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MOROCCO

EBRD
Special Climate Change Fund
Enhancing the climate resilience of the Moroccan ports sector

Project Document

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ABBREVIATIONS AND ACRONYMS

ACCMA	Adaptation au changement climatique au Maroc (Adaptation to Climate Change in Morocco)
AMO	Atlantic Multi-decadal Oscillation
ANP	Agence Nationale des Ports (National Ports Agency)
CCA	Climate Change Adaptation
COP	Conference of the Parties (of the UNFCCC)
DMN	Direction de la Météo Nationale (Moroccan National Weather Service)
DPDPM	Direction des Ports et du Domaine Public Maritime (Directorate of Ports and Public Maritime Land)
E2C2	Energy, Environment and Climate Change
EBRD	European Bank for Reconstruction and Development
EEZ	Exclusive Economic Zone
ENSO	El Niño Southern Oscillation
ESAP	Environmental and Social Action Plan
FPIC	Free Prior Informed Consent
GCM	Global Climate Models
GEF	Global Environment Facility
GET	Green Economy Transition
Hs	Significant Wave Height
ICZM	Integrated Coastal Zone Management
IFAD	International Fund for Agricultural Development
INDC	Intended Nationally Determined Contributions
IPCC	Intergovernmental Panel on Climate Change
LNG	Liquefied natural gas
LRF	Land Acquisition and Livelihood Restoration Framework
LTIP	Long Term Investment Programme
M&E	Monitoring and Evaluation
MAD	Moroccan Dirham
MATEE	Moroccan Ministry of Physical Planning, Water and Environment
MCA	Multi Criteria Analysis
MEMEE	Ministry of Energy, Mines, Water and Environment
METL	Ministry of Equipment, Transport and Logistics
MHWS	Mean High Water Springs
NAO	North Atlantic Oscillation
NGO	Non-governmental Organisation
NHDI	National Human Development Initiative
ODEP	Office d'exploitation des ports (Port Operations Board)
ONP	l'Office national des pêches (National Fisheries Office)
PDPN	Plan Directeur des Ports Nationaux (National Ports Development Plan)
PIANC	World Association of Waterborne Transport Infrastructure
PIP	Priority Investment Programme
PPP	Public-private partnership
PRNC	National Plan Against Global Warming (Plan National de Lutte Contre le réchauffement climatique
RCP	Representative Concentration Pathways
SCCF	Special Climate Change Fund
SEEE	State Secretariat in charge of Water and Environment
SEMED	Southern and eastern Mediterranean
SEP	Stakeholder Engagement Plan
SPGE	Strategy for the Promotion of Gender Equality
SODEP	Société d'exploitation des ports
TIR	Transports International Routmadiers
TMSA	The Tangier Mediterranean Special Agency
TNA	Technology Needs Assessment
TOR	Terms of Reference
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
WG	Working Group

EXECUTIVE SUMMARY

The SCCF-funded 'Enhancing the climate resilience of the Moroccan ports sector' Project (henceforth 'Project') is designed to support the climate resiliency of Morocco's ports in both the immediate and longer-term through investment in climate-resilient upgrades and/or new port facilities, and capacity development to introduce best international practice in the Moroccan ports sector's policy, strategy, management and monitoring.

Through this SCCF-funded Project, the EBRD, the Moroccan authorities and selected port agencies/operators will work together to build adaptive capacity to help ensure that climate change considerations are fully mainstreamed into port infrastructure, operations and management. The Project takes an innovative, holistic approach to promoting climate resiliency of Morocco's ports including addressing capital investment, institutional strengthening, strategy development, training and monitoring needs. Overall, the Project is designed to reduce the expected socio-economic losses associated with climate change and variability.

The Project will demonstrate climate resilient investments that are additional to, and linked with, baseline investments in the expansion, upgrade and/or rehabilitation projects in the Moroccan port sector. SCCF-A funding will support investments in rehabilitating existing structures and building new structures designed to include adaptation features that otherwise would not occur. In the absence of SCCF support, baseline investments in ports would be vulnerable to climate change impacts and therefore not contribute to overall national climate resilience. The Project combines demonstrations of infrastructure investments with technical support activities such as the development of a strategic framework, technical guidance and capacity development so that interventions are sustainable and can be replicated in other ports.

Recognizing the need to coordinate the development of the strategic framework and underlying technical capacity alongside the implementation of infrastructure investments, the Project is structured into workstreams. Workstream I will build the necessary strategy, capacity, technical skills and guidance tools; and Workstream II will select and develop climate resilient infrastructure investments. The two Project components are structured as follows:

Component 1: Capacity development for reducing vulnerability to climate change: *USD 500,000 requested from the SCCF and USD 1,000,000 from EBRD Technical Cooperation Donor Trust Funds as co-financing (note that the EBRD works in Euros therefore subject to exchange rate fluctuations)*

Component 1 aims to strengthen the institutional and technical capacity for effective climate change adaptation in Moroccan port operations and infrastructure. This will be achieved through integration of climate change adaptation and resilience strengthening into port sector management through capacity development activities, technical guidance, tools, methodologies, monitoring activities, awareness raising and knowledge management. These activities ensure that technical assistance provided by the project creates sustainable impact intended to replicate the investments and management and monitoring methodologies implemented throughout Moroccan ports. A coordinated package of technical support will be delivered through four Outputs.

Component 2: Building structural resiliency features in port facility infrastructure: *USD 47,397,000 from EBRD and Technical Cooperation Grant co-financing, with USD 5,692,694 requested from the SCCF (note that the EBRD works in Euros therefore subject to exchange rate fluctuations)*

Component 2 focuses on building additional climate-resiliency features into Moroccan port infrastructure through directly investing in rehabilitation and building projects in Moroccan ports. The intention is to finance upgrades or retrofitting of old infrastructure and/or building of additional port infrastructure that is climate resilient, thereby reducing the vulnerability of port infrastructure to the adverse effects of climate change. This Project will enable best practice to be introduced, adapted and demonstrated in the local Moroccan context through the implementation of investment projects that integrate structural climate resilience measures into port upgrades/construction.

The Project is in full compliance with the EBRD's *Strategy for Morocco 2015*.

1 Project context and situation analysis

1.1 Moroccan coast area and ports sector context

1. With over 80 percent of the volume of world trade carried by sea, international shipping and ports are at the heart of international trade and global supply chains. Ports are considered to be critical infrastructure assets, and serve as catalysts for economic growth and development. Ports play a key role in international trade, create jobs, generate wealth and value as well as promote the expansion of related and nearby cities and industries[1].

2. Morocco has long coasts on both the Atlantic and Mediterranean seaboards. The Mediterranean coast runs for nearly 550 km and the Atlantic coast for nearly 3000 km, from Cap Spartel to Cap Blanc, between the 36th and 21st parallels North. According to the extended definition, Morocco has about 66,000 km² of territorial sea and 1.1 Mkm² of exclusive economic zone (EEZ). Many of the major conurbations are located along the coast, along with the majority of the country's large-scale industrial and economic activities.

3. Morphologically, the Moroccan shore differs from one region to another according to the geological substratum, tectonic conditions and dynamic factors that are accreting or eroding the coastline:
   a. The Mediterranean shore is characterised by a rocky, steep coast (cliffs) that plunges into the sea. The gradients are often steep and the coast is cut by deep valleys, creating small beaches of coarse sand or gravel where they meet the sea, and small alluvial plains and a few lagoons in flatter coastal areas, around bays and rivers.
   b. The Atlantic shore consists more of sand, pebbly beaches, coastal dunes, marshes, lagoons and estuaries, with both low-lying sections and cliffs.

4. The coastal climate is of Mediterranean type, temperate to hot with hot, dry summers and relatively mild, wet winters, at least in the non-Saharan section. The Atlantic upwelling and sea breezes have a notable influence on the air temperature: the maximum temperature is thus lower and the minimum temperature higher, resulting in a smaller thermal range; in some areas, such as Essaouira, it does not exceed 6 °C.

5. The seawater has different characteristics depending on whether it belong to the Mediterranean or Atlantic domains. Mediterranean waters are warmer (25 °C in summer) and saltier (38.5 g/L) than Atlantic waters, the surface temperature of which varies from 15 to 23 °C along the coasts, depending on the season (A. Laouina, 2010).

6. Due to the country's geographical location and its long coastline, 98% of external trade is maritime, and external trade is an important driver of economic and social development for Morocco. As shown in Figure 1, Morocco has a large number of ports, ranging in type and size from small artisanal fishing sites to sites specialised for chemicals and fuels, up to very large ports such as Casablanca which features a commercial port, a fishing port, a marina and shipyards, and Tanger Med, which features container terminals, hydrocarbons, ferries and other services. Other large ports in terms of traffic are Jorf Lasfar and Mohammedia (see Figure 2). The fishing sector is a major economic sector in the country, responsible for the livelihoods of over 3 million Moroccans.

[1] United Nations Conference on Trade and Development (2011) Ad Hoc Expert Meeting on: Climate Change Impacts and Adaptation: A Challenge for Global Ports. Available at: http://unctad.org/en/Docs/dtltlb2011d2_en.pdf

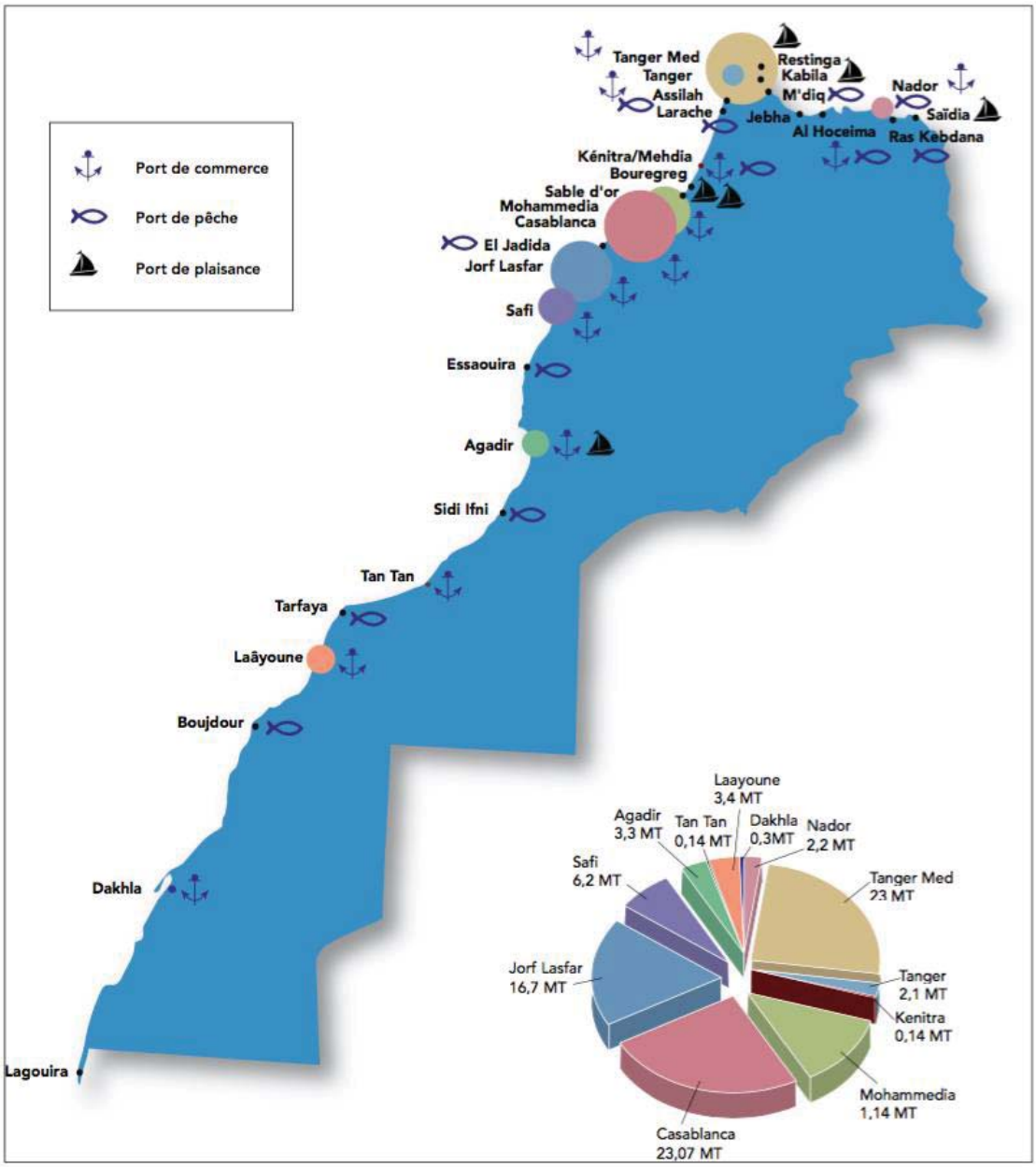

Figure 1. Major Moroccan ports from the National Port Strategy (2010)

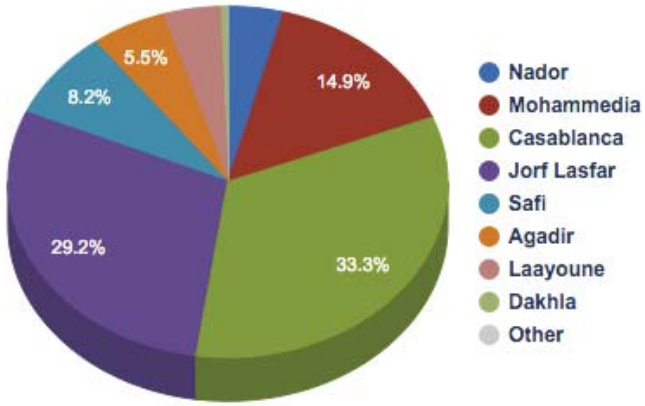

Figure 2. Traffic breakdown by port in Morocco (2014)[2]

7. During 2014, port activity in Morocco had the following characteristics:[3][4]

   a. Total commercial / industrial ports traffic in Morocco reached 115.1 MT volume; ports overseen by ANP had a volume of 75.8 MT, which represents an increase of 11.8% over the previous year
   b. Cereal imports of 7.6 MT, and phosphates and derivates products traffic of 23.8 MT
   c. 4.4 million seaborne passengers.

8. The main port activities by region along the Moroccan coast are:

   a. Mediterranean North-East sector: International Road Transports (Transports International Routiers – TIR) and ferry, coal, container, passenger, cruise and marinas
   b. Mediterranean North-West sector: container (particularly transhipment), TIR, ferry, passenger, cruise & marina
   c. Atlantic Coast North (Kenitra - Casablanca sector): energy, container, passenger, general cargo, cruise and marinas
   d. Atlantic Coast central-North (Abda - Doukkala sector): energy, phosphates, hydrocarbons and LNG
   e. Atlantic Coast central-South (Souss - Tensift sector): containers, passengers, cruise and marinas
   f. Atlantic Coast Southern sector: fishing, logistic for export.

9. The container, hydrocarbon and cruise passenger sectors of Moroccan ports are identified by the National Master Plan (2010) as those with greatest potential growth, as follows:

   a. Container capacity growth – Container capacity at Moroccan ports is expected to grow at a factor of 4 to 10 times between the period 2010 to 2030, with the Mediterranean basin accounting for roughly 20% of this total growth.
   b. Hydrocarbon capacity growth – Hydrocarbon capacity at Moroccan ports is expected to grow at a factor of 4.5 to 6.5 times between 2010 to 2030. Growth is aligned with the start of strong transhipment activity (shipment of goods or containers to an intermediate destination, then to another destination) through the Mediterranean basin. It is expected that 20% to 25% of the global traffic will be handled through the Mediterranean basin by 2030.
   c. Cruise passengers capacity growth – There is potential for growth of up to 1,200,000 cruise passengers per year in Morocco in 2030 versus 385,000 in 2010.

[2] Port traffic, ANP (2015) Available at: http://www.anp.org.ma/En/Agency/Pages/ANPfigures.aspx
[3] Activité portuaire 2014, ANP (2015) Available at: http://www.anp.org.ma/Services/Trafic%20portuaire/Trafic_2014.pdf
[4] Excludes activity at Tanger Med, which is not under the responsibility of ANP

10. The National Master Plan (2010) (Plan Directeur des Ports Nationaux, PDPN) defines the Morocco ports development strategy and outlines the ports identified for major port extensions, integration into urban development and new port development. Between 2015 and 2019, ANP plans to invest 6 billion MAD of which 2.5 billion has been mobilized in 2015 for the development of port facilities. This investment – dedicated primarily to large scale infrastructure projects – including for example extension and restoration of quays in Agadir, including building a quay wall and carrying out civil engineering works; and infrastructure upgrades and strengthening of protection structures in Sidi Ifni. As shown in Figure 2, ports targeted for major extensions are Mohammedia, Casablanca, Jorf Lasfar, Agadir and Tarfaya.

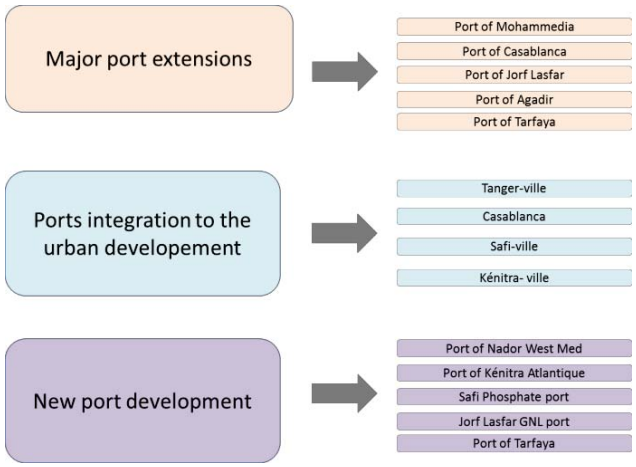

Figure 3. Main proposed port development projects envisaged[5]

11. The National Ports Agency (Agence Nationale des Ports, ANP) exercises its legal responsibilities on all Moroccan ports, except for the special zone of Tanger Med (which are led by a special authority, Tangier Mediterranean Special Agency – TMSA). Among the ports managed by the ANP are:

    a. 12 ports with a strong emphasis on commercial trade (Nador, Al Hoceima, Tanger Ville, Kenitra, Mohammedia, Casablanca, Jorf Lasfar, Safi, Agadir, Tantan, Laâyoune and Dakhla)
    b. 10 regional fishing ports (Ras Kebdana, El Jebha, M'diq, Larache, Mehdia, El Jadida, Essaouira, Sidi Ifni, Tarfaya and Boujdour)
    c. 9 local fishing ports to improve the living and working conditions for local fishermen.

12. In the coming years, the EBRD is planning to invest in a number of ports in Morocco. It is anticipated that the EBRD will provide loans for capital expenditures for equipment, upgrades and new construction in ports, following its investment plan and according to eligibility criteria, and a list of eligible technologies and measures. The EBRD investments (hard loans for capital expenditure for rehabilitation and construction) will be aligned with the National Ports Strategy (2010) This Strategy will be implemented taking the following into account:

    a. The development of sectoral strategies (for instance future decisions on the establishment of new infrastructure)
    b. The development of demand for port services
    c. New opportunities that may arise for the sector.

[5] Extracted from communication with Direction of Ports and of the public maritime domain

13. The EBRD has begun work in the country by providing a loan of up to EUR 200 million to Société Nador West Med to finance the basic infrastructure for a new port on the Mediterranean coast. The EBRD investment will contribute to the construction of a breakwater, quays, dredging and related infrastructure works in the port. The port will include terminals for container transhipment, hydrocarbon storage and transhipment, and bulk. It will also have the capacity to handle other cargo. During the port's construction phase a number of environmental protection measures will be incorporated, including the reduction of the port's carbon footprint by using a lower-carbon cement. The project is expected to be co-financed with the African Development Bank (AfDB) and the Arab Fund for Economic and Social Development.

1.1.1 Policies and legislative framework for the development of the ports sector

14. Given the importance of maritime trade for Morocco, a number of strategies and policies focus on the ports sector. The Ministry of Equipment, Transport and Logistics has developed the National Port Strategy to 2030 (2010). This Strategy describes a vision of the development of Moroccan ports in the period covered, with planned investments of 75 billion Moroccan Dirhams (approximately USD 9 billion).

15. Morocco also has a number of national sectoral strategies whose plans call for expansion of the ports sector in the coming years due to, for instance, increased import of coal, liquid fuels and natural gas, growing phosphate exports, growth in trade and in fisheries, and the construction of cruise terminals and marinas. Together these plans, which are reflected in the National Port Strategy, would lead to a growth in traffic by a factor of 3 to 4 over 20 years. Financing of the plans will be by the State, port agencies or operators under concessions, or public-private partnerships.

16. In 2006, a reform of the legislative framework governing Moroccan ports was undertaken through the adoption of *Law No. 15-02*. The reform aimed to de-cluster port management and monopoly, and introduce competitive market conditions in order for the Moroccan port sector to adapt to new economic, institutional, technological and maritime transport constraints and developments, and to allow private investors to take a more active role in port infrastructures projects.

17. The reform restructured the organization of ports and abolished the de facto monopoly exercised by the Port Operations Board - ODEP (Office d'exploitation des ports) and the oligopoly exercised by the cargo handling companies to bring down costs[6], as well as improve quality and security. Within the context of these reforms, the ODEP was broken up with commercial and authority functions separated through the establishment of the ANP and the SODEP (Societe d'exploitation des ports). In line with ongoing reforms, the Moroccan Government is currently in the process of updating secondary legislation that governs the management of the ports, port infrastructure and the operations of the Directorate of Ports and Public Maritime Land (DPDPM).

18. The ANP is a public body responsible for regulating the sector, granting concessions and permits to exercise port activities, and maintaining and modernizing the port infrastructure. The ANP is responsible for 33 ports, which represents all of Morocco's ports with the exception of the port of the Tanger-Med special development zone and the new port of Nador West Med.[7]

19. As noted above, as part of the 2030 National Port Strategy, the ANP will invest 6 billion MAD between 2015-2019 for the development of port facilities, primarily for large-scale infrastructure projects addressing changes in maritime transport and supporting trade outside of Morocco.[8,9]

20. ODEP's commercial activities (such as handling and warehousing) have now been taken over by SODEP, a publicly owned limited company. SODEP introduced the trade name Marsa Maroc in 2007 and, in 2007-2008, the company created its business and strategic plans for the future, whose

[6] The World Bank considered that port charges were particularly high compared with those in Europe, and that the crossing times for the Straits of Gibraltar were too long. Source: World Bank (2006).
[7] Article 32 of Law No. 15-02 relating to ports.
[8] ANP (2015) Available at: http://www.anp.org.ma/En/Majorprojects/Pages/Infrustructuresconstruction.aspx
[9] 'La stratégie portuaire nationale à l'horizon 2030'. Ministry of Equipment, Transport and Logistics (2015). Available at: http://www.anp.org.ma/En/Publications/Pages/Portstrategy.aspx

plans are termed CAP15. These plans are based on establishing container terminals in Moroccan ports and to set up strategic partnerships in loose bulk and oil industries. The company manages nine ports. Marsa Maroc has two governing bodies: the Supervisory Board, and the Executive Board that is responsible for the daily operations.

