's financial capacity context	Funding/ financing source(s) is known	Opportunity for private sector involvement in financing / funding	Opportunity for revenue earning / cost saving from action
1	*Aménagements hydro-écologiques basés sur la nature pour la gestion de l'eau et la protection contre les inondations*	**21**	**3.92**	2.08	1.83			*1*	*2*	*3*	*2*	*3*	*3*	*3*	*1*	*1*	*2*	*1*	*3*	*2*	*3*	*1*	*1*	*1*	*1*
2	Valorisation de la production des Jardins potagers familiaux	**18**	**4.04**	2.00	2.04			1	3	2	2	1	2	3	2	2	3	1	3	1	3	2	1	2	2
3	Revivification des pratiques ancestrales, développement de pratiques agricoles durables et résilientes (faible consommation d'eau, résistance à la salinité du sol…)	**22**	**3.86**	2.28	1.58			1	3	3	3	1	3	3	2	2	3	1	2	1	2	1	1	2	2
4	Développement et promotion des pratiques de pêche durable et résilientes : Revivification des pratiques traditionnelles (pêcheries fixes par exemple)	**13**	**4.37**	2.33	2.04			1	3	3	3	3	3	3	1	1	3	1	3	1	3	2	1	2	2
5	Pratiques de collecte et de mobilisation de l'eau de pluie : Réhabilitation des impluviums communautaires existants et création de citernes de collecte domestiques	**16**	**4.22**	1.89	2.33			1	2	3	1	1	1	3	3	2	3	1	3	2	3	2	2	2	2
6	Programme de gestion intégrée de la zone RAMSAR	**8**	**4.46**	2.42	2.04			2	3	3	3	3	3	3	1	1	3	1	3	1	3	1	2	1	3
7	Programme de gestion intégrée de l'aire marine protégée	**8**	**4.46**	2.42	2.04			2	3	3	3	3	3	3	1	1	3	1	3	1	3	1	2	1	3
8	Aménagements éco-touristiques des zones humides et des cotes naturelles non urbanisées	**1**	**5.00**	2.42	2.58			1	3	2	3	3	3	3	2	2	3	1	3	2	3	2	2	3	3
9	Réhabilitation des palmeraies	**14**	**4.33**	2.17	2.17			1	2	3	3	3	3	3	1	1	2	1	3	1	3	2	2	2	2
10	Programme de préservation et de réhabilitation des habitats marins	**15**	**4.29**	2.42	1.87			2	3	3	3	3	3	3	1	1	3	1	2	1	3	1	2	1	3
11	Gestion durable des dechets	**2**	**4.94**	2.19	2.75			1	2	3	3	1	3	3	2	2	3	1	3	3	3	3	3	2	2
12	Programme communal d'économie de l'eau	**12**	**4.37**	1.92	2.46			1	2	3	2	1	2	3	1	2	3	1	3	2	3	3	2	1	3
13	Programme communal d'économie d'énergie	**6**	**4.50**	1.92	2.58			1	2	3	2	1	2	3	1	2	3	1	3	2	3	3	3	1	3
14	Planification urbaine locale intégrant les facteurs de risque climatiques	**3**	**4.71**	2.33	2.37			3	3	3	3	1	2	3	2	3	2	1	3	3	3	2	3	1	1
15	Ouvrages de protection des quartiers, infrastructures et équipements littoraux et/ou exposés aux inondations	**28**	**3.58**	1.75	1.83			2	1	3	1	3	1	2	1	3	1	1	3	2	3	1	1	1	1
16	Observatoire local des effets du changement climatique et des risques	**29**	**3.54**	1.75	1.79			3	2	2	2	1	2	3	1	1	1	1	3	1	3	2	1	1	1
17	Partenariats dans des programmes de recherches (collectivité, association et université)	**26**	**3.62**	1.83	1.79			3	3	2	2	1	2	3	1	1	1	1	3	1	3	2	1	1	1
18	Plateforme d'alerte des risques en temps réel aux habitants, aux autorités locales et aux pêcheurs.	**20**	**3.97**	2.14	1.83			3	3	3	2	1	1	3	2	3	2	1	3	2	3	1	1	1	1
19	Restructuration et regénération urbaine des centres ancien : piétonnisation, ilots de fraicheurs, aménagement d'espaces publics	**10**	**4.43**	2.31	2.12			1	2	3	2	3	2	3	3	3	2	1	3	3	3	2	1	1	1

20	Aménagement paysager, urbain et hydraulique du front de mer urbanisé	**5**	**4.53**	2.28	2.25		2	2	3	2	3	2	2	3	3	2	1	3	3	3	2	1	1	2
21	valorisation pédagogique centrée sur la tortue et les oiseaux nicheurs	**19**	**4.04**	2.42	1.62		2	3	2	3	3	3	3	1	2	3	1	2	1	3	2	1	1	1
22	Aménagement des espaces publics en favorisant la mobilité douce, la végétalisation et la sociabilité	**4**	**4.64**	2.39	2.25		2	2	3	2	3	2	3	3	3	2	1	3	3	3	2	1	1	2
23	Déplacement des équipements des zones à risque et réhabilitation écologique des zones basses	**32**	**3.22**	1.89	1.33		2	1	3	2	3	2	3	1	1	1	1	1	3	1	1	1	1	1
24	Création d'une pépinière communale pour la promotion des plantes et des cultures adaptées aux conditions climatique de l'ile et résilientes face au changement climatique	**7**	**4.49**	2.11	2.37		2	2	2	3	1	3	3	2	2	2	1	3	3	3	2	1	1	3
25	Réaménagement des marais salants prenant en compte les considérations écologiques	**31**	**3.46**	1.92	1.54		1	1	3	2	3	3	3	1	1	1	1	1	1	2	1	1	3	2
26	Mise en place un système de surveillance de la salinité des sols et de l'eau	**33**	**3.08**	1.75	1.33		3	2	2	2	1	2	3	1	1	1	1	2	1	2	1	1	1	1
27	Projet de restauration du fonctionnement hydrographique et de réhabilitation des lagons et des zones humides	**30**	**3.50**	2.17	1.33		2	2	3	3	3	3	3	1	1	1	1	2	1	2	1	1	1	1
28	Sensibilisation de la communauté locale, en particulier les jeunes femmes et hommes, aux menaces du changement climatique et à la protection de l'environnement.	**17**	**4.12**	2.17	1.96		3	3	2	2	1	2	3	2	2	3	1	3	2	3	2	1	1	1
29	Promotion de l'éco-tourisme	**23**	**3.81**	1.97	1.83		1	2	2	2	2	3	3	2	1	2	1	3	2	3	1	1	1	1
30	Programme local de lutte contre l'érosion basé sur la nature	**24**	**3.78**	2.11	1.67		2	2	3	3	2	2	3	1	2	2	1	2	2	3	1	1	1	1
31	Programme local de lutte contre la salinisation du sol et de l'eau basé sur la nature	**27**	**3.61**	2.11	1.50		2	2	3	3	1	3	3	1	2	2	1	2	1	3	1	1	1	1
32	Développement des récifs côtiers pour la pêche et réduction de l'érosion côtière	**25**	**3.67**	2.33	1.33		2	2	3	3	3	3	3	1	2	2	1	2	1	2	1	1	1	1
33	Etude des vulnérabilités et Plan local de gestion des risques	**11**	**4.40**	2.28	2.12		3	3	3	2	2	2	3	1	3	2	1	3	3	3	2	1	1	1

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