21. Private companies also undertake some port activities in Morocco, including ship chandling, security, refuse collection and ship cleaning, refuelling, and scrap metal recovery. In addition to SODEP, private companies also conduct activities such as pilotage, towage, berthing, on-board handling, lighterage, cargo trimming, tallying and bagging.

22. Further complementary legislative reforms are underway to strengthen the regulatory climate to increase protection of private sector investors and the attractiveness of private investment in large investment projects. The EBRD is currently assisting the Moroccan Government with such legislative reforms to advance capital markets to improve liquidity, and regulatory and tax frameworks for more advanced financing products.

23. Additional information on the relevant policies and legislative framework for protection of the coastal environment and for the adaptation of coastal zones to climate change is provided in Annex 2.

1.2 Climate change induced problem and the vulnerability of the Moroccan ports sector to the impacts of climate change

1.2.1 Potential impacts of climate change on Moroccan ports

24. Ports are highly exposed to the risk of adverse climate change impacts. Climate change is projected to cause sea level rise; to influence the frequency and severity of storms, storm surge events and extreme wave and wind conditions; and to cause shifts in precipitation, hydrology and sedimentation patterns, all of which could cause negative impacts on ports. While climate change impacts will vary depending on local conditions, ports are expected to be directly and indirectly affected by climatic changes.

25. Morocco's Second Communication to the UNFCCC (2010) notes the following issues in connection with the coastal zone:

    a. The coastal zone is vulnerable to accelerated sea level rise, which will affect coastal infrastructure through flooding and coastal erosion
    b. Vulnerable sectors include maritime transport and fisheries
    c. Adaptation to sea level rise should be integrated in all aspects of planning in coastal areas
    d. In the medium term, it will be necessary to raise the level of breakwaters in ports (as identified specifically for the ports of Tangier and Saidia)
    e. In the long term, institutional responses should be developed for managing coastal areas, taking into account the impacts of climate change
    f. The draft law on the coastal zone should be formulated in such a form that it will enable adaptation to climate change.

26. A recent example of the type of events that will become more frequent in Morocco as sea level rises is the event of the night of 6 to 7 January 2014, when a storm swell caused waves with heights that exceeded the levels for which ports have been designed, causing damage to infrastructure and disrupting port operations in many locations[10]. The damage observed at various locations between Tangier and Laâyoune included: damage to dikes and guard walls; damage to piers, jetties, pavements and bollards; and damage to other infrastructure in areas reached by the waves such as fencing, electric installations and buildings.

27. Given the strategic role of Morocco's ports in linking the Moroccan economy to wider markets through the international trading system, adapting ports to the impacts of climate change and building their resilience is imperative. Further, due to the long service life of port infrastructure,

[10] Impacts de la Houle Exceptionnelle du 06-07 Janvier 2014 sur les Infastructures Portuaires, report by the Ministry of Equipment, Transport and Logistics, March 2014

effective adaptation requires establishing approaches and practices early to avoid locking into vulnerable technologies and infrastructure, and to enable long-lived port infrastructure and assets to cope with shifts in climatic conditions that may occur over a timescale of many decades.[11]

28. Direct impacts affect infrastructure, operations and services, and are expected to have significant effects on ports and other types of coastal infrastructure, especially given that this infrastructure consists of long-lived, fixed assets with a useful lifespan of several decades. Possible direct impacts affecting port infrastructure include: inundation, changed erosion patterns, collapse of steep slopes, changed siltation patterns and landslides. These impacts will likely have varying degrees of economic and operational impacts upon ports including: disruption to port and shipping operations; disruptions to international and national trade; disruption to supply chains; and impacts on broader economic activity.

29. Indirect effects of climate change upon port operations and the demand for port services are caused by the impacts of climate change on other sectors. Indirect effects may include climate change effects on international trade, investment decisions, agricultural production, demographics, energy exploration and consumption, forestry and fishing activity. Further, given the links between ports and their hinterland and the concentration of populations, assets and services associated with ports, as well as the size and value of built infrastructure, climate change impacts may have serious broader implications, especially in regions with low adaptive capacity.

30. The vulnerability analysis conducted in preparation for this Project included an analysis of climate scenarios presented in IPCC's 2014 report[12] to provide insight into the possible impacts of climate change on Morocco's ports. For this analysis the scenarios involving the stabilisation of CO_2 emissions (RCP4.5 and RCP6.0) were considered.

31. Analysis identified the following main potential impacts of climate change on Morocco's ports, with sea level rise predicted to have the greatest impacts:

    a. Direct impact of the rise in sea level on the quays and their equipment (in particular the fenders and electrical equipment that is liable to suffer the effects of salt water overtopping on the landward side.
    b. Indirect impact of the rise in sea level in the form of increased wave energy (overtopping or breaking waves)
        - On the crest and rear slope of protective breakwaters, owing to greater overtopping caused by higher sea levels
        - On the outer (seaward) side of the breakwaters situated in the surf zone, as the height of breaking waves is directly related to the depth of water at the foot of the structures.

32. Details of the analysis are provided in Annex 4, which includes climate change impacts that can be expected for different types of infrastructure in Morocco. Other potential impacts of climate change identified included: increased precipitation and flood discharges, and increased temperatures and acidification rate. However, as these other impacts were found to be low impact, they are not considered further in terms of the Project's response (i.e. infrastructure investments).

1.2.2 Vulnerability of the Moroccan ports sector to climate change

33. Climate change *vulnerability* refers to the state of susceptibility to harm from exposure to climate hazards, and the ability of a region (sub-national territory or other unit of analysis) to cope with, and recover from, such exposure as well as manage incremental and long-term change in climate.

[11] Von Storch, H., G. Gonnert and M. Meine, 2008. "Storm surges—An option for Hamburg, Germany, to mitigate expected future aggravation of risk". Environmental Science and Policy, 11, 735-742.

[12] IPCC, 2014: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1132 pp.

34. The first studies carried out regarding the vulnerability of the Moroccan shore to rising sea levels were qualitative and concerned only two restricted areas (Tangiers and Saidia) (MATEE-UNEP, 2005)[13]. The analysis of bio-geophysical and socio-economic impacts carried out during this study showed that the Saïdia shore is generally more vulnerable to flooding and coastal erosion phenomena resulting from rising sea levels (see Table 1), because of the low altitude of the coastal strip and the extent of sandy beaches.

Table 1. Land lost and economic losses caused by sea level rise along the Saïdia and Tangiers shores

		Saïdia		Tangiers	
		2050	**2100**	**2050**	**2100**
Land lost (%)	Flooding	24	59	10	24
	Erosion	51	66	22	49
Economic losses (billions of MAD)		1.2	391	24	68.6

35. This study also estimated that economic losses by 2100, in particular those relating to tourist facilities, would be considerable. With regard to the shore in Tangiers bay, the physical impacts of flooding and coastal erosion resulting from the future rise in sea level appear to be relatively less serious, probably as a result of the morphological configuration of the bay (see Table 1). In contrast, economic losses would be very considerable, even by 2050.

36. In preparation of this Project, a number of existing studies were first examined to understand the overall vulnerability of Morocco's shoreline to the direct and indirect impacts of climate change phenomena. Analysis revealed an urgent need to protect the Moroccan shore, and to further determine the possible effects of climate change phenomena on the country's different coastal strips to limit the negative impacts of climate change and to adapt the management and development of the shore and coastal infrastructure to future situations that may arise.

37. Then, during Project preparation, a high level analysis was undertaken of the general vulnerability of the Moroccan coast to sea level rise and wave energy attributable to climate change. As shown in Figure 4 and Figure 5, the Moroccan coast has three different zones of exposure to increased wave energy: Mediterranean (quite mild to severe); North Atlantic (extremely severe); and Central to South Atlantic (very severe). The exceedence (in %) of the Significant Wave Height/ Hs[14] of the yearly storm is distinguished for each zone in Figure 4 and Figure 5.

[13] In this study vulnerability of different parts of shore (not only ports) to rise in sea level have been considered.
[14] Hs is defined as the mean wave height - trough to crest - of the highest third of the waves mean wave height

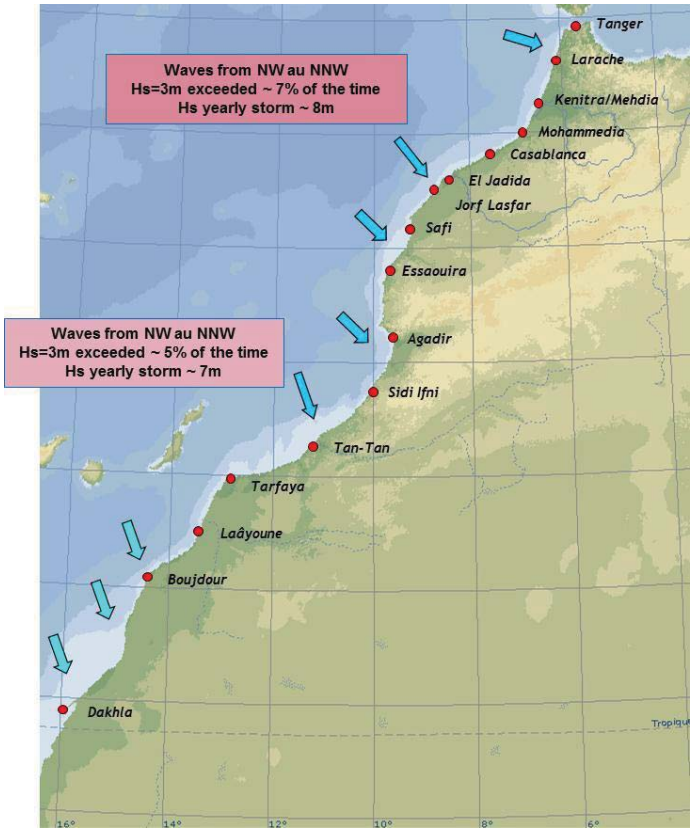

Figure 4. Wave Regime: Morocco's Atlantic Coast

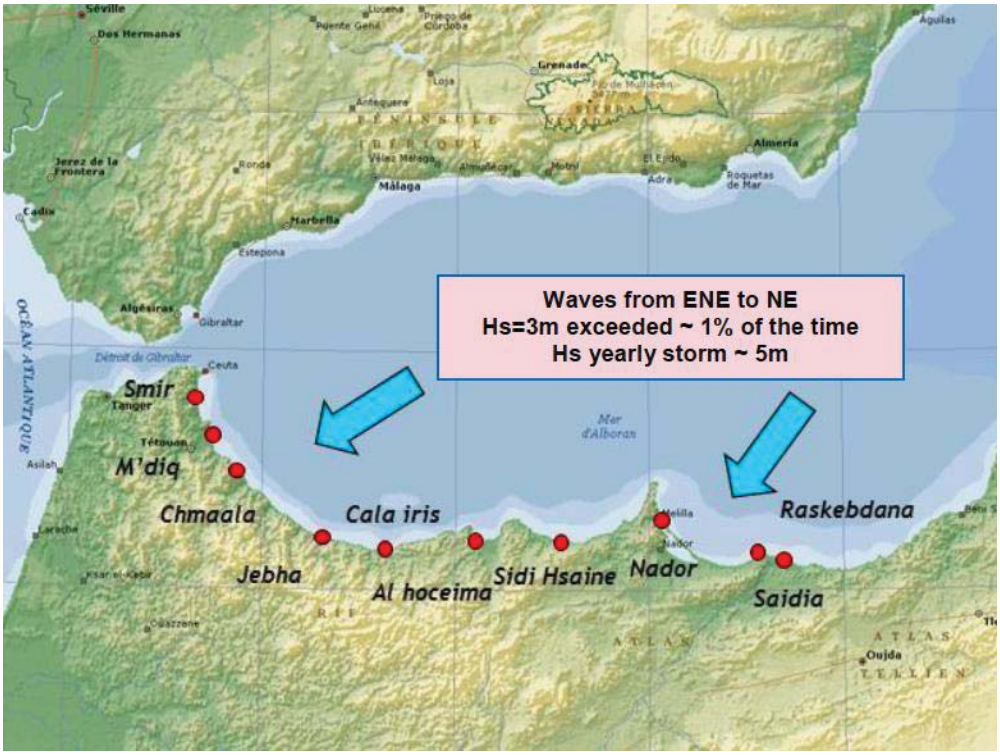

Figure 5. Wave Regime: Morocco's Mediterranean Coast

38. As vulnerability of ports is affected by three main factors – **exposure** to climate change, **sensitivity** to those changes and **adaptive capacity** – additional analysis was carried out to examine each factor in detail as outlined below. Exposure refers to the exposure of ports to climate change; sensitivity describes the degree of negative impact on the port's human resources, infrastructure, and assets; and adaptive capacity is the measure of the potential of the port's human resources, assets and infrastructure to cope with, recover and adjust to the impacts.

39. The potential exposure of the Moroccan coast to sea level rise was assessed, with three zones of exposure defined as follows and shown in Figure 6:

    a. High exposure: Casablanca, Mohammedia, Nador and Agadir
    b. Average exposure: Dakhla
    c. Slight exposure: Jor Lasfar, Tan-Tan and Laayoune.

Figure 6. Morocco's exposure to sea level rise

40. The sensitivity of ports to climate change phenomena is a direct result of the presence of human infrastructure and activities and exposure to such phenomena along the coast. An analysis of the causes of sensitivity of Moroccan ports to climate change impacts was conducted and the main factors causing this sensitivity were:

    a. Stability issues and overtopping of protective structures such as breakwaters
    b. Exposure to residual waves in the port basin during downtime at berths
    c. Insufficient level of the quays.

41. When considering the adaptive capacity of Morocco's ports sector to cope with, recover, and adjust to the exposure and sensitivity to climate change, the following are considered: human resources, finances, and port assets and infrastructure.

42. Human adaptive capacity is found to be low as there is insufficient awareness of climate change risks, and specific and timely information is not available on risks and vulnerability related to climate change and the risk reduction processes. There is little experience with identifying and preparing climate change adaptation projects and initiatives at both national and port levels.

43. The financial adaptive capacity of ports is limited in part by the lack of a long-term perspective on, and knowledge about, climate resilient investments in addition to the availability of financing. As a result there is very little financial investment into improving the climate resilience of port's human resources, assets and infrastructure. There has been no budgeting for climate risk reduction activities related to ports, despite that between 2005 and 2010 Morocco devoted 64% of all climate related spending in the country on adaptation (representing a 9% of overall investment expenditure).[15]

44. The adaptive capacity of Morocco's ports assets and infrastructure is also extremely limited. Specifically the built infrastructure (structural) does not include resilience design measures to protect against the two main climate risks: (i) increased wave energy on the crest and rear slope of protective breakwaters caused by overtopping and (ii) increased height of breaking waves on the outer (seaward) side of breakwaters situated in the surf zone. Ports remain susceptible to damaged infrastructure and downtime.

45. Overall, the combination of limited human, financial and infrastructural adaptive capacity results in the Moroccan ports sector's extreme vulnerability to climate change. Analysis revealed three main vulnerabilities of Morocco's ports, including:

    a. Physical vulnerability of the port structures caused by failure of breakwaters or docks
    b. Downtime of port operations, assuming that ports already affected by high downtime will even more vulnerable
    c. Vulnerability due to an insufficient level of quays.

1.3 Long-term solution and key barriers to enhancing the resilience of the Moroccan ports sector

1.3.1 Long-term solution

46. The long-term, or preferred, solution is where the underlying vulnerabilities of Morocco's ports to climate change are addressed and managed. This solution takes into account several inputs including: a) results of climate change assessments; b) findings from technical assessments, including those from applied research; c) technical expertise (local, sub-national, national, and international (where relevant); and d) political considerations.

47. The long-term solution for Morocco's ports sector requires increased adaptive capacity of port assets, infrastructure and financial and human resources in the immediate and longer-terms resulting in climate resilience. For Morocco's port sector, climate resilience requires the capacity for port assets, infrastructure and financial and human resources to: (i) absorb stresses and maintain function in the face of external stresses imposed upon it by climate change and (ii) adapt, reorganize and evolve into more desirable configurations that improve the sustainability of the ports, leaving them better prepared for future climate change impacts.

48. SCCF resources will be used to implement the long-term solution by integrating increased climate resilience into baseline activities of port expansion, which consists of investments in port expansion and rehabilitation without climate change considerations. SCCF resources bring value added (i.e. additional climate resilient benefits) to the baseline investments by combining them with climate change resilient features (outlined in Table 2) that would otherwise not be possible.

[15] Morocco's Intended Nationally Determined Contribution (INDC) under the UNFCCC (2015).

Table 2. Long-term solution for climate resilient ports in Morocco: climate change resilient features

Technical Capacity	Financial resources	Physical Resources
• Strategic framework that outlines the risks and consequences of climate change, and the courses of action necessary to adapt to its effects is in place • Technical guidance for adapting port infrastructure to climate change has been developed • Capacity of port authorities, operators and national government stakeholders increased for climate resilient port management • Coordination and knowledge management improved, and awareness of climate change adaptation raised	• Finance is available for investments in rehabilitating existing structures and building new structures designed to include adaptation features.	• Taking climate change into account when investing in infrastructure for the port sector • All new investments in port infrastructure are resilient • Reduced vulnerability of physical assets to the adverse effects of climate change

49. To achieve this value added, direct infrastructure investments coupled with technical assistance are necessary. Direct investments for advanced and climate resilient port infrastructure will increase the adaptive capacity of port assets and physical resources to increase resilience of port infrastructure against sea level rise and increased wave energy. This should be achieved through:

    a. Rehabilitation of existing structures to include adaptation features
    b. Building new structures designed to include adaptation features.

    Direct investments for advanced and climate resilient port infrastructure require the availability of financial resources, funding mechanisms as well as increased national investment budget dedicated to climate resilient port infrastructure.

1.3.2 Key barriers

50. To achieve the long-term solution, a number of key barriers need to be addressed. Morocco's Second National Communication (2010)[16] characterized the following as barriers to effective adaptation to climate change of the broader coastal zone:

    a. A lack of understanding of the impact that sea level rise will have on coasts and coastal infrastructure
    b. A lack of legislation and regulation that clarifies the responsibility of the different authorities with respect to adaptation
    c. Integrated Coastal Zone Management (ICZM) is currently not practiced
    d. There is a great lack of all types of oceanographic data needed to plan for future climate change impacts.

51. Barriers to adoption of adaptation measures at Moroccan ports were further mapped and analysed as part of Project preparation. Key barriers to be addressed by the Project are summarised in Table 3 and explained below.

[16] Second National Communication of Morocco (2010). Available at: http://unfccc.int/resource/docs/natc/mornc2f.pdf

Table 3. Key barriers to climate change adaptation in Moroccan ports

Barrier category	Description
Financial	• Financial trade offs • Limited availability of long-term finance • High capital costs of engineering solutions • Associated costs of climate change information and project preparation costs • No budgeting for climate risk reduction activities
Policy and regulatory	• Limited inclusion of climate change risks in policy and regulatory texts relevant to the ports sector
Governance/ Institutional	• Uncoordinated adaptation decision-making • Absence of necessary climate-resilient development strategies and supportive policies
Technical capacity	• Limited technical capacity for monitoring impacts of climate change on ports infrastructure • No centralized monitoring networks and limited technical capacity related to climate risk assessment methods and adaptation planning • Limited availability of adaptation tools, approaches, technologies and demonstration of successful adaptation interventions in the Port sector
Awareness	• Awareness and information constraints

Financial Barriers

52. *Financial trade offs* – After the identification of adaptation measures a number of financial trade-off barriers may be faced including trade-offs between short-term profitability and implementation of measures; the need for costly infrastructure such as raising the height of port facilities; and difficulty with financing necessary measures. Financing for climate risk reduction activities are considered additional costs to upfront investment costs for infrastructure and can often be ignored in development programmes and projects.

53. *Limited availability of long-term finance* – Limited long-term funding for banks impedes the granting of long-term loans, which constitute around a third of total loans for infrastructure investments that aim to increase climate resilience. This represents a significant degree of maturity mismatch risk and reduces the availability of credit to longer-term projects such as those in the infrastructure sector.

54. *Associated costs of climate change information and project preparation costs* – Costs associated with collecting and analysing climate change risk data as well as project preparation costs, such as engineering and feasibility studies that are a precondition for project implementation, often need to be financed separately and sources of finance for such up-front costs are scarce. Overlooking the importance of such data and feasibility studies can lead to maladaptation (poor or inadequate adaptation), which may result in more costly rectification measures and fewer adaptation benefits.

55. *Minimal budgeting for climate risk reduction activities* – While climate risk integration can improve sustainability of built infrastructure, budgets do not currently allow for these additional costs. Further, local banks often do not have the technical expertise to appraise port infrastructure projects that aim to increase climate resilience and that have high upfront investment costs.

Policy and regulatory barriers

56. *Limited inclusion of climate change risks in policy and regulatory texts relevant to the ports sector* – Interviews with key stakeholders revealed there is limited inclusion of clear adaptation policy guidelines, and land use planning and associated regulations to guide climate change adaptation planning, management and development of ports. The lack of adaptation policy means that regulatory responses are not integrated or non-existent. Limited inclusion of adaptation policy related to ports is partially an outcome of governance processes and uncoordinated adaptation decision-making.

Governance and institutional barriers

57. *Uncoordinated adaptation decision-making* – Managing coastal hazards requires an integrated cross-disciplinary approach to address the multidisciplinary and cross-boundary nature of coastal-

hazards management. The prevalence of institutional silos (compartmentalised management in relation to adaptation efforts) operating within government organisations, port management and operators means a lack of integration of adaptation planning and management across areas, as well as vertically and horizontally across these organisations. The "Ad Hoc Expert Meeting on Climate Change Impacts and Adaptation: a challenge for global ports" (UNCTAD, 2011) found that there is often a general disconnect between scientific knowledge and the decision making process. Indeed, interviews with port operators and planners revealed that even if relevant climate risk information is generated at certain technical departments no inputs have been provided to the key decision-making ministries or they fail to act on them. Due to this lack of effective institutional coordination, solutions devised at technical departments are not often disseminated widely.

58. *Absence of necessary climate-resilient development strategies and supportive policies* – Adaptation and climate change risk reduction are not integrated into port strategy, and infrastructure planning and construction by port authorities. This is evident in the absence of thorough considerations of climate adaptation in the Moroccan national ports development strategy. Authorities lack adaptive planning capacity, timely inputs on climate change, exposure to international best practice and feedback on experiences from cities facing similar situations.

59. There is a lack of clarity regarding the roles and responsibilities in relation to adaptation to climate change and coastal-hazard management leading to an absence of integrated coastal hazards management. Institutional silos (compartmentalised management in relation to adaptation efforts) results in uncertainty surrounding the decisions being made at higher levels of government and the lack of guidance on appropriate direction for adaptation planning in ports.

Technical capacity barriers

60. *Limited technical capacity related to climate risk assessment methods and adaptation planning* – During Project preparation the absence of technical skills and knowledge on climate risk assessment and adaptation planning methods was recognised by researchers as a key barrier to integrating climate risk management into on-going port development plans. Opportunities to develop such skills and knowledge necessary for broader climate risk management and adaptation planning, including economic valuation of adaptation options (in particular for integrating climate risks into the port infrastructure investments) require skills and knowledge that are underdeveloped in Morocco. Port operators and planners alone do not possess the information, tools or capacity to conduct risk assessments nor related cost-benefit analysis of probable adaptation options and design interventions and thus remain unaware of cost-effective climate risk reduction strategies. This is particularly the case in Morocco where there is inadequate information to support necessary decision-making (such as only basic data on climate change phenomena and little analysis of relevant policy and feasibility assessments). Indeed, while information on adaptation does exist in Morocco, barriers are also present to access that information, the capacity to understand it, and the lack of tools and techniques to transplant that information into informed decisions for adaptation measures in ports.

61. *No centralized monitoring networks, and limited technical capacity for monitoring impacts of climate change on ports infrastructure* – There is no centralized, coordinated national wave measurement network in Morocco, which contributes to the insufficient technical information necessary to project sea level rise and increased wave energy and height. Other than a limited number of studies (including analysis undertaken for project preparation), there is insufficient monitoring equipment, network and data to predict more effectively the likely impacts of climate change phenomena on port infrastructure. It should be noted that, in its report on the storm of 6 and 7 January 2014, the Ministry of Equipment, Transport and Logistics recommended that such a national network be set up. Related, there is limited technical capacity within Morocco to implement and monitor a centralized, coordinated national wave measurement network; and there is a lack of technical capacity to analyse data to predict more effectively the likely impacts of climate change phenomena on port infrastructure.

62. *Limited availability of adaptation tools, approaches, technologies and demonstration of successful adaptation interventions in the port sector* – There are few regional and port level scientific and engineering studies on the implications of long term climatic variability and change upon

Morocco's coasts and port infrastructure and operations. Such information has to be generated in order for port operators and planners to design appropriate adaptation interventions. The cost-benefit analysis of alternative adaptation options also needs to be considered. To enable proactive involvement of the Moroccan ports sector in climate change adaptation activities, short to medium term projections of localised impacts and their effects on business and the operations of ports are also necessary. As a result, port development planning in Morocco often does not sufficiently incorporate cost-effective climate risk management measures and, therefore, the design of infrastructure overlooks climate change-related limitations and impacts.

Awareness barriers

63. *Awareness, information constraints* – Lack of awareness, and lack of specific and timely information on risks and vulnerability related to climate change, and on climate risk reduction processes at the national and local levels, are among the most pressing barriers to adaptation to climate change in Morocco ports. Despite high levels of climate risk, in particular to sea level rise and increased wave energy and height at some ports, interviews revealed that port authorities and operators had little awareness of the risks posed and the most appropriate solutions. Gaps in information and insufficient awareness pose challenges to adaptation in ports, for example, selecting the most suitable adaptation options to prevent maladaptation.

2 Project design

64. During preparation of the full Project, analysis and scoping were undertaken to gather information on climate change impacts, infrastructure upgrade priorities and socio-economic conditions at local and national levels to support informed decision-making and effective adaptation response measures. Data gathering was undertaken with inputs from the Ministry of Equipment, Transport and Logistics; the Directorate of Ports and Public Maritime Land; Moroccan National Weather Service; National Ports Agency; National Fisheries Office and key port operators (Somaport and Marsa Maroc). This covered information on the projected physical, social and economic impacts of climate change, on the emerging Moroccan legislative and regulatory context for addressing climate change impacts on coastal areas and ports, and on international best practice adaptation measures most appropriate to provide increased climate change resilience against the business-as-usual baseline. Project scoping also collected information on strategic and technical priorities for improving the climate resilience of the Moroccan ports sector. The following sections describe the project design based upon these findings.

2.1 Eligibility for SCCF funding

65. The Project is eligible for funding through the SCCF Adaptation Program (SCCF-A), as it seeks to support priority investments in climate-resilient development across the areas of intervention identified by the Conference of the Parties (COP), and consistent with national sustainable development agendas.

66. The SCCF supports the integration of adaptation strategies, approaches, tools, measures and budget allocations across policies, plans and investments. The Project falls in two core sectors supported by the SCCF: coastal zone management; and infrastructure, including transport and energy.

67. The Project is aligned with the following SCCF strategic objectives:

    a. CCA-1: Reducing the vulnerability of people, livelihoods, physical assets and natural systems to the adverse effects of climate change
    b. CCA-2: Strengthen institutional and technical capacities for effective climate change adaptation
    c. CCA-3: Integrating climate change adaptation into relevant policies, plans and associated processes.

68. Table 4 details how the SCCF objectives have been integrated into the Project's design.

Table 4. Integration of SCCF objectives in Project design

SCCF Objective	Integration in Project design
CCA-1: Vulnerability of people, livelihoods, physical assets and natural systems to the adverse effects of climate change has been reduced	The Project will reduce the vulnerability of livelihoods, physical assets to the adverse effects of climate change through investments in climate resilient port infrastructure and technical assistance activities such as the development of a strategic framework; development of technical guidance and selection of adaptation measures; capacity building and skills transfer; and development and implementation of an investment programme.
CCA-2: Institutional and technical capacities for effective climate change adaptation	The Project directly contributes to increased institutional and technical capacities through development of technical guidance and capacity building, and its skills transfer programme. This Project will develop operational guidance materials and technical manuals for operation and maintenance of adaptation measures.
CCA-3: Climate change adaptation has been integrated into relevant policies, plans and associated processes	Climate change adaptation will be integrated into a comprehensive strategic framework outlining the risks and consequences of climate change, and the courses of action necessary to adapt to its effects. The Project will support the government along with relevant port authorities to develop and implement a monitoring programme that generates information on climate change impacts to establish an appropriate basis for port authorities and operators to identify, prioritise and implement adaptation measures and to effectively deliver risk-based decision making.

69. In alignment with programming guidelines for the SCCF (GEF/LDCF.SCCF.16/03/Rev.01), and in accordance with paragraph 2 of decision 7/CP.7, the Project targets climate change adaptation measures that are complementary and additional to those already funded by the GEF or other bilateral and multilateral sources (see section 2.3 for a description of activities already funded). The Project focuses on supporting the climate resiliency of Morocco's ports in both the immediate and longer terms through capacity development to introduce best international practice in the Moroccan ports sector's policy, strategy, management and monitoring; and investment in climate-resilient upgrades and/or new port facilities, which is in accordance with paragraph 8 of decision 5/CP.7 and eligible under SCCF guidelines. SCCF-A will fund the additional costs for integrating into port design the climate-resilient features that reduce vulnerability and increase adaptive capacity.

70. The Project is also consistent with national sustainable development agendas as outlined in UNFCCC decision 5/CP.7 as this Project follows a country-driven approach allowing Morocco to pursue activities most appropriate to their unique national circumstances as outlined in section 2.2.

2.2 National strategies and priorities

71. The Project is consistent with Morocco's Second National Communication to the UNFCCC (2010). The project will contribute to national efforts to build resilience to climate change in the following sectors identified by the Second National Communication:

    a. The coastal zone is vulnerable to accelerated sea level rise, which will affect coastal infrastructure through flooding and coastal erosion. The Project will directly address vulnerabilities of ports in the coastal zone to these effects through investment in climate resilient infrastructure and management practices.
    b. Vulnerable sectors include maritime transport and fisheries. As above, the Project will directly address vulnerabilities of port operations to the adverse effects of climate change such as sea level rise and increased wave height and energy.
    c. Adaptation to sea level rise should be integrated in all aspects of planning in coastal areas. The project's investments in retrofits and new builds will directly adapt port infrastructure to sea level rise and encourage the integration of adaptation into planning for ports. This will be based on the results of a monitoring programme to assist risk-based decision-making.
    d. In the medium term, it may be necessary to raise the level of breakwaters in ports, and investing in raising the level of breakwaters in ports is one of the possible investments interventions under the Project.
    e. In the long term, institutional responses should be developed for managing coastal areas, taking into account the impacts of climate change. The Project will increase the long-term capacity of stakeholders to assess and prioritise appropriate measures for adaptation to climate change.

72. The Project is also consistent with the following national plans, strategies and assessments:

    a. **(Planned) National Plan/ Strategy for climate change adaptation** − Morocco is committed to developing, in the short term, a National Adaptation Plan up to 2030, to better coordinate its actions and maximize their impact.
    b. **National Plan Against Global Warming (Plan National de Lutte Contre le réchauffement climatique, PRNC)** − Morocco has developed the PRNC that was presented at the COP 15 held in Copenhagen in 2009. The PRNC outlines the Government's sectoral plans for mitigating and adapting to climate change, and includes detailed action plans for renewable energy, energy efficiency and sustainable transport. The Plan provides a strategy for the evaluation of the vulnerability and adaptation to climate change impacts and the implementation of adaptation measures that rely mainly on the water strategy and Green Morocco Plan for Agriculture, also launched in 2009.

c. **Moroccan Technology Needs Assessment (TNA)**[17] - The TNA notes that the coastal zone is vulnerable to climate change impacts.

73. Development of the ports sector in a sustainable way is one of the Moroccan Government's aims for economic development of the country. Morocco has developed sectoral strategies for the main economic sectors of the country, whose impacts on ports have been integrated into the ***National Ports Strategy to 2030***. This Strategy articulates a vision in which the sector contributes to economic development in a sustainable manner. A number of national sectoral strategies whose plans call for expansion of the ports sector in the coming years due to, for instance, increased import of coal, liquid fuels and natural gas, growing phosphate exports, growth in trade and in fisheries, and the construction of cruise terminals and marinas. Together these plans would lead to a growth in traffic by a factor of 3 to 4 over 20 years. Financing of the plans will be by the State, port agencies or operators under concessions or public-private partnerships.

74. The Project will be consistent with the National Ports Strategy and contribute to sustainable economic development in the ports sector through its investment and technical assistance activities to increases climate resilience. The national sectoral strategies, however, do not take into consideration the clear risks that climate change imposes on Moroccan port operation and, thus, highlight the importance of this Project's interventions.

2.3 *Baseline projects*

75. The container, hydrocarbon and cruise passenger sectors of Moroccan ports are identified by the National Master Plan (2010) as those with greatest potential growth, as follows:

a. Container capacity growth – Container capacity at Moroccan ports is expected to grow at a factor of 4 to 10 times between the period 2010 to 2030, with the Mediterranean basin accounting for roughly 20% of this total growth.
b. Hydrocarbon capacity growth – Hydrocarbon capacity at Moroccan ports is expected to grow at a factor of 4.5 to 6.5 times between 2010 to 2030. Growth is aligned with the start of strong transhipment activity (shipment of goods or containers to an intermediate destination, then to another destination) through the Mediterranean basin. It is expected that 20% to 25% of the global traffic will be handled through the Mediterranean basin by 2030.
c. Cruise passengers capacity growth – There is potential for growth of up to 1,200,000 cruise passengers per year in Morocco in 2030 versus 385,000 in 2010.

76. The National Master Plan (2010) (Plan Directeur des Ports Nationaux, PDPN) defines the Morocco ports development strategy and outlines the ports identified for major port extensions, integration into urban development and new port development, as shown in Figure 3. Ports targeted for major extensions are Mohammedia, Casablanca, Jorf Lasfar, Agadir and Tarfaya.

77. In the coming years, the EBRD is planning to invest in a number of ports in Morocco. It is anticipated that the EBRD will provide loans for capital expenditures for equipment, upgrades and new construction in ports, following its investment plan and according to eligibility criteria, and a list of eligible technologies and measures. The baseline EBRD investments (hard loans for capital expenditure for rehabilitation and construction – are considered business as usual) will be aligned with the National Ports Strategy (2010) This Strategy will be implemented taking the following into account:

d. The development of sectoral strategies (for instance future decisions on the establishment of new infrastructure)
e. The development of demand for port services
f. New opportunities that may arise for the sector.

78. In the absence of this Project, it is expected that the EBRD's investments in port infrastructure will continue at a similar rate on a comparable scale. At the date of submission of the Request for CEO Endorsement of the SCCF Project, the EBRD has provided a sovereign guaranteed loan of EUR

[17] Maroc: Evaluation des Besoins Technologiques et Plan d'Action Technologique aux Fins d'Adaptation au Changement Climatique (Version Finale), M. Sinan, Sep. 2012

200 million for infrastructure development at the Nador West Med port. While these investments include technical assistance (namely engineering), they focus on one off investments and do not systematically address the barriers to long-term sustainability in climate resilience in ports throughout Morocco. These investments, therefore, lack a nation-wide demonstrative and capacity development impact (e.g. through training, technical capacity development and development of national port strategy for adaptation based on science and analysis of climatic variability and associated risks).

79. In the absence of this Project, a sustainable approach that combines a package of technical assistance measures with infrastructure investments to address the barriers outlined and increase availability of finance, awareness, capacity and effective demonstration of climate change adaptation is unlikely. Rather, it is likely that Moroccan port management and infrastructure will remain underdeveloped in relation to adaptation. While port expansion and new developments will continue, they may overlook important considerations leaving these developments maladapted and susceptible to the impacts of climate change such as impacts from extreme floods and sea level rise. Climate impacts will have varying degrees of operational, economic and indirect impacts upon ports such as infrastructure damages and downtime in port operations.

80. Given the strategic role of Morocco's ports in linking the Moroccan economy to wider markets through the international trading system, as well as the expected impacts of climate change that will reduced the ability of the sector to fulfil its role in the economy, adapting ports to the impacts of climate change and building their resilience is imperative. Further, due to the long service life of port infrastructure, effective adaptation requires establishing approaches and practices early to avoid locking into vulnerable technologies and infrastructure, and to enable long-lived port infrastructure and assets to cope with shifts in climatic conditions that may occur over a timescale of decades. As it stands, planned developments in the port sector will not adequately consider adaptation to climate change. As such, a strategic approach that increases the institutional and technical capacities for effective climate change adaptation; introduces the necessary management tools and methodologies to avoid maladaptation; and integrates climate change adaptation into relevant policies, plans and associated processes is necessary.

Related EBRD initiatives

81. The EBRD is a major investor in port infrastructure across its countries of operations, having made loans to over 30 port projects representing a total project value of over EUR 3.6 billion, and is currently planning to invest in a number of ports in Morocco. The EBRD has recently developed detailed technical guidance for assessing and managing climate change risks to ports and other coastal infrastructure. This guidance is being applied practically in the EBRD port investments under development in Poland and Turkey[18]. The EBRD will ensure coordination between this Project and EBRD's other port and climate change resilience projects.

82. As noted above, in 2015 the EBRD provided a sovereign guaranteed loan of EUR 200 million to the Moroccan government for infrastructure development at the new Nador West Med Port in Morocco.[19] The EBRD is also investing in Morocco through investments in other sectors such as water supplies working with private sector clients to mitigate the risks associated with water stress and the impact of climate change [20] and the rehabilitation of 11 hydropower plants to extend the lifespan of the hydro assets as well as improve climate resilience, energy efficiency and safety. [21]

83. The Project will coordinate with the EBRD-GEF 'Green Logistics Program', which is designed to facilitate accelerated investments in green logistics. The Green Logistics Program aims at making investments demonstrating the technologies and practices of green logistics. Eligible investments

[18] For detailed information on the impact of the project in Gdansk, Poland see: http://www.ebrd.com/work-with-us/projects/psd/dct-gdansk-expansion.html
For an environmental and social impact assessment in Gdansk Poland, see:
http://www.ebrd.com/english/pages/project/eia/45805esap.pdf
[19] For more information see: http://www.ebrd.com/work-with-us/projects/psd/nador-west-med-port.html
[20] For more information see: http://www.ebrd.com/work-with-us/projects/psd/onee-water-supply.html
[21] For more information see: http://www.ebrd.com/work-with-us/projects/psd/onee-hydro-rehabilitation-.html

include those in the subsectors of logistic terminals/centres, intelligent transportation systems, road fleet modernization, port development, short sea shipping, inland river transport, and rail rolling stock. The concessional financing from GEF will be blended with market based financing mechanisms, with financial terms and conditions that will have a common structure for all investments. In parallel to the investments, the Program will foster sustainability in the logistics sector within the region through building capacity of local stakeholders to consider global and local environmental benefits of developments in the sector. Technical assistance will support companies in the process of including green logistics in their day-to-day operations as well as in the identification of new investments to be made.

Related initiatives led by other organisations

84. The Project will also coordinate with other SCCF and GEF projects underway in Morocco. While none of these projects overlap with the Project (by combining adaptation planning and technical assistance with infrastructure investments in ports), the EBRD will seek synergies and avoidance of duplication of efforts during the early stages of the Project through established GEF inter-agency channels. The Project will seek to coordinate fully with the following projects:

    a. The World Bank GEF – Morocco ICZM Project aims to pilot the application of the ICZM approach in the project area on the eastern Mediterranean coast of Morocco. The three components of the project are as follows:
        - Capacity building and institutional strengthening to incorporate the ICZM approach into local development planning. This will strengthen the capacity of government institutions and local communities to incorporate the ICZM approach into their local development plans.
        - Investments to improve coastal resource management and livelihoods through co-management approach. This approach will support specific and appropriate investments that demonstrate the application of key tools available for use in an ICZM approach, within the project area.
        - Project management and Monitoring and Evaluation (M&E).

        The EBRD will seek to fully coordinate with the World Bank project and its ICZM efforts through technical assistance and investment activities. Where applicable, the EBRD Project team will work with the World Bank Project team to explore where synergies exist and how the EBRD Project can integrate ICZM interventions into project design through investments and technical assistance activities for example increasing the ICZM knowledge for Port authorities and operators.

    b. The United Nations Development Programme (UNDP) – Mainstreaming climate change in the National Logistics Strategy and Roll-Out of Integrated Logistics Platforms project seeks to maximize the coordination and switching of freight modes to sustainable modes. The Project will aim to coordinate and seek synergies with the UNDP projects efforts in targeting the shipping and ports sectors.

    c. Sustainable Climate Change Adaptation in Morocco (ACCMA) – Initiated by the Center for Research and International Development, this project focuses on adaptation to rising sea levels and extreme weather events in the eastern Moroccan Mediterranean coast. Its aim is to improve knowledge and awareness on climate change and build capacity to assess vulnerability to climate change in different socio-economic sectors in Morocco (e.g. the coastal provinces Nador and Berkune). The Project will aim to coordinate with ACCMA's efforts to engage in learning networks concerning climate change adaptation with key stakeholders and institutions in Morocco.

2.4 Summary of key features of the Project

2.4.1 Project objective

85. The objective of the SCCF project is:

> *"to support the climate resiliency of Morocco's ports in both the immediate and longer-term through investment in climate-resilient upgrades and/or new port facilities, and capacity development to introduce best international practice in the Moroccan ports sector's policy, strategy, management and monitoring."*

86. Through this SCCF-funded Project, the EBRD, the Moroccan authorities and selected port agencies/operators will work together to build adaptive capacity to help ensure that climate change considerations are fully mainstreamed into port infrastructure, operations and management. The Project takes an innovative, holistic approach to promoting climate resiliency of Morocco's ports including addressing capital investment, institutional strengthening, strategy development, training and monitoring needs. Overall, the Project is designed to reduce the expected socio-economic losses associated with climate change and variability.

87. The Project will demonstrate climate resilient investments that are additional to, and linked with, baseline investments in the expansion and rehabilitation of a number of Moroccan ports. SCCF-A funding will support investments in rehabilitating existing structures and building new structures designed to include adaptation features that otherwise would not occur. In the absence of SCCF support, baseline investments in ports would be vulnerable to climate change impacts and therefore not contribute to overall national climate resilience.

2.4.2 Approach of the Project

88. The Project combines demonstrations of infrastructure investments with technical support activities such as the development of a strategic framework, technical guidance and capacity development so that interventions are sustainable and can be replicated in other ports.

89. Recognizing the need to coordinate the development of the strategic framework and underlying technical capacity alongside the implementation of infrastructure investments, the Project is structured into two workstreams. Workstream I builds the necessary strategy, capacity, technical skills and guidance tools, while Workstream II selects and develops climate resilient infrastructure investments. This approach is presented schematically in Figure 7, with the Workstreams summarized below.

Workstream I: Development of strategic framework and technical capacity tools

90. Workstream I will increase the adaptive capacity of human assets of Moroccan ports by addressing the policy and regulatory, and technical barriers to climate change adaptation in preparation for further capacity development and appropriate selection of adaptation measures/ investments in Workstream II. Workstream I will also begin to address governance issues related to necessary climate-resilient development strategies and supportive policies, and establishing coordinated adaptation decision-making processes.

91. Workstream I will engage all key stakeholders identified in Figure 11 through the establishment and support of a cross-agency Working Group (WG) chaired by the Ministry of Equipment, Transport and Logistics, and involving the ANP. The WG will lead the development a strategic framework outlining the risks and consequences of climate change, and the courses of action necessary to adapt to its effects.

92. Under Workstream I technical guidance and recommendations will be developed regarding monitoring and emergency responses, based on the best international practices and adapted to the Moroccan context. Based on this technical guidance, training will be developed and delivered.

93. Also under Workstream I, a national-level stakeholder consultation process and awareness initiative on the port sector and climate change will be organized and implemented.

Workstream II: Delivery of further capacity development and infrastructure investments

94. Workstream II will continue to establish the conditions necessary to achieve the Project's objectives by ramping up and accelerating efforts to address barriers to identify, design and develop appropriate climate resilient infrastructure investments. Workstream II will develop and deliver training, skills transfer and project twinning (with international ports) activities to develop local capacity to identify, prioritise and establish climate resilient structural upgrades and management regimes. The strategic framework and guidance materials developed under Workstream I will support Workstream II activities.

95. With the assistance of local technical experts, the WG and the EBRD will establish a Priority Investment Programme (PIP) for investments to be made during the SCCF Project. Alongside the PIP, a Long Term Investment Programme (LTIP) will be developed to outline appropriate climate resilient infrastructure investments as well as any necessary investments in monitoring equipment. The investments identified under the LTIP would be financed through non-SCCF resources during or after the Project's lifetime.

Barrier removal approach

96. The Project has been designed to systematically address the relevant barriers previously identified in section 1.3.2. The Project's response to each of these barriers is summarized in Table 5 below.

Table 5. Actions to remove barriers to be integrated into project design

Barrier category	Description	Relevant Components and outputs
Financial	• Financial trade offs • Limited availability of long-term finance • High capital costs of engineering solutions • Associated costs of climate change information and project preparation costs • No budgeting for climate risk reduction activities	Component 2, Outputs 2.1 and 2.2
Policy and regulatory	• Limited inclusion of climate change risks in policy and regulatory texts relevant to the ports sector	Component 1, Output 1.1
Governance/ Institutional	• Uncoordinated adaptation decision-making • Absence of necessary climate-resilient development strategies and supportive policies	Component 1, Output 1.1 and 1.2
Technical capacity	• Limited technical capacity for monitoring impacts of climate change on ports infrastructure • No centralized monitoring networks and limited technical capacity related to climate risk assessment methods and adaptation planning • Limited availability of adaptation tools, approaches, technologies and demonstration of successful adaptation interventions in the Port sector	Component 1, Output 1.2 and 1.3
Awareness	• Awareness and information constraints	Component 1, Output 1.4

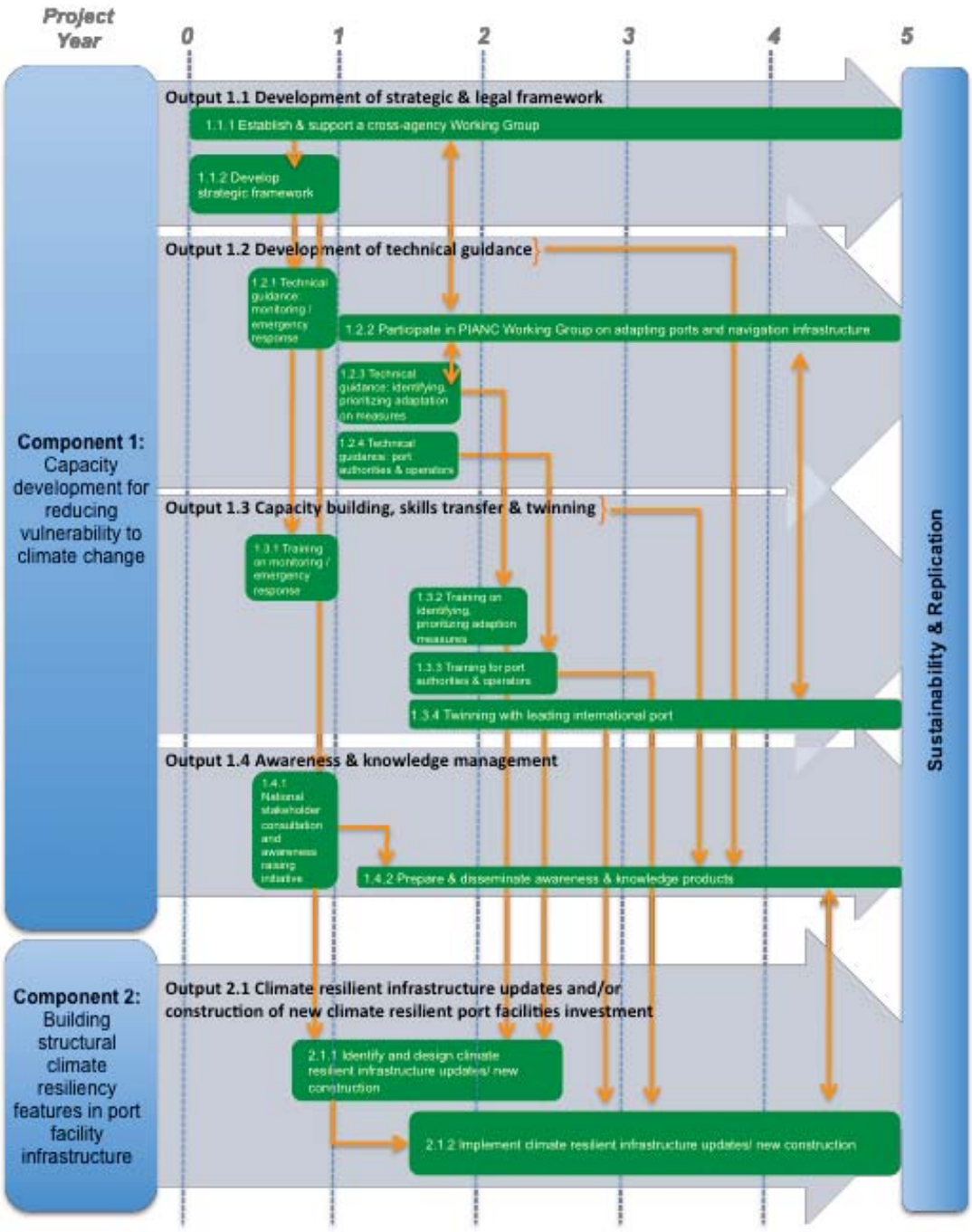

Figure 7. Relationship between Project Components

2.5 Project outcomes, components, outputs and activities

97. The following SCCF outcomes are sought:

(i) Outcome 1.1: Vulnerability of physical assets and natural systems reduced
(ii) Outcome 2.1: Increased awareness of climate change impacts, vulnerability and adaptation
(iii) Outcome 2.3: Institutional and technical capacities and human skills strengthened to identify, prioritize, implement, monitor and evaluate adaptation strategies and measures
(iv) Outcome 3.2: Policies, plans and associated processes developed and strengthened to identify, prioritize and integrate adaptation strategies and measures

98. The Project will be implemented through two inter-related Components described below. The relationship between Component 1 and 2, and their outputs and activities, is shown in Figure 7.

Component 1: Capacity development for reducing vulnerability to climate change

Financing: USD 500,000 requested from the SCCF and USD 1,000,000 from EBRD Technical Cooperation Donor Trust Funds as co-financing *(note that the EBRD works in Euros therefore subject to exchange rate fluctuations)*

99. Component 1 aims to strengthen the institutional and technical capacity for effective climate change adaptation in Moroccan port operations and infrastructure. This will be achieved through integration of climate change adaptation and resilience strengthening into port sector management through capacity development activities, technical guidance, tools, methodologies, monitoring activities, awareness raising and knowledge management. These activities ensure that technical assistance provided by the project creates sustainable impact intended to replicate the investments and management and monitoring methodologies implemented throughout Moroccan ports.

100. A coordinated package of technical support will be delivered through four Outputs. The relationship between the Outputs of Component 1 is shown in Figure 8. , with further details provided below.

Output 1.1 Development of strategic framework

Activity 1.1.1 – Establish and support a cross-agency Working Group

101. Following the projects initial inception, a cross-agency Working Group (WG) on climate resilience will be established and supported. The WG will consist of key stakeholders including Ministry of Equipment, Transport and Logistics acting as chair of the WG, and ANP and Meteo as active participants among others. The WG will have secretariat function and, with technical support provided, will participate in a number of activities, including; (i) lead the development of a strategic framework; (ii) assist the EBRD to create technical guidance and provide recommendations under Output 1.2; (iii) be the recipients of capacity building, skills transfer and twinning projects under Output 1.3; and (iv) participate in awareness and knowledge management activities under Output 1.4.

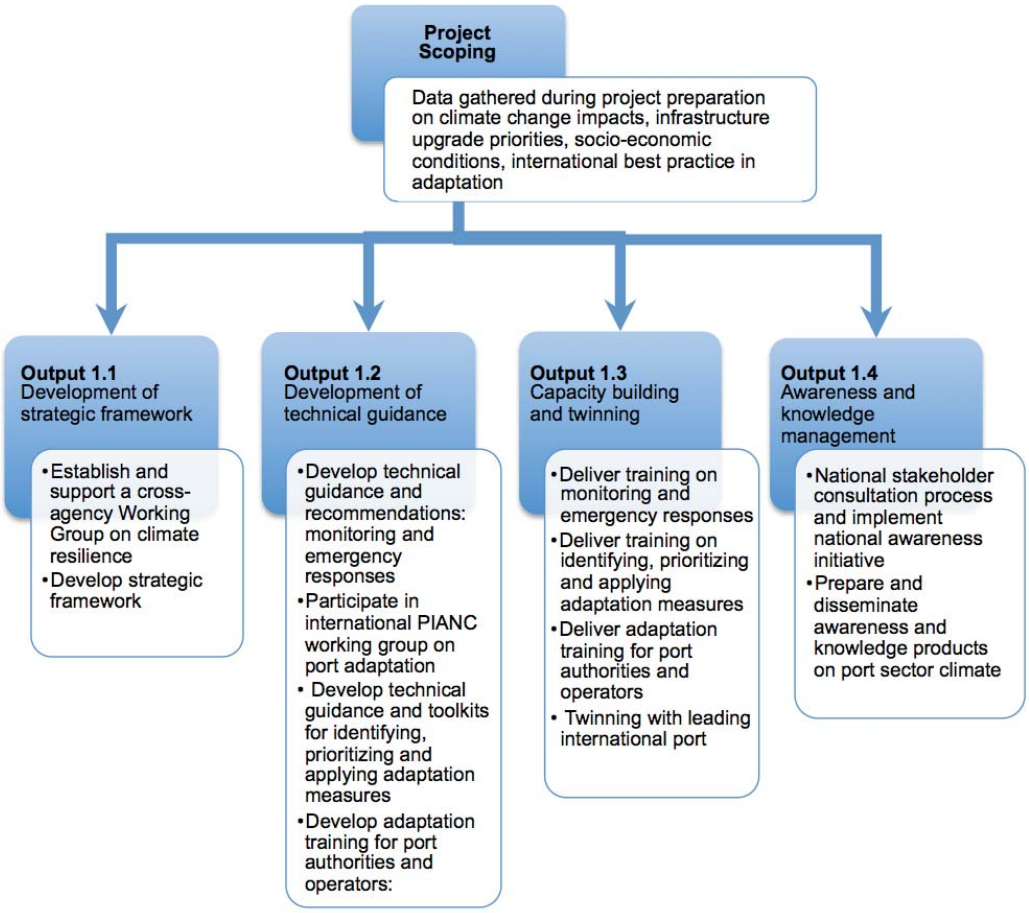

Figure 8. Component 1 outputs

Activity 1.1.2 - Development of strategic framework

102. A comprehensive strategic framework will be prepared by the WG with the assistance of the EBRD to outline the risks and consequences of climate change, the necessary monitoring activities to ensure up to date information on climate risks and the courses of action necessary to adapt to these risks. Importantly, the strategic framework will outline both the long-long term vulnerability of ports and the potential resilience to climate change made possible through implementing adaptation measures. In Workstream II of the project, further research at the individual port level will reveal detailed information of the long-term resilience of specific measures.

103. The Moroccan Government is currently in the process of updating secondary legislation that governs the management of the ports, port infrastructure and the operations of the DPDPM. As such, the Project may provide technical assistance to achieve a supportive framework where deemed necessary. This may include support to prepare adaptation policy guidelines, land use planning and associated policies to support climate change adaptation planning, management and development of ports.

104. The development of the strategic framework will use three key sources of data:

a. Detailed climate change impacts assessment information outlined in Annex 4
b. Best practice standards for adaptation to sea level rise and increased wave height and energy;
c. The EBRD guidance document ‘Development of guidance for optimising resilience to climate change in investments in sea ports and other coastal infrastructure’.

105. The strategic framework will inform the development of technical guidelines to be developed under Output 1.2, targeted capacity development under Output 1.3 and guide the necessary awareness and knowledge management activities under Output 1.4. The strategic framework will help to identify and prioritise those ports most vulnerable to sea level rise and increased wave energy and height, and outline the necessary investments to improve the climate resilience of ports identifying the most suitable adaptation measures from a list of best practice standards. The strategic framework and targeted capacity development will be aligned with the most suitable international best practice.

106. As noted above, the strategic framework will build upon the EBRD guidance document 'Development of guidance for optimising resilience to climate change in investments in sea ports and other coastal infrastructure' by applying it to the specific Moroccan context including local climate change risks and impacts, the nature of specific port assets and operations of major ports detailed during project preparation, and the local institutional context.

107. The strategic framework will guide Component 2 and, throughout Project implementation, the strategic framework may be refined and finalized.

Output 1.2 Development of technical guidance

Activity 1.2.1 - Technical guidance: monitoring and emergency response

108. Informed by the strategic framework and developed in coordination with the WG, this activity aims to develop the capacity of key stakeholders for monitoring climate change and emergency response to extreme climatic events. Key stakeholders include, but are not limited to: Ministry of Equipment, Transport and Logistics, other WG members, the National Meteorological Service of Morocco (DMN) and those involved in the emergency response – the Royal Navy, the Ministry of Public Works, the Police, the Civil Protection Department, the Fisheries Ministry and the Ministry of Merchant Marine.

109. Technical guidance for monitoring and emergency response will include the production of the following:

a. *Monitoring program guidelines/ frameworks/ resources; develop a pilot monitoring programme* - This activity will produce a pilot monitoring program and suitable resources and guidance materials demonstrating how a best-practice monitoring programme would be implemented.
b. *Recommendations for the improvement of the quality of marine weather forecasts* – The Project will work with the DMN to make recommendations for potential improvements in long-term marine weather forecasts. Recommendations will be based on steps to overcome gaps in weather forecasts identified by the WG in the Strategic Framework. This will likely include supporting the Ministry of Equipment, Transport and Logistics, and the DMN to roll out dynamic downscaling of Global Climate Models (GCM) and statistical downscaling to compare local observations to GCM data in order to understand local conditions in greater detail for two to three strategic port locations (to be decided during formulation of strategic framework).
c. *Design a national measurement network for swells* – To monitor swells and the effects of climatic variability and change on swells, plans for a national measurement network for swells will be developed with relevant entities.
d. *Recommendations for improving the availability of rescue teams and emergency patrols* – The Project will work with the Royal Navy, the Ministry of Public Works, the Police, the Civil Protection Department, the Fisheries Ministry and the Ministry of Merchant Marine to make to make recommendations for improving the availability of rescue teams and emergency patrols Recommendations will be based on steps to overcome gaps in rescue teams and emergency patrols identified by the WG in the Strategic Framework.

110. The technical guidance developed under Workstream 1 will be delivered through training in activity 1.3.1. Technical guidance will also inform, and be disseminated by, awareness and knowledge management activities under activities 1.4.1 and 1.4.2.

Activity 1.2.2 - Participate in PIANC Working Group on adapting ports and navigation infrastructure

111. Supported by the project, ANP will participate in the PIANC (World Association for Waterborne Transport Infrastructure) Working Group (henceforth PIANC WG) on Climate Change Adaptation for Maritime and Inland Port and Navigation Infrastructure.[22] The PIANC WG will drive capacity development aimed enabling best practice to be introduced, adapted and demonstrated in the local Moroccan context. The PIANC WG will assist with the development of adaptation tools and measures including non-structural (management) as well as structural measures. Participation in the PIANC WG will assist the inclusion of international best practice (adapted to local context) in the development of technical guidance under activities 1.2.3 and 1.2.4 as well as the training activities under activities 1.3.2 and 1.3.3, and twinning with leading international ports under activity 1.3.4.

Activity 1.2.3 - Technical guidance: identifying and prioritizing adaptation measures

112. Technical guidance will be produced to assist the identification and prioritisation of adaptation measures. Technical guidance will be informed by the strategic framework developed under activity 1.1.2 and will use risk-based decision-making to provide greater clarity regarding benefits and costs of different options.

113. Guidance will take the form of 'decision trees' for selecting adaptation measures and will be based on international best practice informed by the PIANC WG. The process of assessment, followed by adaptation or replacement, will be followed to prioritize potential infrastructure initiatives.

114. The method of prioritizing adaptation will be refined (using EBRD guidance and methodologies for prioritization of adaptation measures) and then packaged with other tools and disseminated as guidance materials to other ports. These tools will be informed by the financial and non-financial assessment criteria noted in Table 6 below, and processes and prioritization processes as outlined in Annex 3.

Table 6. Financial and non-financial assessment criteria for adaptation measures

Effectiveness	Will the adaptation option achieve the stated objective
Efficiency	Will the benefits of the option be greater than the costs
Equitable	The adaptation option should not adversely affect other areas or people. The adaptation option should have either a neutral or whenever possible a positive gender impact.
Priority	How high a risk is the adaptation option addressing? High or extreme risks should be addressed urgently.
Costs	Costs not only refers to the immediate economic costs of the option, but also likely on-going costs, as well as associated social and environmental costs
Co-benefits	Adaptation options may be able to take advantage of opportunities, which lead to environmental, social or economic benefits.
Maladaptation	Does the option lock in outcomes, and limit future adaptation options, or adversely impact on other areas or people?

115. A number of tools may be developed and used in activity 1.3.2 to assist the prioritization of adaptation options being assessed for inclusion in the investment programme. These tools include:

[22] The aims of PIANC Working Group are to explore the range of climate change adaptation options for maritime and inland port and navigation infrastructure; to refer to the PIANC TG3 report on climate impacts (which is assumed to be subject to updating as necessary) indicating key regional differences as far as practicable; to collate and review other existing information on climate projections; to generate a toolbox of adaptation options including non-structural (management) as well as structural measures; to evaluate the effectiveness of different adaptation options in typical or generic climate change scenarios; to understand and address challenges; and to provide a guidance framework for decision making.

a. Cost benefit analysis – This is predominantly an economic decision support tool. It helps determine if the total monetary benefits of a selected adaptation option exceed the monetary costs. It is best used where actions have focused objectives and where monetary costs and benefits can be generated.
b. Multi-criteria analysis – Decision support tools that can assist in assessing benefits, where the monetary values are harder to define. They can generally accommodate quantitative and qualitative variables. Information on multi-criteria analysis (MCA) is provided in Annex 3.
c. Cost efficiency analysis – A tool to help compare the relative costs and outcomes from two or more alternatives. This is also appropriate to use when monetary values are hard to determine.
d. Rapid gender impact analysis – in line with EBRD's environmental and social due diligence requirements, a checklist will be developed to assess potential gender and other social impacts of the adaptation measure to be applied ex-ante during the decision making process.

116. A thorough assessment of adaptation measures requires building awareness and adaptive capacity as well as building human capital. As such, technical guidelines, methodologies and tools for selecting appropriate climate change adaptation measures will be used in early stage capacity building and skills transfer through output 1.3.2. This training will focus on developing the ability of appropriate ANP staff to prioritize and select adaptation measures.

117. In addition, technical guidance will also be produced to assist ANP (working alongside port authorities and operators) to update templates and develop tender documents for the procurement of services for development and maintenance of adaptation measures.

118. While the Project targets climate resilience interventions specifically in ports and not generally along the coastline, from the perspective of integrated coastal zone management, attention will be paid to the inclusion of green solutions in the following five project activities: 1.1.2 through the adaptation strategy for ports; 1.2.2 participation in PIANC working group; incorporated into technical guidance in 1.2.3 and 1.2.4; incorporated into training under 1.3.2; as part of the investment selection process noted in Annex 3, and in general awareness initiatives. It is recognized that green investments such as planting mangrove tree buffers can be effective and environmentally sustainable approach to dispersing wave energy and protecting coastal areas from sea-level rise cause by climate change. Therefore, green options appropriate for Moroccan ports may be identified, considered and prioritized during Project implementation. The project will seek opportunities for gender aware community based natural resource management as part of the ICZM actions implemented. Please also refer to section "3.3 Cost Effectiveness" in the Project Document for discussion of SCCF infrastructure measures vis-à-vis other potential options to enhance port resilience.

Activity 1.2.4 Technical guidance: port authorities & operators

119. Technical guidance will be also be produced for port authorities and operators (including private sector operators who may be loan beneficiaries). Three streams of technical guidance will include:

a. Technical guidance to assist port authorities and operators identify and prioritise adaptation measures in individual ports. Technical guidance will be informed by the strategic framework developed under activity 1.1.2 and aligned with the technical guidance produced under activity 1.2.3. Technical guidance will use risk-based decision-making to provide greater clarity regarding benefits and costs of different options.
b. Technical guidance will be produced to assist port authorities and operators to implement and manage infrastructure and operational adaptation options. For infrastructure investments, guidance will cover the implementation of construction and rehabilitation measures as well as their operation and on-going maintenance. For operational measures guidance will cover the establishment and on-going implementation of 'soft' adaptation options such as climate resilient management practices including practices to reduce downtime in ports (see Annex 5 for soft adaptation options).
c. Technical guidance will also be produced to assist port authorities and operators to update templates and develop tender documents for the procurement of services for development and maintenance of adaptation measures.

Output 1.3 Capacity building and twinning

120. Support in the form of targeted capacity development will be implemented during Workstream I and Workstream II to strengthen the institutional and technical capacity of the WG and other stakeholders. Targeted capacity development will take the form of two training programs and project twinning.

Activity 1.3.1 Training on monitoring and emergency responses

121. Under Workstream I of the Project, a training program will be provided with the aims to develop capacity of key stakeholders on monitoring and emergency responses to extreme climatic events. Training will be based on guidance produced under Activity 1.2.1 and informed by the Strategic Framework. Training will be provided to (but not limited to): Ministry of Equipment, Transport and Logistics, other WG members, the DMN and those involved in the emergency response – the Royal Navy, the Ministry of Public Works, the Police, the Civil Protection Department, the Fisheries Ministry and the Ministry of Merchant Marine. Training will be provided on:

a. A pilot monitoring program and suitable resources
b. Designing a national measurement network for swells
c. How to improve the quality of marine weather forecasts
d. Improving the availability of rescue teams and emergency patrols.

Activity 1.3.2 Training on identifying and prioritizing adaption measures

122. Under Workstream II of the Project, training will be provided to ANP with the aim of developing ANP's capacity to identify and prioritize adaptation measures. Training will be based on guidance produced under Activity 1.2.3 and informed by the Strategic Framework. Training will support ANP to use a number of technical guidelines, methodologies and tools produced under Activity 1.2.3 for assessing and selecting appropriate infrastructure and operational adaptation options. A 'training of the trainers' programme will also be included under this activity to ensure capacity exists to provide training following project closure and ensure the sustainability of the projects outcomes.

123. Training will also be provided to assist ANP to update templates and develop tender documents for the procurement of services for development and maintenance of adaptation measures.

Activity 1.3.3 Training for port authorities and operators

124. Under Workstream II of the Project two streams of training will be provided to port authorities and operators with the aim of developing; i) their capacity to identify and prioritize adaptation measures; and ii) implement and manage these measures. Training will include private sector operators who may be EBRD loan beneficiaries. Training will be based on guidance produced under Activity 1.2.4 and informed by the Strategic Framework. A 'training of the trainers' programme will also be included under this activity to ensure capacity exists to provide training following project closure and ensure the sustainability of the projects outcomes

125. Three streams of training will support port authorities and operators to use a number of technical guidelines, methodologies and tools produced under Activity 1.2.4 for selecting, developing, maintaining and procuring associated services for appropriate infrastructure and operational adaptation options. The three streams of training will include the following.

a. Training will be provided to port authorities and operators to develop their capacity to identify and prioritise adaptation measures in individual ports. Training will support port authorities and operators to use a number of technical guidelines, methodologies and tools produced under Activity 1.2.3 for assessing and selecting appropriate infrastructure and operational adaptation options.
b. Training will also be provided to assist port authorities and operators to implement and manage infrastructure and operational adaptation options. For infrastructure investments training will cover the implementation of construction and rehabilitation measures as well as their operation and on-going maintenance. For operational measures training will cover the

establishment and on-going implementation of 'soft' adaptation options such as climate resilient management practices. Training will also be provided to assist port operators develop operational adaptation measures to reduce the incidence of port downtime due to climate hazards. This training will be supported by guidance produced under Activity 1.2.4.

c. Training will be provided to assist port authorities and operators (alongside ANP) to update templates and develop tender documents for the procurement of services for development and maintenance of adaptation measures.

Activity 1.3.4 Twinning with international ports

126. Under Workstream II of the Project, ports where climate change adaptation measures are being implemented will be twinned with appropriate leading international ports that have comprehensive strategies and operational guidelines for promoting climate resilience. Port twinning activities may include study tours and knowledge exchanges with ports identified as implementing international best practice for climate change adaptation, such as Rotterdam, New York or London. This twinning will facilitate skills transfer and staff exchanges, thereby building awareness and adaptive capacity.

Output 1.4 Awareness and knowledge management

127. Under Workstream II, the Project will begin to produce and disseminate a number of knowledge and awareness raising products and activities to raise awareness and share lessons learned.

Activity 1.4.1 National stakeholder consultation and awareness raising initiative

128. Under Workstream I, the Project will begin a national stakeholder consultation process. This stakeholder consultation process will engage with a broad range of stakeholders identified in section 4.3. Stakeholders will be engaged at two levels: at the national level for wider consultation and awareness raising activities; and, at the local level for individual port investments and activities.

129. At the national level, the project management team will build on the stakeholder consultation process that began during the Project development stage. Following a Project kick-off meeting with key stakeholders, a broader meeting with a broader range of stakeholders may be held under the leadership of the Ministry of Equipment, Transport and Logistics to raise awareness of the Project and to establish communication and networking approaches to be used throughout the Project duration.

130. At the local/ investment site level, stakeholders will be engaged through the EBRD's standard stakeholder engagement processes, which will likely include an Environmental Impact Assessment, and Environmental and Social Action Plan (ESAP).[23] These will enable consultation with local (and where appropriate national) community-based organizations and relevant non-governmental organizations.

131. In Workstream II, the Project managers will organise and implement a national awareness initiative focused on the Moroccan port sector and climate change. This will include the organization of a 'national day' in coordination with the bodies concerned with ports and responsible for assessing the ability to react and proceed with the establishment of a real strategy for action. This national day may be held alongside other relevant initiatives such as port development or national climate change adaptation meetings/ days.

Activity 1.4.2 Prepare and disseminate awareness and knowledge products

132. Under Workstream II, the Project will prepare and disseminate a number of knowledge products on port sector climate change adaptation. These products will include the following:

a. A project website will be developed and maintained by the project. The website will provide a portal for sharing and disseminating, lessons learned studies, technical guidance tools and

[23] For an example of an environmental and social impact assessment for EBRD investment in the Deep Water Container Terminal Expansion Project in Gdansk Poland, see: http://www.ebrd.com/english/pages/project/eia/45805esap.pdf

methodologies as well as monitoring information
b. Publications/leaflets for a range of stakeholders (including local residents/groups)
c. Dissemination of information on the Projects on-going activities related to monitoring of climate change risks and impacts and on the identification prioritisation of adaptation measures
d. Compile and disseminate good practices and lessons learned studies.
e. Awareness products and activities aimed at the general public to engage them in improved port safety and resilience. This may include encouraging the formation of volunteer groups or community disaster response committees. Men and women's different roles in environmental management will be taken into consideration during the development and implementation of awareness raising campaigns. Active involvement of local women's organizations with an environmental vocation will be sought in order to maximize impact and outreach of awareness raising strategies.

133. Following Project closure, the Project website will be maintained by Project executing partners: Ministry of Equipment, Transport and Logistics, and ANP. Consistent with the knowledge management focus of the Project (Output 1.4) the project website will contain the toolkits, training materials and lessons learned produced by the Project in order to ensure continued access to these capacity development products and hence sustainability of the Project's interventions post project closure.

Component 2: Building structural climate resiliency features in port facility infrastructure

Financing: Component costs: USD 47,397,000 from EBRD and Technical Cooperation Grant co-financing, with USD 5,692,694 requested from the SCCF *(note that the EBRD works in Euros therefore subject to exchange rate fluctuations)*

134. Component 2 aims to build the climate resiliency of port structural assets through port facility infrastructure investments that reduce vulnerability of physical assets to the adverse effects of climate change.

135. As previously noted, Morocco's large ports and shipping sector are critically important for the economy and for livelihoods, and yet remain vulnerable to climate change impacts such as sea-level rise and associated impacts such as wave overtopping. Component 2 focuses on building additional climate-resiliency features into Moroccan port infrastructure through directly investing in rehabilitation and building projects in Moroccan ports. The intent is to finance upgrades or retrofitting old infrastructure and building of additional port infrastructure that is climate resilient, thereby reducing the vulnerability of port infrastructure to the adverse effects of climate change. This Project will enable best practice to be introduced, adapted and demonstrated in the local Moroccan context through the implementation of investment projects that integrate structural climate resilience measures into port upgrades/rehabilitation/construction.

136. The Project will seek to implement, and thereby showcase, a range of adaptation measures. Therefore, rather than targeting the involvement of a specific number of ports, the Project will target the introduction of a number of adaptation measures that will have a demonstrative effect and enhance replication potential.

137. The intent is then to showcase these infrastructure investments, and the processes of their identification and prioritisation (including technical guidance tools and methodologies) through the knowledge management and awareness activities of Output 1.4 to create awareness and ultimately replication of these investments in other ports.

138. As shown in Figure 7, investment activities (Project Component 2) take place in Workstream II and will be supported by activities undertaken through Workstream I.

Output 2.1 Climate resilient infrastructure upgrades and/or construction of new climate resilient port facilities investment

Activity 2.1.1 – Identify and design climate resilient infrastructure upgrades / new construction

139. A range of specific adaptation options that will be implemented by the participating port(s) will be prioritised and selected by the technical appraisal of the specific investments (aided by capacity building in Output 1.3).

140. As previously noted, the process of assessment, followed by adaptation or replacement (as depicted in the figure below) will be followed to prioritize potential infrastructure initiatives.

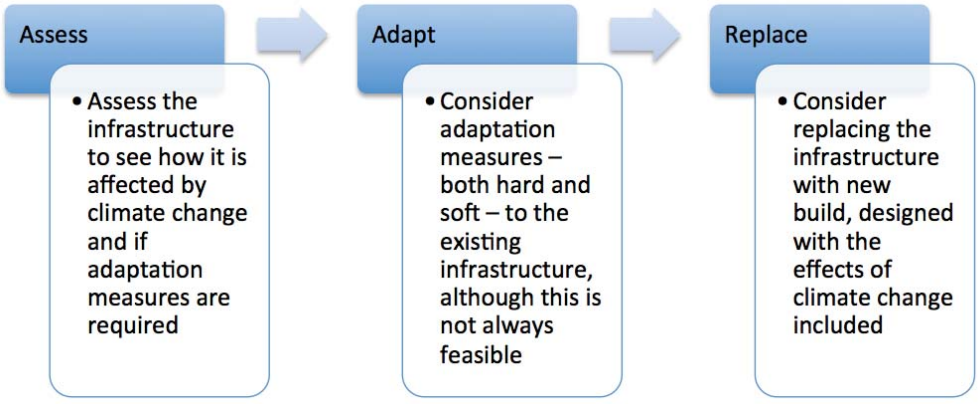

Figure 9. Adaptation measures prioritisation for rehabilitation initiatives

141. The method of prioritizing adaptation developed under Workstream II will be applied. This will include the application of financial and non-financial assessment criteria for adaptation measures (see Table 6) and guidance developed under the Project.

142. Processes and prioritization processes refined under the Project, as outlined in Annex 3, and tools – including cost benefit analysis, MCA cost efficiency analysis, and gender impact analysis – will be applied.

143. In coordination with the ANP, port operators, the EBRD and technical experts, the PIP will be established outlining the investments to be made during the SCCF Project.

144. Alongside the PIP, a LTIP will be developed to outline appropriate long-term climate resilient infrastructure investments as well as any necessary investments in monitoring equipment. The investments identified under the LTIP would be financed through non-SCCF resources during or after the Project's lifetime.

145. The choice of each intervention will be linked to what is understood about the specific climate change vulnerabilities facing each port as dictated by the strategic framework developed under Output 1.1 and assessment of measures developed aided by training delivered under Outputs 1.2 and 1.3.

Activity 2.1.2 – Implement climate resilient infrastructure upgrades / new construction

146. The majority of this Component will be funded by the EBRD (as hard loans for capital expenditures) as infrastructure rehabilitation and construction are considered business-as-usual. The SCCF-A will fund the additional costs for integration of climate-resilient features that reduce vulnerability and increase adaptive capacity into port design. These investments may support:

a. Infrastructure rehabilitation, and/ or
b. New construction of climate resilient features such as adjustment of quay heights and other infrastructure, additional breakwaters, drainage and pumping equipment, etc.

147. The expected outputs are climate resilient infrastructure upgrades and/or construction of new climate resilient port facilities. The selection of these ports will be optimized on the basis of the results of the further strategy development work, an assessment of the ANP's and port operators' business needs and the most effective use of the funds. Additional anticipated benefits are noted in section 3.2.

2.6 Additional cost

148. Additional cost is defined by the SCCF as the full adaptation cost, in particular the cost of concrete adaptation actions that reduce vulnerability and increase adaptive capacity to the impacts of climate change. These costs are added to the costs of business-as-usual (BAU) development, where BAU refers to activities that would be implemented also in absence of climate change. The cost that would be incurred for BAU is considered the Project's baseline, which constitutes the co-financing. Table 7 summarized the BAU / co-financing and adaptation costs.

Table 7. Business-as-usual, co-financing and adaptation cost

	Baseline/ Business-as-usual	With climate change
Problem Description	The Project's baseline consists of ambitious plans for the modernisation of Morocco's ports with a view to increasing the national economy's competitiveness, driving regional development and positioning Morocco as a logistics hub in the Mediterranean. Therefore, under BAU, the development of the Moroccan ports sector will continue. However, because of a range of information, awareness, governance, regulatory and financial barriers, port development planning and operation practices will not fully take into account the risks posed by climate change. Without the full realisation of, and response to, the risks posed by climate change to port infrastructure and operations the potential to integrate pressing climate change adaptation needs into port developments will remain underdeveloped.	Climate change and its associated impacts such as accelerated sea level rise will lead, in time, to increased vulnerability of Moroccan port infrastructure, operations and investments. Awareness of this vulnerability is currently low within Morocco, as evidenced by none of the existing investment plans considering climate change impacts. As such, existing and future planned ports, their physical infrastructure, operations and – as a result – socio-economic benefits remain at risk to the negative impacts of climate change. The SCCF is requested to provide funding for these additional costs that reduce vulnerability and increase adaptive capacity of the Moroccan ports sector to the impacts of climate change. SCCF funding will cover the additional costs to reduce vulnerability and increase adaptive capacity of the Moroccan ports sector to the impacts of climate change through Project components focused on technical assistance and provision of investment in port infrastructure climate resiliency.
Project Component 1	There is little realisation of, and response to, the risks posed by climate change to port infrastructure due to a number of regulatory, technical, knowledge and awareness barriers. Port development planning and operation practices will not fully take into account the risks posed by climate change. *EBRD technical cooperation (USD 1,000,000)*	The additional costs for adaptation action are incurred by the need to a) reinforce the technical and human capacities of the Ministry of Equipment, Transport and Logistics, ANP and partner agencies to help them better assess and address emerging and anticipated climate change risks to Morocco's ports. Specifically, SCCF funds will build on the baseline projects in the following manner by a) developing a strategic framework; b) developing technical guidance; c) capacity building, skills transfer and project twinning; and d) coordination knowledge management and awareness. *Adaptation cost: USD 500,000*
Project Component 2	Baseline investments in port infrastructure will likely continue through rehabilitation and new builds without the full realisation of, and response to, the risks posed by climate change to port infrastructure. *EBRD co-financing (USD 47,367,000)*	The additional costs for adaptation action are incurred by the need to incorporate additional climate resilience features into port design and through investments in port infrastructure. SCCF funding there will used to demonstrate of viable climate change resilience features in rehabilitation and new build investments (e.g. adjustment of quay heights and other infrastructure, additional breakwaters, drainage and pumping equipment, etc.). Investments in port infrastructure climate resiliency will be combined with technical assistance provided under Component 1 to drive replication of climate change resilience features of these measures in selected ports with replication effects on other ports. *Adaptation cost: USD 5,692,694*
Cost	Total BAU development cost: USD 48,900,000 (including project management cost)	Total additional adaptation cost: USD 6,192,694
Financed by	Co-finance from the EBRD	Funding from the SCCF

2.7 Adaptation benefits

149. The Project provides a number of adaptation actions (funded by the SCCF) that are considered additional to BAU development. Adaptation actions and their benefits that reduce vulnerability and increase adaptive capacity to the impacts of climate change are outlined in Table 8.

Table 8. Adaptation Benefits

Action	Benefit
Component 1: Capacity development for reducing vulnerability to climate change	
Establish and support a cross-agency Working Group (WG) on climate resilience in ports.	A cross-agency WG (consisting of key stakeholders involved in port sector operations and management) will provide the foundations necessary for long-term improved coordination and adaptation decision-making processes. Improved coordination will counteract the prevalence of institutional silos (compartmentalised management in relation to adaptation efforts) and allow for the integration of adaptation planning and management within and between organisations as well as scientific knowledge and adaptation decision-making process. Improved coordination, as well as the WG's participation in a number of capacity building and skills transfer activities will directly enhance the adaptive capacity of human resources to identify, prioritise and implement operational and infrastructure measures to adapt to the effects of climate change.
Development of a strategic framework	The strategic framework will provide stakeholders from the WG with a valuable long-term adaptation decision making framework, clear adaptation policy guidelines, land use planning and associated regulations and laws to guide climate change adaptation planning, management and development of ports. The strategic framework will outline the risks and consequences of climate change, the necessary monitoring activities to ensure up to date information on climate risks and the courses of action necessary to improve the adaptive capacity of port's human resources, assets and infrastructure to cope with, recover and adjust to the impacts.
Development of technical guidance, recommendations and delivery of training on monitoring climate change and emergency responses	Training on monitoring and emergency responses, design of a pilot monitoring program, improvements in the quality of marine weather forecasting and the design of a national measurement network for swells will increase the adaptive capacity of those involved in emergency responses to extreme climatic events, and improve the ability to predict them. Port resources will have reduced vulnerability to extreme climatic events.
Development of technical guidance, tools, methodologies and delivery of training to capacitate and assist ANP in identifying and prioritising adaptation measures at the strategic/national level.	Adaptation benefits will be ensured through the appropriate selection of operational and infrastructure adaptation measures best suited to increase resilience to climate risks and reduce vulnerability at the strategic/national level. The appropriate selection of adaptation measures will help avoid mal-adaptation, or the selection of sub-optimal adaptation measures. Long-term adaptation benefits will be achieved through increased capacity to plan and make decisions on a strategic/national level as well as update the strategic framework when necessary.
Development of technical guidance, tools, methodologies and delivery of training to capacitate port authorities and operators to identify, prioritise, implement and manage adaptation options at the individual port level.	Adaptation benefits will be ensured through the appropriate selection of operational and infrastructure adaptation measures best suited to increase resilience to climate risks and reduce vulnerability at the individual port level. This will also prevent the occurrence of mal-adaptation, or the selection of sub-optimal adaptation measures. Long-term adaptation benefits will be achieved through the increased longevity of adaptation measures as a result of training provided on the implementation and on-going management of adaptation measures.
Participation of the WG in the PIANC working group on adapting ports and	The participation of the WG in the PIANC working group and twinning with international ports will introduce best practice

Action	Benefit
Component 1: Capacity development for reducing vulnerability to climate change	
navigation infrastructure to climate change as well as project twinning with leading international ports.	adaptation measures to ensure optimal adaptation benefits from measures selected.
Component 2: Climate resilient infrastructure upgrades and/or construction of new climate resilient port facilities investment	
At least USD 5,692,694 invested in the development of resilient infrastructure upgrades and/or construction of new climate resilient port facilities	The development of resilient infrastructure upgrades and/or construction of new climate resilient port facilities will directly increase resilience of port infrastructure to climate risks and reduce vulnerability of ports to climate change

2.8 Sustainability and innovativeness

150. The Project incorporates a number of key design features to ensure the sustainability of the Project's interventions.

a. ***Innovation***: The project will introduce the Moroccan Government and port sector stakeholders to international best practice and state-of-the-art examples for increased climate resilient investments and management practices in ports through the PIANC WG and twinning initiatives. Due to the underdeveloped nature of climate resilience in Moroccan ports there is little experience with such projects. This project introduces a new and innovative approach to climate resilience in Morocco. SCCF support will be instrumental in demonstrating and building a knowledge base on climate resilient investments and management practices.
b. **Enhancing capacity for climate resilience in the port sector:** The development of supportive conditions for climate resilient ports through a strategic framework, technical guidance and training programmes for port authorities, operators, other national government stakeholders and key technical experts ensures long-term sustainability of project outcomes and strengthens the basis for sustainability and replication. The Project will demonstrate the benefits of increased climate resilient infrastructure investments and management practices, and will raise awareness about the potential and viability of such measures.
c. **Design and development of long-term climate resilient port infrastructure** by nature will ensure sustainable long lasting structures with reduced vulnerability to climate change. Furthermore, training provided by the project for on-going maintenance of climate resilient infrastructure will ensure that these investments can be sufficiently maintained.
d. **Dissemination of lessons learned studies and best practice examples:** The Project includes a focus on learning, bringing experience together and establishing processes for continued post-project impact. The lessons learned and best practice examples of climate change adaptation of port operations and infrastructure will be identified and documented through knowledge management activities that are integrated into project Component 1 through Output 1.4 on knowledge management.

2.9 Replication

151. The Project incorporates a number of key design features to enhance the potential for replication and scaling up:

a. **Stimulate demand for climate resilient port infrastructure investments and management practices**: The Project is based on a process of gradually building experience and demand for climate resilience in ports through training for a supportive strategic framework that will drive the assessment of risks and consequences of climate change, and the courses of action necessary to adapt to its effects. Demonstrating investments and practices will, in turn, stimulate greater demand for climate resilient port infrastructure investments and practices and encourage the availability of new and additional financial resources for replicating investments in other ports.

b. **Technical assistance to support replication in other ports:** Investments in climate resilient port infrastructure climate will be combined with technical assistance provided under Component 1 to drive replication of climate change resilience features of these measures in selected ports with replication effects on other ports.
c. **Awareness raising:** The Project will showcase infrastructure investments, and the processes of their identification and prioritisation (including technical guidance tools and methodologies) through knowledge management and awareness activities of Output 1.4 to create awareness and ultimately encourage replication of these investments in other ports.

2.10 Gender dimensions

152. All Project components and activities will take relevant gender issues in consideration, as gender equality is considered an integral part of sound business management and also key in the EBRD's activities to advance sustainable growth in its countries of operations. The Project will therefore be consistent with the Strategy for the Promotion of Gender Equality (SPGE) which promotes gender equality and the empowerment of women in the Bank's investment and technical cooperation projects.

153. The EBRD, through the SPGE, works to promote women's access to finance, access to services, and access to employment and skills through its investments. Gender inequalities remain high in Morocco. According to EBRD gender gaps map, Morocco shows large gender gaps in access to finance, employment and entrepreneurship. For this Project, the EBRD will consider the promotion of training initiatives that target, and support inclusion of, women in the ports sector as stakeholders, employees or potential employees and within the supply chain taking into account the entrenched cultural norms regarding gender roles continue to exert an influence on women's economic, social and political participation and leadership. In Morocco the traditional gender paradigm places women's responsibilities mainly within the private sphere. Women's labour force participation is estimated at 26%, compared to 72% for men. Nearly half of all working women in Morocco are unpaid family workers, most of whom are concentrated in the agricultural sector in rural areas. In the formal private sector, women's average earnings represent 70% of men's average earnings. The current key sectors for women's employment are agriculture, services and manufacturing. Some 60% of the agricultural workforce is female. Young, unmarried women are often particularly vulnerable to poor terms and conditions of work, as – in line with gender norms – women's employment is often seen as a temporary activity to provide secondary income to their family before marriage rather than a 'real job' with rights attached.

154. The promotion of gender equality is one of the priorities of the Moroccan Government. The 2004 Labour Code regulates employment in the private sector, while employment in the public sector is regulated by a separate law. The Labour Code prohibits gender discrimination and provides for equal pay for work of equal value. In recent years there was a national strategy for equality for the period 2012-2016 (Ikram Programme). The 2011 Constitution provides for the creation of a government body to ensure the respect of article 19 on equality and non-discrimination. This body, called 'Autorité pour la parité et la lutte contre toutes formes de discrimination', has been created in 2015.

155. All investment projects financed by the EBRD are subject to the EBRD's internal procedures, which include an Environmental and Social Action Plan (ESAP) that ensures that environmental, social, gender and other issues are taken into consideration prior to or during Project implementation.

156. In addition to this, zero or positive gender impact will be one of the criteria for decision making on adaptation strategies. In line with EBRD's environmental and social due diligence requirements, a rapid gender impact analysis tool will be designed to guide project teams during the decision making process.

157. Opportunities for promoting women's employment in construction of port infrastructure as well as port operations will also be explored as part of the EBRD investments undertaken under this Project.

158. The Project will actively encourage women to participate in all training and awareness initiatives. The Project aims to build on women's role as environmental managers to maximize impact and outreach of awareness raising strategies.

159. As part of this Project, there is a unique opportunity to use the adaptation activities to understand the link between gender and climate resilience in Morocco, and to ensure that gender equality is promoted through men and women's participation in high-value activities such as technical training, management and governance.

160. As part of EBRD investments in selected ports, gender assessments will be conducted to identify opportunities for enhancing women's livelihoods and economic empowerment as part of climate adaptation strategies. EBRD investments in ports with integration in urban development (Tangier, Casablanca, Safi, and Kentira) and in local fishing ports will include a gender assessment.

2.11 Risks

Risk category	Risk and mitigation approach	Level
Climate Change	***Climate change impacts***: The fundamental objective of this Project is to address the risks of climate change through adaptation measures, and investments will have been identified and developed with climate change mitigation considerations in mind. However, climate change still posses a number of risks to the fulfilment of the objective and project components. One example is the effects of increased occurrence of storm surge events during construction of adaptation. Measures will be taken to reduce the effect of climate change during the construction phase on a case-by-case basis.	Low
Environmental and Social	***Environmental and/ or social issues:*** External risk of site-specific localised and or temporary environmental and/ or social issues may impact the Project (e.g. the construction works undertaken). These risks will be addressed by ensuring sufficient due diligence and stakeholder consultation and coordination, in particular, with local groups. Environmental and social due diligence and safeguards will be ensured through following the EBRD's established policies and procedures. The EBRD's Environment and Social Action Plan[1] includes procedures for assessment and management of environmental and social risks and impacts, listing mitigation and measures and corrective actions.	Low
Institutional	***Insufficient operational capacity:*** One of the main risks of the Project is that key stakeholder organisations do not have sufficient operational capacity to undertake the outlined activities and consequently the Project will not be successful in achieving its targets. Operational capacity will be partially mitigated by the outlined technical capacity development training activities. The Project will identify and attempt to insufficient operational capacity of key stakeholder organisations, however, some aspects of operational capacity lie outside of the control of the Project. These aspects include insufficient staffing levels and the loss of staff trained by the Project within key stakeholder organisations and Government departments (namely the Ministry of Equipment, Transport and Logistics, and ANP).	Low
Political	***Inadequate government ownership and buy in/ lack of political will***: There may be a lack of political will to adapt Moroccan ports to climate change. This may be caused by a failure of key Project stakeholders to coordinate their actions in the process of Project implementation that results in the lack of adequate government ownership of the project. Reduced political will may also be caused by a change in government or a change in government priorities that may be a result of factors largely outside of the Project's control. This risk is considered moderate as the Government has a strong commitment to climate change adaptation as indicated by their INDC[2] as well as a commitment to the sustainable development of Morocco's ports in the National Port Development strategy. Key Government departments will be engaged throughout the Project lifetime through technical assistance and awareness raising activities aimed at understanding the effects of climate change and suitable adaptation measures.	Low - Medium
Financial	***Overall financial risks:*** This is a moderate risk that will be mitigated by conditionalities of the EBRD's loan structure and by thorough technical support as a component of Project implementation. As a financial institution, the EBRD operates extensive risk assessments of all its transactions covering, credit, economic, environmental, implementation, legal, market, technological and	Low-medium

[1] Please see: http://www.ebrd.com/documents/environment/47081-esap.pdf
[2] Morocco's Intended Nationally Determined Contribution (INDC) under the UNFCCC (2015).

Risk category	Risk and mitigation approach	Level
	integrity risks. The investments financed under the Component 2 of the Project will be subject to standard approval processes of the EBRD.	
	Procurement / implementation risk: Although port agencies and operators have a substantial track record in implementing capital investments, this will be the first time to procure in accordance with EBRD Procurement Policies and Rules. A procurement capacity assessment will be carried out to assess any support required to mitigate this risk.	Low
	Repayment capacity: Agencies and operators are cash generative but further analysis will be required to assess its stand-alone debt capacity and the exact nature of its financial arrangements with the Moroccan government. The funding plan for the capex programme and its debt service capacity will be assessed in detail prior to Final Review. EBRD standard internal procedures will be used to mitigate repayment capacity risk.	Low
	Foreign exchange risk: Tariffs are partially indexed to EUR/USD, but received in MAD. During due diligence, revenue and cost profile will be examined in detail to assess its exchange rate exposure in the context of repayment of a EUR loan. EBRD standard internal procedures will be used to mitigate foreign exchange risk.	Low - Medium
	Limited long term funding for banks: Limited funding for local Moroccan banks impedes the granting of long-term loans, which constitute around a third of total loans.[3] This represents a significant degree of maturity mismatch risk and reduces the availability of credit to longer-term projects such as those in the infrastructure sector. Limited funding in the long-term impedes the sustainability and replication of the projects interventions in other ports. The risk level is considered low to medium as the Project addresses some of the lack of funding by providing loans. The EBRD will bring its particular expertise in infrastructure financing and encourage local banks and share knowledge concerning adaptation infrastructure financing, which is seen as a key priority by the government.	Low - Medium
Technology	***Technology risk* or maladaptation** (the inappropriate selection of adaption measures): This risk is considered low because only proven technologies will be eligible for financing and because technologies will be thoroughly researched in the scoping phase and their selection site specific and outlined in the Operational Directives for each port. Adaptation technologies need to address local vulnerabilities to climate change. As these are very location specific, the Project assessment will assess the local vulnerabilities and review to which extent the proposed investment address these vulnerabilities, with only adaptation investments sufficiently addressing specific vulnerabilities of each individual eligible for finance.	Low

[3] EBRD 2012 Morocco Country Assessment

3 Rationale for the Bank's involvement

3.1 Fit with the EBRD

161. The EBRD is the regional development bank for the Eastern European and Central Asia countries and the Southern and Eastern Mediterranean (SEMED) region. The EBRD has been chosen as the preferred GEF/ SCCF Implementing Agency by the Government of Morocco based on its recognized added value in the most strategic elements of the project, namely technical assistance combined with infrastructure investment projects for climate change adaptation. Indeed, through its global GEF and non-GEF portfolio, the EBRD brings its extensive knowledge of climate change adaptation, climate proof coastal development and port infrastructure development projects.

162. The EBRD's first country strategy for Morocco[1] focuses on four key priorities identified in cooperation with the Moroccan government: realising Morocco's entrepreneurial potential; regional inclusion; sustainability and commercialisation of public services and infrastructure; and advancing the development of capital markets.

163. Morocco is a founding member of the EBRD and become a Country of Operations in 2011. Since then, the EBRD has invested EUR 380 million in 17 projects in the country in addition to EUR 130 million worth of trade facilitation credit lines with local banks. In addition the EBRD has provided technical assistance support to more than 135 small and medium-sized local enterprises.

164. The EBRD recognizes that Morocco is one of the most vulnerable countries to climate change in the EBRD region and faces a number of important transition challenges. The Project is particularly aligned with the EBRD's focus on sustainability and commercialisation of public services and infrastructure. Over the past ten years, Morocco has developed large infrastructure projects in the transport, municipal environment, power and water sectors. However, national operators and infrastructure providers do not operate on a commercial basis, and large operating subsidies, along with tariffs that are not cost reflective, continue to hamper the sustainability of operations. Despite their scale, these projects have not been able to meet the country's large and growing infrastructure needs, resulting in water scarcity, an increase in electricity imports with the infrastructure of a number of sectors, including ports, in need of capital repairs. Furthermore private sector participation in infrastructure remains low, the EBRD aims to increase private sector provision of services through Public-Private Partnerships (PPPs).

165. While most infrastructure projects have so far received state guarantees and concessional funding, alternative forms of financing must be developed to address the country's needs. In this context, the private sector has a key role to play both in terms of financing and bringing expertise in these sectors and technical assistance is provided to establish the conditions required for the involvement of the private sector.

166. The Project is consistent with the EBRD's Transport Strategy, approved in 2013.[2] The focus of this Strategy is private sector development and sustainable transport. In the transport sector, the EBRD seeks to support further development of the much needed basic infrastructure, whether road, railways, ports, intermodal and logistics platforms, with the view to facilitate access to remote regions, mitigating climate change through emissions reductions and adaptation to climate change thus boosting regional trade and allowing development of commercial operations and contributing to the overall sustainability of the transport sector.

167. The Project is also consistent with the EBRD's Green Economy Transition (GET) approach, approved in 2015[3]. The GET approach seeks to scale up the EBRD's transition impact and environmental financing activity. It is based on the transition and client-driven business model of

[1] http://www.ebrd.com/news/2015/ebrd-approves-first-country-strategy-for-morocco-.html
[2] EBRD Transport Strategy (2013). Available at: http://www.ebrd.com/downloads/sector/transport/transport-strategy.pdf
[3] Green Economy Transition approach (2015). Available at: http://www.ebrd.com/what-we-do/strategies-and-policies/green-economy.pdf

the EBRD, and its operating principles of transition impact, sound banking and additionality. Building on the successful delivery model used by the EBRD's Sustainable Resource Initiative, policy work will play an important role alongside the financing activity of the Bank.

168. Investments in municipal, transport and power infrastructure, where possible, will be in coordination with other IFIs, and supported by conditionalities for commercialisation and private sector participation.

169. The opportunity to support infrastructure investments coupled with technical assistance to enhance adaptation to climate change in Morocco is welcomed as a unique opportunity by the EBRD as it enables engagement with a broad range of stakeholders (beyond governments, which are typically targeted by the EBRD's technical assistance activities).

170. Overall, the Project is consistent with the EBRD's mandate to support transition, economic growth and sustainable projects that will help to improve many people's quality of life across the EBRD's region of operation.

3.2 Socioeconomic benefits

171. Consistent with the EBRD's mandate to support transition, the Project will offer significant socioeconomic benefits for ports through future-proofing ports against climate change risks that can disrupt and damage port facilities and threaten socio-economic benefits. Future-proofing will be achieved through investments in climate resilience infrastructure and an associated package of technical assistance.

172. The adoption of climate resilient port infrastructure investments is crucial for the overall socioeconomic development of the country and the Project has much to offer in that respect. Morocco's ports handle 98% of the country's foreign trade. Maritime industries associated with ports (including shipping and freight forwarding services, managing and/or operating shipping and ports, fishing and other industries associated with ports) are one of the countries largest employers. Morocco is also currently experiencing significant growth in industry and manufacturing sectors and associated exports (4% increase in GDP in 2015).

173. The exceptional storm of 2014 demonstrated the susceptibility of Morocco's ports to the adverse affects of climatic variability and change and the urgent need for strategic planning in a rapidly growing sector to increase the climate resilience against such threats. The Project enhances the ability of port businesses to survive and grow in the face of climate change risks to ports. The Project will benefit Morocco as a whole by assisting investments in climate resilient port infrastructure and developing local capacity and setting Morocco on a sustainable growth trajectory leading to reduced vulnerability to climate change. These gains can also lead to increased levels of employment and job security.

174. The Moroccan ports strategy targets value creation through increases in productivity and revenue, new growth engines (such as special economic/ free zones), cost reduction, heightened efficiency and sustainability. Increasing Moroccan port competitive advantage though differentiation and port expansion is considered key. A good example of the socioeconomic benefits of ports is industry development and employment growth in and around the expanded Tanger-Med port. Tanger-Med become a major transport hub for commercial trade and increased its logistical competitiveness, and has facilitated the development of supply chain growth through the development of associated industries in the special economic/ free zone around the port, such as the establishment of a new Renault assembly plant. The Moroccan government is planning similar developments around the port of Kenitra with a new Peugeot assembly plant that will be developed in 2019, and for which the port capabilities will also be upgraded. The integral and unique position of ports as economic and trade drivers exemplifies their importance and the urgent need to future proof ports against climate change related phenomena that can threaten these socioeconomic benefits.

175. Additional socioeconomic benefits will be catalysed through the package of technical assistance provided by the project. Technical assistance includes raising awareness, knowledge and monitoring of the risks posed to ports by climatic variability and change combined with the

training, tools and methodologies to assess and plan climate adaptation in ports. Participants involved in training and workshop programmes will benefit from enhanced technical capacity and knowledge, and hence increased job security, employability and income levels.

3.3 Cost-effectiveness

176. The Project involves a grant of USD 6,192,694 from the SCCF-A of which USD 500,000 is requested for technical assistance activities in Workstream I. The approach of the Project will help ensure the cost effective use of SCCF funding as the underlying technical capacity and a strategic framework for port adaptation are essential to support the implementation of infrastructure investments. Workstream I will increase the adaptive capacity of human assets through skills, capacity and technical knowledge development.

177. The approach to developing local capacity for selecting and designing management/ operations and infrastructure based adaptation measures will prove cost effective in the long term. Making infrastructure investments without developing local capacity to select, design and maintain adaptation measures may later prove more costly as a result of mal-adaptation. This approach effectively establishes and maintains the capacity needed to support infrastructure investments made under Workstream II.

178. Technical assistance activities will consider the inclusion of cost effective green/non-engineering solutions such as vegetation replanting as approaches to dispersing wave energy and protecting coastal areas from sea-level rise caused by climate change. Technical assistance activities such as training and awareness will assist decision makers to determine the cost-effectiveness of potential green adaptation measures vis-à-vis infrastructure measures where relevant and feasible.

179. Under Workstream II, USD 5,692,694 is requested from the SCCF-A for investments in climate resilient infrastructure measures additional to baseline development activities. SCCF funding will be used effectively to demonstrate suitable adaptation measures and provides a catalyst for further investments and replication of project results. These investments enable best practice and innovative technologies to be introduced, adapted and demonstrated in the local Moroccan context through the implementation of investment projects that integrate structural climate resilience measures into port upgrades/ construction. This is expected to result in a programme of adaptation activities that will leverage approximately USD 47,397,000 in co-financing from the EBRD (not including project management costs).

4 Project structure

4.1 Project management

180. The EBRD has experience in designing and implementing programmes, and the necessary staff capacity in the region to follow-up Project implementation. The EBRD opened its permanent Casablanca Resident Office in 2015. The office plays a key role in boosting the Bank's activities and strengthening the EBRD's relationship with the country authorities and the business community.

181. The Moroccan in-country team includes a senior banker who has been closely involved with the preparatory activities and with the development of this Project. The in-country team members have excellent relations with industry and government, and a sound understanding of the potential of this Project.

Project Leaders

182. The Project will be led jointly by the Transport Team and Energy Efficiency and Climate Change (E2C2) department, with support from the EBRD Resident Office in Morocco. The Project Leaders will include Transport Team and E2C2 representatives. Support to Project leadership will be provided by support staff.

183. Responsibilities of the Project Leaders include: the day-to-day management of the operations of the Project; monitoring and benchmarking of the Project process; development of reporting to GEF/SCCF on the Project's progress; to be the first point of contact for external communications regarding the Project; capacity building among Bankers related to climate technologies; and internal coordination related to the Project, including management of the consultants (with support of Project Team).

184. The Project Leaders will liaise with the national team as well as with the GEF/ SCCF Secretariat. The SCCF Project funding will not be used to cover the EBRD's staff costs.

Project Team

185. The Project Team will be based at EBRD Headquarters and in the country. The Project Team will be composed of experts with a track record of supporting and implementing adaptation projects, including experts in policy dialogue, on sustainable financing tools, and technical experts on climate change adaptation technologies

186. Among the responsibilities of the Project Team are the provision of input into the Terms of Reference (TOR) for the work of Consultants, participation in consultant selection, review of the factual content and quality of outputs provided by consultants, assistance to consultants with identifying key stakeholders, participation in key meetings in Morocco, ensuring that the undertaken activities are in line with EBRD procedures in the area of their expertise and responsibilities within the EBRD (e.g. compliance with environmental strategies, policy dialogue strategies, etc.).

187. The Project Team will also engage with, and draw on, other units within the EBRD if the need arises – such as experts from Legal Transition Team, Communication Department and others. The Project Team will meet at the Project kick-off and then liaise regularly, and as and when needed.

Project Support

188. The EBRD's headquarters-based E2C2 Team comprises 34 professionals with backgrounds in banking, finance, climate change adaptation and engineering.

189. Bank-wide there are approximately 100 professionals based throughout the SEMED region. In addition, the EBRD has an extensive network of consultants in those countries.

190. Investment projects will be generated by in-country bankers supported by the E2C2 experts.

191. Investment projects will comply with EBRD internal approval procedures and will be supported by experts from Credit, Environmental Department, Office of the Chief Economist, Legal Department, Banking, etc. as necessary.

192. The following experts may be called upon to support the Project as needed:

- 2 experts from HQ will support policy dialogue activities
- Approximately 5 experts from the engineering unit will support the definition of eligible investments
- Bankers from HQ and in Morocco will take an active role in the business development activities for individual transactions.

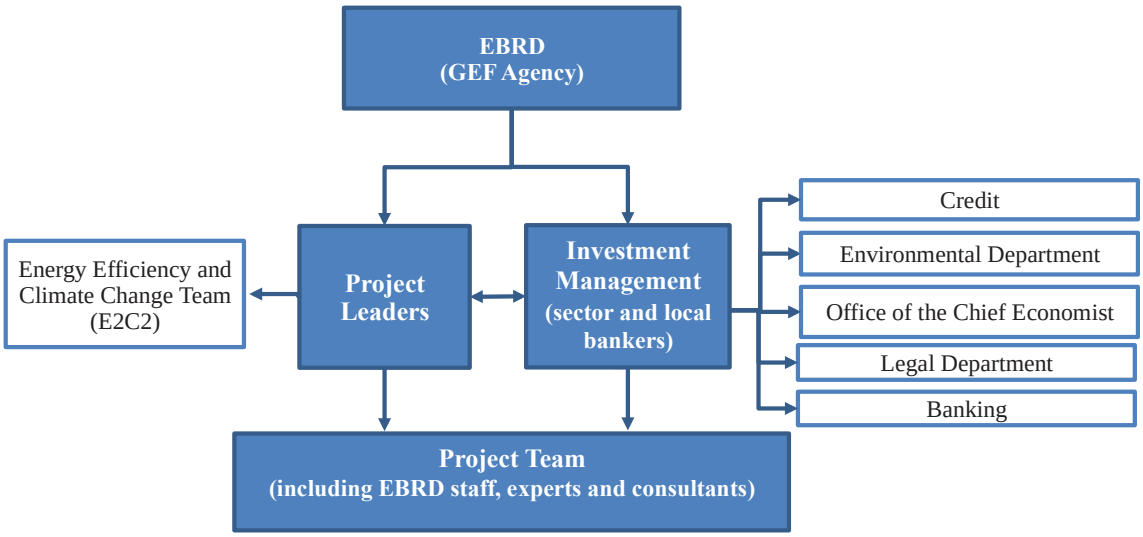

Figure 10. EBRD's internal Project management and implementation arrangements

4.2 EBRD co-financing

193. The EBRD will provide the following **cash (hard loan)** contributions: a total of USD 45,667,000 made available for direct bank financing of climate resilient infrastructure.

194. The EBRD will provide the following **grant** contributions: a total of USD 1,000,000 for technical cooperation from EBRD's Technical Cooperation Donor Trust Funds.

195. The EBRD will provide in-kind contributions that reflect staff costs associated with activities related to investments and Project management. This includes the overall cost of EBRD staff directly working on the development, implementation and promotion of the Project, including:

- The extra work required by the bankers on developing transactions with adaptation focus (identify investment opportunities, engagement with the clients and further development and internal approval of the adaptation aspects of the transactions);
- Costs for staff and operations supporting the Project (legal support, processes, internal approval processes and establishment of internal project structure, preparation of relevant materials); and
- Activities associated with external promotion such as sourcing information for marketing materials, collecting relevant information from projects to be disseminated, and participation in external events to promote the Project.

196. The EBRD will provide a total **in-kind** contribution of USD 2,233,000 composed of:

- A total of USD 1,730,000 in-kind contribution to cover activities for managing and sourcing the loans on financing projects.
- A total of USD 503,000 in-kind contribution associated with Project management.

4.3 Key stakeholders and coordination

197. The EBRD has identified a number of key stakeholders during the initial Project scoping and project preparation activities held in Morocco. As part of Project development, a thorough review of on-going activities in the sector and a stakeholder consultation process was held.

198. Key stakeholders engaged in this process include the following institutions:

a. The Ministry of Equipment, Transport and Logistics
b. The Direction des Ports et du Domaine Public Maritime (DPDPM – Directorate of Ports and Public Maritime Land)
c. The Agence Nationale des Ports (ANP – National Ports Agency)
d. The Direction de la Météo Nationale (DMN – Moroccan National Weather Service)
e. The main port operators (Somaport and Marsa Maroc)
f. The Office National de la Pêche (National Fisheries Office).

199. Effective coordination with relevant national and port sector entities in Morocco and wider stakeholders involved in port activities and management of coastal zones is considered critical for adapting ports to climate change and increasing the adaptive capacity of key stakeholders.

200. Additional stakeholder consultations will be conducted as part of the due diligence (Social and Environmental Impact Assessment) required for each port investment undertaken.

Ports sector

201. Parties involved in the Moroccan ports sector include the following broad categories as noted in Figure 11.

Figure 11. Organisation of the port sector in Morocco

The port authority

202. The ANP is the authoritative and regulatory body of the Moroccan port system established by Law 15-10, under technical supervision of the Ministry of Equipment, Transport and Logistics. The ANP is responsible for 33 ports in Morocco, with the exception of Tanger-Med, and has the following duties:

a. Ensuring port management (except in the case of management concessions)
b. Ensuring the development, maintenance and modernisation of ports in order for them to handle ships and goods in transit in optimum conditions with regard to cost, time and safety
c. Ensuring optimum use of port facilities by improving their competitiveness, simplifying procedures and organisation/operating methods
d. Ensuring competition in port operations

e. Defining the activities to be carried out and the number of authorisations and concessions to be granted in each port
f. Ensuring compliance with port safety, operating and management rules as set out in current laws and regulations
g. Performing any port operation activity that has not been awarded to a concessionaire or permit-holder on conclusion of a bidding process.

203. As one of the executing partners of the SCCF Project, the ANP will work closely with the EBRD in project implementation and coordination of technical assistance and investment activities. During any planned engineering or construction phase any potentially adversely affected members or groups of civil society will be appropriately notified and consulted. This will be done in accordance with ANP's commitment to social development and reflecting its policy to respect neighbourhoods and their facilities.

Public organisations

204. The EBRD has already established close links with Government entities in Morocco and will continue to foster these relationships through this Project and the EBRD's other on-going country activities including policy dialogue and investment financing. In particular, this Project will coordinate with the public organisations outlined below.

The 'Direction des Ports et du Domaine Public Maritime' (DPDPM – Directorate of Ports and Public Maritime Land)

205. The DPDPM's duties are:

a. Define, propose and monitor the implementation of the Government's port policy.
b. Carry out general studies relating to the development of the port sector, such as perform strategic and economic studies, and draw up the national port master plan and monitor its implementation
c. Draw up legal and regulatory texts concerning ports and ensure their application
d. Perform technical studies and development and construction works for ports and port infrastructure
e. Carry out major repairs to port infrastructure
f. Examine any port project undertaken by other organisations, approve it from the technical standpoint and monitor its implementation
g. Participate in the production of internal development plans and port operation regulations
h. Monitor the installation, operation and maintenance of maritime beacons and signalling equipment outside ports, including lighthouses and beacons throughout the public maritime domain
i. Perform studies and hydrographic works and draw up the related documents such as charts of coastal waters
j. Manage and preserve the public maritime domain and monitor the coastline
k. Improve surveillance and security in the public maritime domain
l. Take part in upgrading the legal and regulatory framework relating to the shore.

206. Multiple Government stakeholders are involved in the wider management of ports and the coastal zone will be engaged in the project activities. In particular the project will engage and coordinate with the following agencies where appropriate:

Port operators

207. There are three broad types of operators in Morocco:

a. Operators responsible for the overall management of a port in the framework of a management concession such as the National Fisheries Office (l'Office national des pêches (ONP)) in certain fishing ports and marina concession-holders
b. Concessionary operators of port terminals, who are responsible for managing commercial activities (handling, warehousing, ship repairs, etc.)
c. Operators working in the framework of authorisations such as piloting, tug operation, refuelling, surveillance, etc.

Private sector

208. The activities carried out in ports require a large number of services (mainly private sector). These activities can be classified into the following categories:

a. Pilotage
b. Towage
c. Boatage
d. Storage
e. Warehousing
f. Guarding ships on board and/or in the port
g. Checking goods
h. Surveillance of goods
i. Combining and handling goods at the back of the port
j. Loading and unloading goods
k. Ship handling (foodstuffs, spare parts, oils and grease)
l. Supplying hydrocarbons (bunkering)
m. Degassing and deballasting ships.

209. The Project will coordinate with private sector operators in ports where technical assistance to increase the adaptive capacity and loans for adaptation investments may be provided to modify private sector operations to increase the resilience to climate change.

Research institutions, thematic experts and institutes

210. During Project inception relevant expert stakeholders from academia and private research institutes and other thematic experts will be identified for the purpose of participating in knowledge management and related activities, such as monitoring of climate change impacts and assessments of vulnerability and adaptation. The Project will tentatively seek to partner with Meteorological Service of Morocco and the University Mohamed V, Faculty of Sciences, Department of Earth Sciences and their research programmes on climate change impacts and assessments of vulnerability and adaptation of coastal zones to sea level rise.

211. Engagement with national and international experts will be pursued for knowledge sharing and may provide learning opportunities that will benefit all stakeholders.

NGOs, civil society and local communities

212. The knowledge products produced by the Project will be made accessible to NGOs, civil society and local communities in Morocco, the EBRD region of operation and beyond. Access to materials will be granted on the basis of expression of interest by stakeholders, and there will be opportunity to give feedback on Project activities through communication with stakeholders who share interest through the national stakeholder consultation process and awareness programme.

213. The knowledge products generated by the Project will benefit from, as well as enhance, the expertise of these groups regarding the challenges of adapting ports to climate change and increasing adaptive capacity of stakeholders.

214. In particular, civil society and local communities at the local/ investment site level, will be engaged through the EBRD's standard stakeholder engagement processes to conduct site specific Environmental and Social Impact Assessments. This will likely include conducting an Environmental Impact Assessment (and supporting documents), ESAP and Stakeholder Engagement Plan (SEP).

215. Any indigenous communities in areas of port investment activities will be engaged through the EBRD's standard indigenous community engagement practices. These practices include obtaining Free Prior Informed Consent (FPIC) from such communities whereby Indigenous Peoples are informed about development activities in a timely manner and provided with an opportunity to approve (or reject) a project without any form of manipulation or coercion prior to the commencement of operations. Obtaining FPIC implies a process of good faith engagement

whereby the parties establish a dialogue allowing them to find appropriate solutions in an atmosphere of mutual respect with full and equitable participation.

Public institutions and other non-governmental initiatives on mitigation themes

216. The EBRD will coordinate and network with institutions, bilateral counterparts and international agencies working on climate adaptation (see Section 4.4). The EBRD will ensure full coordination with existing initiatives in the country and region early in Project implementation under Component 1.

4.4 Coordination with related initiatives

217. To avoid duplication and realize opportunities for synergy, during the Project's inception phase the Project will review complementary projects and begin coordination. The EBRD has already recognised synergies, established contact and initiated coordination with a number of programmes and projects regionally and nationally as detailed below.

EBRD initiatives

218. As previously noted, the EBRD is a major investor in port infrastructure across its countries of operations, having made loans to over 30 port projects representing a total project value of over EUR 3.6 billion. The EBRD has recently developed detailed technical guidance for assessing and managing climate change risks to ports and other coastal infrastructure. This guidance is being applied practically in the EBRD port investments under development in Poland. The EBRD will ensure that the Project in Morocco will coordinate closely with these other recent and on-going EBRD projects and initiatives, ensuring that experiences and lessons learned are leveraged and shared.

219. The ANP has a number of projects underway and the country has identified a portfolio of projects planned for the next many years of over USD 800 million. The ANP will facilitate coordination with other relevant projects and initiatives underway and planned in the country. The ANP will be key to the scaling of climate-resilient investments in future, and will act as the focal point for this Project's demonstration aspects both within Morocco and the region.

GEF and SCCF Projects

220. The Project will also coordinate with other SCCF and GEF projects underway in Morocco. While none of these projects overlap with the Project (by combining adaptation planning and technical assistance with infrastructure investments in ports), the EBRD will seek synergies and avoidance of duplication of efforts during the early stages of the Project through established GEF inter-agency channels.

221. The Project will coordinate with the EBRD-GEF 'Green Logistics Program', which is designed to facilitate accelerated investments in green logistics. The Green Logistics Program aims at making investments demonstrating the technologies and practices of green logistics. Eligible investments include those in the subsectors of logistic terminals/centres, intelligent transportation systems, road fleet modernization, port development, short sea shipping, inland river transport, and rail rolling stock. The concessional financing from GEF will be blended with market based financing mechanisms, with financial terms and conditions that will have a common structure for all investments. In parallel to the investments, the Program will foster sustainability in the logistics sector within the region through building capacity of local stakeholders to consider global and local environmental benefits of developments in the sector. Technical assistance will support companies in the process of including green logistics in their day-to-day operations as well as in the identification of new investments to be made.

222. In addition, the EBRD will coordinate with two GEF-funded ICZM projects.

a. An IBRD-GEF International Waters project 'MED: Integrated Coastal Zone Management-Mediterranean Coast' supports ICZM in selected areas of Morocco's Mediterranean coast (Lake Nador and Moulouya).
b. Additionally, a World Bank-GEF project 'Morocco ICZM Project' aims to pilot the

application of the ICZM approach in the eastern Mediterranean coast of Morocco.

223. Where applicable, the EBRD Project team will work with those project teams to explore where synergies may exist in the delivery of technical assistance and investment activities. For example, integrating ICZM knowledge into the technical assistance provided to Port authorities and operators as well as including ICZM considerations in port infrastructure investment design.

224. The Project will seek to coordinate and leverage knowledge management activities, where possible, with the two SCCF-funded adaptation projects in Morocco:

a. The IFAD-SCCF project 'Increase productivity and adaptive capacities in mountain areas of Morocco (IPAC-MAM)'
b. The World Bank 'Integrating climate change in development planning and disaster prevention to increase resilience of agricultural and water sectors', which focuses on strengthening the capacity of public and private institutions and of farmers for integrating climate change adaptations in projects directed to small farmers.

225. The EBRD Project will also coordinate with other relevant GEF projects in Morocco to avoid duplication of efforts:

a. The UNDP-GEF project 'Mainstreaming climate change in the National Logistics Strategy and Roll-Out of Integrated Logistics Platforms' which focuses on mitigation of emissions from land transport, but will include activities in the planned 'logistics platforms' (multi-modal freight centres), some of which are associated with ports.
b. The UNDP-GEF project, 'Mainstreaming Global Environment Aspects in the planning and monitoring processes of the National Human Development Initiative (NHDI) in Morocco' which illustrates the importance of environmental aspects in the fight against poverty, which is one of the Moroccan Government's priorities.

Annex 1. Project results framework

SCCF Strategic Objectives and Outcomes (relevant to this project):
Objective 1: Reduce the vulnerability of people, livelihoods, physical assets and natural systems to the adverse effects of climate change
SCCF Outcome 1.1: Vulnerability of physical assets and natural systems reduced
Objective 2: Strengthen institutional and technical capacities for effective climate change adaptation
SCCF Outcome 2.1: Increased awareness of climate change impacts, vulnerability and adaptation
SCCF Outcome 2.3: Institutional and technical capacities and human skills strengthened to identify, prioritize, implement, monitor and evaluate adaptation strategies and measures
Objective 3: Integrate climate change adaptation into relevant policies, plans and associated processes
SCCF Outcome 3.2: Policies, plans and associated processes developed and strengthened to identify, prioritize and integrate adaptation strategies and measures

Project Strategy	**Objectively Verifiable Indicators**	**Baseline (Start of Project in 2016)**	**Target (End of project)**	**Sources of Verification**	**Risks and Assumptions**
Impact					
Project Objective: To support the climate resiliency of Morocco's ports in both the immediate and longer-term through capacity development to introduce best international practice in the Moroccan ports sector's strategy, operations, management and monitoring; and investment in climate-resilient upgrades and/or new port facilities	SCCF Indicator 10: Capacities of regional, national and sub-national institutions to identify, prioritize, implement, monitor and evaluate adaptation strategies and measures SCCF Indicator 2: Type and extent of assets strengthened and/or better managed to withstand the effects of climate change	No capacity for institutions to identify, prioritize, implement, monitor and evaluate adaptation strategies and measures (Score=0) No adaptation measures in place or managed to withstand the effects of climate change	Capacity for institutions to identify, prioritize, implement, monitor and evaluate adaptation strategies and measures increased (Score=7) Number of adaptation infrastructure measures (as listed in Annex 3 of the EBRD's Project Document) in place = 3	Technical guidance, methodologies and tools and their associated documentation. Training attendance. Building construction plans and design documentation. Construction verification documentation.	

Project Strategy	Objectively Verifiable Indicators	Baseline (Start of Project in 2016)	Target (End of project)	Sources of Verification	Risks and Assumptions
Outcomes					
Component 1: Capacity development for reducing vulnerability to climate change					
SCCF Outcome 2.1: Increased awareness of climate change impacts, vulnerability and adaptation	SCCF Indicator 5: Key stakeholder awareness activities carried out and population reached	No awareness of climate change impacts, vulnerability and adaptation among key stakeholders	75[30] key stakeholders (% female = 30[31]) sensitised of climate change impacts, vulnerability and adaptation 50% increase in awareness of the importance of adaptation to climate change for Moroccan ports among sampled population (representing general public). Number of public targeted to be determined once ports have been chosen.	Survey of key stakeholders before and after awareness raising activities Awareness campaign documents and brochures Project website Training documents and attendance records	ASSUMPTIONS: Exposure to awareness raising results in willingness of key stakeholders to participate in training
SCCF Outcome 2.3: Institutional and technical capacities and human skills strengthened to identify, prioritize, implement, monitor and evaluate adaptation strategies and measures	SCCF Indicator 9: Number of people trained to identify, prioritize, implement, monitor and evaluate adaptation strategies and measures SCCF Indicator 10: Capacities of regional,	No key stakeholders trained No institutions with capacity to identify, prioritize, implement, monitor and evaluate adaptation strategies and measures (Score = 0)[32]	50[33] key stakeholders (% female = 30[34]) trained for climate change impacts, vulnerability and adaptation 3 institutions (including the Working Group) with capacity to identify, prioritize, implement, monitor and evaluate	Project reports including: Project financial reporting Project monitoring reports (annual and semi-annual)	ASSUMPTIONS: Institutions have the will and ability to engage in long-term planning to mitigate potential risks to ports RISKS: There is insufficient engagement and

[30] 75 Key stakeholders (employees of the organisations listed in Section 4.3 Key stakeholder and coordination) will be targeted by the awareness raising campaign. This number includes 50 participants in training activities.

[31] % of women in relevant positions will be assessed at project start. Current assumptions are based findings of on research of women's participation in decision making positions by ministerial department in Morocco, see Anne 5 in UNDP 2011 Gender Equality and Women's Empowerment in Public Administration, Morocco. Accessed 01/03/15. See: http://www.undp.org/content/dam/morocco/docs/GOVERNANCE/GEPA%20Morocco%20Case%20study.pdf

[32] Score is based on relevant SCCF scoring of aggregated criteria from SCCF Tracking tool for CAA Projects. See guidance tab and related indicator: https://www.thegef.org/gef/sites/thegef.org/files/documents/document/Copy%20of%20Tracking%20Tool%20for%20CCA%20Projects%20FINAL%202014-12-16%20%282%29.xlsx

Project Strategy	Objectively Verifiable Indicators	Baseline (Start of Project in 2016)	Target (End of project)	Sources of Verification	Risks and Assumptions
	national and sub-national institutions to identify, prioritize, implement, monitor and evaluate adaptation strategies and measures		adaptation strategies and measures (Score = 7)[35]		coordination between members of the WG that may prevent successful delivery of project activities to identify, prioritize, implement, monitor and evaluate adaptation strategies and measures
SCCF Outcome 3.2: Policies, plans and associated processes developed and strengthened to identify, prioritize and integrate adaptation strategies and measures	SCCF Indicator 12: Regional, national and sector-wide policies, plans and processes developed and strengthened to identify, prioritize and integrate adaptation strategies and measures	No plans or processes concerning adaptation strategies and measures in place (Score = 0[36])	Strategic guidance for a framework to increase ports resilience to climate change available (Score = 8[37])	Strategic guidance documentation for the formulation of a high level strategy for adaptation to climate change in ports	Strategic guidance is implemented by the Working Group
Component 2: Building structural climate resiliency features in port facility infrastructure					
SCCF Outcome 1.1: Vulnerability of physical assets and natural systems reduced	SCCF Indicator 2: Type and extent of assets strengthened and/or better managed to withstand the effects of climate change	No adaption measures in place (Score = 0)	Number of adaptation infrastructure measures (as listed in EBRD's Project Document Annex 3) in place = 3	Building construction plans and design documentation. Construction verification documentation.	ASSUMPTION: Investments in adaptation measures are appropriately selected to avoid mal-adaptation

[33] 50 key stakeholders will be targeted: 20 from the Working Group, 20 from port authorities and operators of individual pilot ports and 10 from key stakeholders involved in monitoring and emergency response
[34] See footnote 34.
[35] See footnote 35.
[36] ibid
[37] ibid

Component / Outputs	Objectively Verifiable Indicators	Baseline (Start of Project in 2016)	Target (End of Project)	Sources of Verification	Assumptions
Component 1: Capacity development for reducing vulnerability to climate change					
Output 1.1 Development of strategic framework	Strategic guidance documentation for the Working Group to develop the framework outlining risks and consequences of climate change and course of action Existence of institutional structure coordinating climate change adaptation of the ports sector	No support for high level strategy for adaptation to climate change in ports No institutional structure coordinating climate change adaptation of the ports sector exists.	Strategic guidance documentation developed National Working Group established	Project monitoring reports (semi annual and annual) Strategic framework documents	
Output 1.2 Development of technical guidance	Technical guidance, methodologies and tools for: 1) Monitoring and emergency response 2) Identification, prioritisation, and selection of appropriate mitigation measures 3) Implementation, monitoring and evaluation of adaptation strategies and measures	No technical guidance, methodologies and tools for identification, prioritisation, implementation, monitoring and evaluation of adaptation strategies and measures	Technical guidance, methodologies and tools exist for: 1) Monitoring and emergency response 2) Identification, prioritisation, and selection of appropriate mitigation measures 3) Implementation, monitoring and evaluation of adaptation strategies and measures	Project monitoring reports (semi annual and annual) Guidance and training material	ASSUMPTION: Technical guidance, methodologies and tools provides sufficient capacity to identify, prioritize and integrate adaptation strategies and measures
Output 1.3 Capacity building, skills transfer and twinning	SCCF Indicator 9: Number of people trained to identify, prioritize, implement, monitor and evaluate adaptation strategies and measures Moroccan ports twinned with international ports exhibiting best practice examples	No training for identification, prioritisation, implementation, monitoring and evaluation of adaptation strategies and measures No twinning of ports in Morocco with international ports exists	Training delivered for: 1) Monitoring and emergency response delivered to 10 key stakeholders (30% women) 2) Identification, prioritisation and selection of adaptation measures delivered to 20 key	Project monitoring reports (semi annual and annual) Training attendance records	ASSUMPTION: Technical guidance, methodologies, tools and associated training provides sufficient capacity to identify, prioritize and integrate adaptation strategies and measure

Component / Outputs	Objectively Verifiable Indicators	Baseline (Start of Project in 2016)	Target (End of Project)	Sources of Verification	Assumptions
			stakeholders (30% women) 3) Implementation, operation, maintenance monitoring and evaluation of adaptation measures delivered to 20 key stakeholders (30% women) 1 Moroccan port has been twinned with international ports exhibiting best practice examples		
Output 1.4 Awareness and knowledge management	SCCF Indicator 5: Public awareness activities carried out and population reached	No awareness of climate change impacts, vulnerability and adaptation among key stakeholders	75[38] key stakeholders (% female = 30[39]) sensitised of climate change impacts, vulnerability and adaptation	Survey key stakeholders before and after awareness raising and training activities Project monitoring reports (semi annual and annual)	
Component 2: Building structural climate resiliency features in port facility infrastructure chains					
Output 2.1 Climate resilient infrastructure upgrades and/or construction of new climate resilient port facilities investment	Indicator 2: Type and extent of assets strengthened and/or better managed to withstand the effects of climate change Amount in USD invested in climate resilient measures	No adaption measures in place	Number of adaptation infrastructure measures (as listed in Annex 3) in place = 3 USD 5,692,694 invested in climate resilient infrastructure measures	Project reports including: Project financial reporting Project monitoring reports (annual and semi-annual) Building construction	ASSUMPTIONS: Macro economic conditions are such that investments are attractive Adaptation investment decisions are made in a transparent way with sufficient use of risk-based adaptation

[38] This amount includes 50 those targeted for training activities.

[39] % of women in relevant positions will be assessed at project start. Current assumptions are based findings of on research of women's participation in decision making positions by ministerial department in Morocco, see Anne 5 in UNDP 2011 Gender Equality and Women's Empowerment in Public Administration, Morocco. Accessed 01/03/15. See: http://www.undp.org/content/dam/morocco/docs/GOVERNANCE/GEPA%20Morocco%20Case%20study.pdf

Component / Outputs	Objectively Verifiable Indicators	Baseline (Start of Project in 2016)	Target (End of Project)	Sources of Verification	Assumptions
				plans and design documentation. Construction verification documentation.	planning, preventing mal-adaptation

Annex 2. Policies and legislative framework for protection of the coastal environment and for the adaptation of coastal zones to climate change

Moroccan legislation illustrates the importance of sustainable management of the coastal zone. Key legal instruments are described below.

Integrated Coastal Zone Management (ICZM) Protocol

Morocco has ratified the Integrated Coastal Zone Management Protocol, thus ratifying the full set of legal instruments adopted in the framework of the Mediterranean Action Plan, which is based on the Barcelona Convention and its Protocols. ICZM Protocol sets out that coastal zones of the Mediterranean Sea are the common natural and cultural heritage of the peoples of the Mediterranean and requires signatories to act in cooperation for the development of appropriate and integrated plans for coastal zone management pursuant to Article 4, paragraph 1(e), of the United Nations Framework Convention on Climate Change (UNFCCC). The ICZM Protocol draws on existing experience with integrated coastal zone management and the work of various organizations, including the European institutions. The Protocol also requires signatories to undertake vulnerability and hazard assessments of coastal zones and take prevention, mitigation and adaptation measures to address the effects of natural disasters, in particular of climate change. The Protocol also requires signatories to prevent and mitigate the negative impact of coastal erosion more effectively, undertake to adopt the necessary measures to maintain or restore the natural capacity of the coast to adapt to changes, including those caused by the rise in sea levels. Signatories must also consider the negative effects on coastal erosion and direct and indirect costs that may result from new activities and works located in coastal zones including marine structures and coastal defence works.

The law on coastal protection and development

In June 2015 Morocco adopted the *Law No. 81-12* for coastal protection zones. The law presents a tool of chief importance for the preservation and sustainable management of Morocco's 3,500-kilometer long coastal zone. The Ministry of the Environment reported that the coast's degradation had until now been exacerbated by insufficient, inefficient, obsolete and sectorally fragmented laws, unadapted to the present context. The new law balances the need to protect and promote the natural assets of the coastal zone, with the requirements of the country's economic, social and cultural development, which are considered no less important. The law establishes that scientific data be the basis for the integrated management of the coastal environment, taking the impact of climate change on the coastal zone into consideration. The Law establishes a setback zone of 100 meters for construction near the sea (2012). This is aligned with Article 8-2 of the Mediterranean ICZM Protocol. This may be extended when justified by the sensitivity of the environment or by coastal erosion. Exceptional authorisation may, however, be granted to "building projects of guaranteed economic interest". The law aims to:

- Preserve the coast's biological and ecological balance, natural and cultural heritage – including archaeological and historic sites and natural landscapes – while combatting coastal erosion
- Prevent and reduce pollution and the coast's degradation, while rehabilitating polluted and damaged areas
- Improve planning, by means of a national plan for the coast and compatible regional spatial planning documents
- Guaranty free and unpaid access to the seashore
- Enable the involvement of organizations, the private sector, and affected local and regional authorities in decisions pertaining to coastal zone management
- Advance research and innovation promoting the coast and its resources.

Importantly, the law establishes a national commission and various regional commissions for coastal management, bringing together and mobilizing stakeholders, and provides a legal definition of the coastal zone, incorporating marine and land components. The coastal zone also includes a 100-meter wide strip free of construction, and a two-kilometre wide zone free of transportation infrastructure. All solid wastes that contribute to the pollution of the seashore are forbidden by the law, and liquid wastes will be subject to permits within explicit limits and the payment of fines in case the limits are exceeded.

The National Plan Against Global Warming (PRNC)[40]

The PRNC outlines the Government's sectoral plans for mitigating and adapting to climate change, and includes detailed action plans for renewable energy, energy efficiency and sustainable transport. Morocco has developed the PRNC, which was presented at the COP 15 held in Copenhagen, in 2009. The Plan provides a strategy for the evaluation of the vulnerability and adaptation to climate change impacts and the implementation of adaptation measures that rely mainly on the water strategy and Green Morocco Plan for Agriculture, also launched in 2009.

Other relevant laws for coastal protection

Laws relevant for coastal protection include:

- Law on the Protection and Valorisation of the Environment (no. 11-03)
- Law on the Planning, Protection, Valorisation and Conservation of the Littoral (no. 31-06)
- Draft charter on Protection of the Environment and Sustainable Development.

Morocco has recently strengthened its legal arsenal of laws by serving directly and indirectly in the management of coastal areas including:

- The municipal charter and its provisions on ICZM
- Laws Code forming marine fisheries and conservation of marine ecosystems
- Legislation on national parks and protected areas
- Law 12-03 on impact studies
- Law 10-95 on water
- Law 28-00 on waste management and disposal.

Regarding planning and construction in the maritime context, Morocco established an EEZ of 200 nm (Law no. 1.81.179), however the EEZ is not enforced in the Mediterranean Sea basin. Environmental legislation has been revised and updated (legislation has been adopted by Ministries Council, but not yet by the Parliament). Morocco has environmental legislation in place, such as the Law on the Protection and Volarisation of the Environment (no. 11-03) that provides for the established of coastal and marine protected areas, but ICZM or MSP legislation is missing.

Regarding new construction or rehabilitation of port infrastructure, Moroccan laws on expropriation apply. The entire State land and land tenure system is governed by Law No. 07-81 on expropriation for public purpose and temporary occupancy, promulgated by Dahir No. 1-81-254 of 6 May 1982. The law comprises four parts: (1) expropriation for public purpose; (2) temporary occupancy; (3) compensation for loss of value added; and (4) transitional and implementing provisions. The Moroccan land tenure system is characterized by a multiplicity of legal status established throughout the country's history and land acquisition mechanisms differ depending on the status of land.

[40] For more information see:
http://www.onhym.com/pdf/Publications/Plan%20of%20Morocco%20Against%20Global%20Warm.pdf

Annex 3. Relevant procedures for selecting soft (management and operational) and infrastructure adaptation options

The EBRD will ensure that relevant procedures are established to identify, screen and select both soft (management and operational) and infrastructure adaptation measures. Criteria for prioritizing adaptation options will be based on the EBRD guidance document '*Development of guidance for optimising resilience to climate change in investments in sea ports and other coastal infrastructure*'. From this guidance document, Figure 12 presents a flowchart for considering both soft and infrastructure adaptation measures based on site characteristics and Figure 13 presents a flowchart for consideration of infrastructure adaptation measures.

The steps of conducting a Multi Criteria Analysis (MCA) process that may be used to identify, screen and prioritise soft (management and operational) and infrastructure adaptation options are:

Step 1: Identify the decision-making body and context

Step 2: Identify adaptation options to prioritize

Step 3: Identify criteria

Step 4: Identify outcome and performance of options and rank against identified criteria in a qualitative and quantitative performance matrix

Step 5: Assign weights to each criteria to reflect its relative importance and aggregate

Step 6: Examine results

Step 7: Conduct a sensitivity analysis with different weights and new criteria if needed

For Step 3, criteria for prioritizing adaptation options will be based on the EBRD guidance document '*Development of guidance for optimising resilience to climate change in investments in sea ports and other coastal infrastructure'* and its process for adaptation measures prioritisation for rehabilitation initiatives and financial and non-financial assessment criteria. Preliminary criteria may include the following:

- Social:
  - Community support
  - Effect on segment of population including zero or positive gender impact
- Technical:
  - Feasibility
  - Level of climate risk
  - Long-term solution – consider the lifetime of the
  - Secondary impacts – could the measure possibly result in reducing adaptive capacity of other parts of the port or cause mal-adaptation
- Administrative:
  - Staffing
  - Funding allocated
  - Maintenance and operations
- Political:
  - Political support
  - Local champion
  - Public support
- Legal:
  - State authority
  - Potential legal challenge
- Alignment with plans and regulations:
  - Complementary with national plans
  - Synergy with national plans and Multilateral agreements
- Economic:
  - Benefit of action
  - Cost of action

  - Cost effectiveness
  - Contribution to economic goals
  - Outside funding required
- Environmental:
  - Effect on land/water
  - On endangered species
  - On hazardous materials and items/waste sizes
  - Consistent with community environmental goals

Other important criteria for selecting appropriate investments may include the following:

- Suitability of the port for pilot projects including the following considerations:
  - Demonstration value: Ports will be selected for their demonstration value, human capacity and political will rather than their overall vulnerability
  - The willingness and commitment of the individual port authority or operator to participate in all aspects of the project throughout the project period
- Investment risk: Creditworthiness of borrower and security of investments – assessed through the EBRD's internal risk assessment criteria

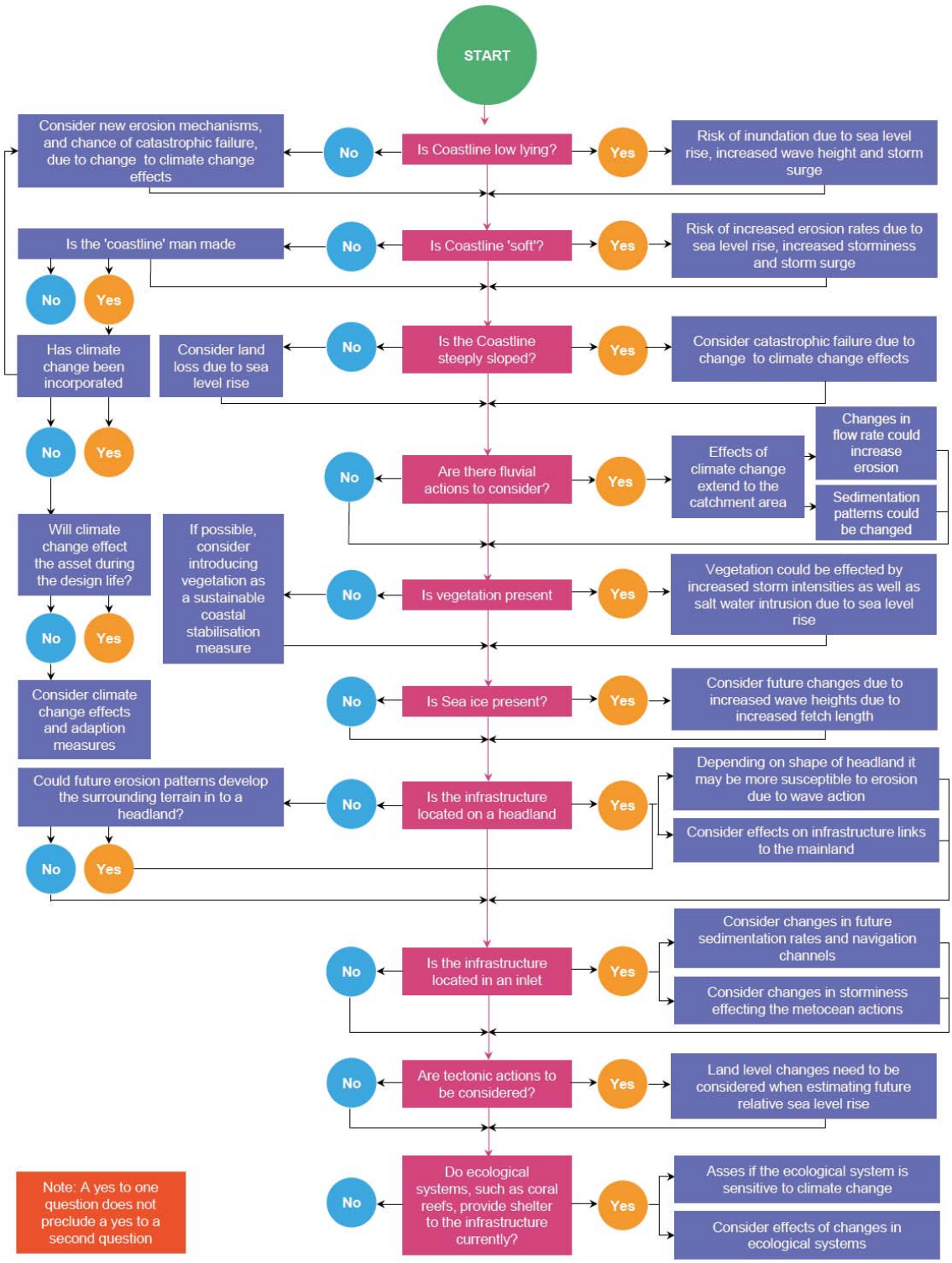

Figure 12. Site characteristics flow chart for selection and prioritization of soft and infrastructure adaptation measures

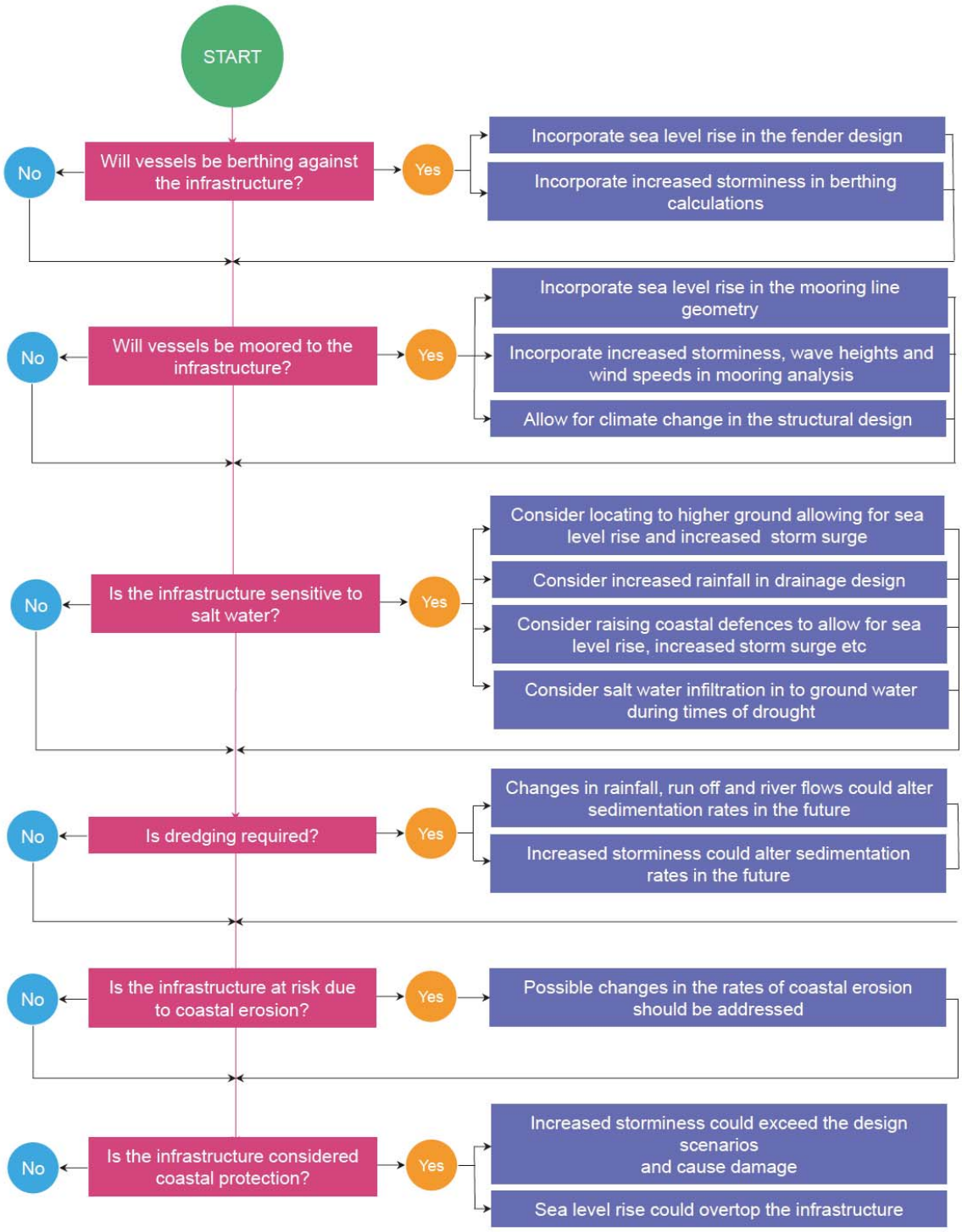

Figure 13. Infrastructure selection flow chart

Table 9. Climate change impacts and adaptation measures on infrastructure

Type of infrastructure	Climate change impact	Impact on infrastructure	Adaptation measure
Concrete structure	Sea level rise	Changes in the intertidal, splash zones etc.	-Assessment and monitoring -Installation of protection
Steel structure	Sea level rise	Changes in the intertidal, splash zones etc.	-Increased monitoring -Increased repair regime -Construction of replacement infrastructure -Cathodic protection
Mooring and berthing jetties	Sea level rise	Alters the geometric interaction between the moored vessel and the mooring point	-Introduce upper operational water level limits -Raise the mooring equipment
		Possibility inundate the working platform/area	-Raise working platform -Raise equipment sensitive to salt water
		Previously assumed 'dry' structures being effected by wave forces	-Strengthen structural sections if required -Construction of replacement infrastructure
		Introduction or increase in uplift forces	-Strengthen structural sections if required -Construction of replacement infrastructure
		Changes in the geometric interaction may affect the fender interaction with the vessel	-Introduce upper operational water level limits -Raise the fenders -Replace the fenders
	Increased wave height	Increase in wave forces	-Strengthen structural sections if required -Construction of replacement infrastructure -Construction of breakwater to provide sheltered environment
		Previously assumed 'dry' areas being effected by wave forces	-Strengthen structural sections if required -Construction of replacement infrastructure -Construction of breakwater to provide sheltered environment -Increased monitoring -Increased repair regime -Cathodic protection

Type of infrastructure	Climate change impact	Impact on infrastructure	Adaptation measure
		Introduction or increase in uplift forces	-Strengthen structural sections if required -Construction of replacement infrastructure -Construction of breakwater to provide sheltered environment -Increased monitoring -Increased repair regime
		Increase in mooring forces and vessel movement	-Construction of breakwater to provide sheltered environment -Strengthen structural sections if required -Replace the mooring equipment with higher rated equipment -Replace the fenders -Construction of replacement infrastructure
Breakwaters	Sea level rise	Increased overtopping	-Raise the crest level of the breakwater -Construct a crown wall -Construction of replacement infrastructure
		Will alter the force profile on the breakwater	-Increased monitoring -Increased repair regime -Construction of replacement infrastructure
	Increased wave height	An increase in the wave forces experienced by the structure	-Increased monitoring -Increased repair regime -Construction of replacement infrastructure
		Possible increase in 'damaging' events	-Increased monitoring -Increased repair regime -Construction of replacement infrastructure
Navigation channels	Sea level rise	A reduction in the required dredging depth/quantities to maintain the required dredge depth	-An alternative source of material may need to be found if required
	Increased wave height	Changes in sedimentation patterns may lead to changes in dredging quantities/requirements	-Increased dredging quantities -Construct silt traps -Construct alternative navigation channel
Transport infrastructure road, rail, etc.	Sea level rise	Low lying transport infrastructure may be at risk of inundation due to rising sea levels	-Increase capacity of drainage system -Raise level of the infrastructure -Install dykes or sea walls

Type of infrastructure	Climate change impact	Impact on infrastructure	Adaptation measure
	Increased wave height	Low lying transport infrastructure may be at risk of increased overtopping due to increased wave heights	-Increase capacity of drainage system -Raise level of the infrastructure -Install dykes or sea walls
Floating infrastructure	Sea level rise	The water level/tidal range that the floating infrastructure is designed for may be exceeded due to sea level rise	-Introduce operation limits -Adapt infrastructure to allow for increased water level -Construction of replacement infrastructure
	Increased wave height	The increased wave height could lead to the floating infrastructure place too much stress on the mooring system of the floating infrastructure	-Strengthen structural sections if required -Construction of replacement infrastructure
		The increased wave height could lead to the allowable motions of the floating infrastructure being exceeded	-Introduce operation limits -Construction of breakwater to provide sheltered environment
Electrical infrastructure	Sea level rise	Electrical infrastructure could be at risk of water damage due to inundation due to sea level rise	-Move or raise electrical infrastructure -Waterproof electrical infrastructure
		Sea level rise can lead to an increase in the height of the water table leading to buried ducts and chambers flooding	-Move or raise electrical infrastructure -Waterproof electrical infrastructure
	Increased wave height	Electrical infrastructure could be at risk of water damage due to overtopping	-Move or raise electrical infrastructure -Waterproof electrical infrastructure -Construct a wave wall
Handling/ loading equipment	Sea level rise	Alters the geometric interaction between the handling/loading equipment and the vessel	-Raise the handling equipment -Install new equipment

Annex 4. Detailed climate change impact analysis

A detailed analysis on the impacts of climate change phenomena and their potential impact on the ports of Morocco was undertaken during project preparation. This annex summarises the analysis that has been undertaken.

Analysis revealed that the climate appears to be undergoing a significant change in view of the climate trends observed between 1960 and 2005, for example increase in air temperature, drop in rainfall, intensification of extreme events such as droughts and flooding, confirms the results of the 5th IPCC report published in 2013 (IPCC, 2013). Climate simulations of the coming decades confirm that these climate trends will continue in IPCC's "best case climate scenario" (RCP 2.6) before stabilising around 2100, and worsen in the other "intermediate scenarios" (RCP 4.5 and RCP 6.0). Maximum deterioration in climate trends occurs in the "worst-case" scenario, RCP 8.5 (MEMEE, 2015).

Climate change has likely direct and indirect impacts on ports and the associated infrastructure, and will modify the hazards related to:

- Sea level
- Waves
- Winds
- Storm regime
- Coastal erosion
- Air temperature
- Seawater temperature
- Seawater acidification
- Regime of precipitation.

Sea level

Sea level rise will have the most impact on Morocco's ports. Using the IPCC's "best case climate scenario" the rise in mean sea level (on average along Morocco's coast) in 2050 will be +0.25m and in 2100 + 0.60m compared to 2015.

The sea level is influenced by multiple physical phenomena and can be broken down as follows: mean sea level; astronomical tide; meteorological surges; coastal seiches; harbour seiches; action of waves; exceptional phenomena. These various components are generated by distinct physical mechanisms. Their degree of dependency on one another is extremely variable, ranging from complete independence to a strong correlation.

Mean sea level: With regard to the possibilities of a future rise in sea level along the coast of Morocco, and as there is no appropriate regional model available, we must consider the general trends given by the IPCC. Owing to the rise in sea level predicted throughout the 21st century and beyond, coastal systems and low-lying areas should experience undesirable effects such as submersion, coastal flooding and erosion.

Astronomical tides: The main tidal wave along the Atlantic shore of Morocco is the mean lunar wave M2. The Atlantic shore of Morocco is in a zone of moderately large amplitude of wave M2. The tide is thus semi-diurnal (two high tides and two low tides each day). In the Mediterranean, tides are also semi-diurnal but the range is very small. For example, the range of mean spring tides is of the order of 0.40 m at Nador.

Meteorological surges: There is little documentation on meteorological set-ups / set-downs in Morocco. Whilst there is an extensive tide gauge network along the Atlantic and Mediterranean coasts, this network is relatively new and data sufficient data for extensive analysis is not yet available. The case of the storm of 6 and 7 January 2014 is very enlightening in this respect. This storm caused major damage along the Atlantic coast. However, the height of the offshore waves does not appear to have been exceptional (with a return period probably of the order of 5 years). It is therefore possible that coastal damage was caused by high sea level with a strong meteorological surge component. However, the available studies and reports (METL, 2014, Aouiche et al., 2014) do not mention this and simply provide the predicted astronomical tide levels (which are certainly high,

as they correspond roughly to the mean high water springs (MHWS)). Being aware of this phenomenon and characterising it along the coast of Morocco appear to be major challenge in determining the climatic context over the coming years.

Coastal seiches: The Moroccan shore is not favourable to the formation of coastal seiches. In particular, there is no continental shelf along the Mediterranean shore, while it is quite narrow along the Atlantic shore, which has a relatively straight coastline. The phenomenon of coastal seiches is therefore limited.

Harbour seiches: Harbour seiches have been observed regularly along the north Atlantic shore, in particular from Tangiers to Safi. This phenomenon has not yet been attested beyond Agadir. It will be necessary to take measurements using harbour tide gauges in order to characterise this phenomenon precisely, provided that the sampling time step is suitable.

Set-up due to wave action: The Moroccan shore is highly exposed to set-up and run-up. In particular, the Atlantic coast is subject to Atlantic waves, which can have considerable heights and periods. During storms, there is intense wave breaking. This phenomenon probably played an important role during the storm of 6 and 7 January 2014. However, there is a lack of measurements and detailed information. Nevertheless, it is possible to model set-up values at a given site depending on incident wave conditions.

Exceptional phenomena: The most famous example of a tsunami occurring in Morocco is that associated with the earthquake of 1 November 1755 (known as the Lisbon earthquake). Mr Najib Cherfaoui has written a report on this subject. He describes the damage caused by this tsunami between Tangiers and Agadir: retreat and sudden rise in the sea level, penetration inland, destruction of the kasbah in Mohammedia, loss of one arm of the wadi Loukkos at Larache, shifting of the Bouregreg estuary.

In 1960, an earthquake off Agadir produced waves more than six metres high, which fortunately caused little damage. On several occasions (1775, 1848, 1889), tsunamis have breached the sand spit forming the Mar Chica lagoon on the Mediterranean coast.

Impacts of predicted sea level rise: It is estimated that the rise in sea level will directly impact quays and their equipment (in particular the fenders and electrical equipment that is liable to suffer the effects of salt water overtopping on the landward side). Indirect impact of the rise in sea level in the form of increased wave energy (overtopping or breaking waves):

- On the crest and rear slope of protective breakwaters, owing to greater overtopping caused by higher sea levels
- On the outer (seaward) side of the breakwaters situated in the surf zone, as the height of breaking waves is directly related to the depth of water at the foot of the structures.

Precipitation and extreme floods

The IPCC findings conclude that rainfall will increase in Morocco, this is supported by quantitative rainfall and extreme flood observations in Morocco. However, it is not possible at present to quantify reliable rainfall and extreme flood values that take into account the impacts of climate change.

Precipitation in Morocco has declined by between 3 and 30% over the past few decades, with a drop of 26% in the North-West region, which is considered to be the wettest in the country.

An analysis of the precipitation index for the Atlantic and Mediterranean regions over the water year (September - August) from 1900-1901 to 2006-2007 reveals less than average precipitation has prevailed in the Mediterranean region since the end of the 1970s.

In the Atlantic region, precipitation was low from the end of the 1970s to the beginning of the 1990s, but with a few wet years towards the end of the 1990s

This situation could be explained by the impact of global warming that has led to an eastward shift in the Azores High, which blocks rainfall episodes over the Atlantic area (MEMEE, 2015).

It should be noted that in this context of a general decrease in precipitation, Morocco has experienced increasingly intense and frequent flooding over the past 20 years. These have been flash floods or

massive floods affecting different parts of the kingdom, including the Atlantic and Mediterranean coastal zones, causing very severe loss of life and economic damage.

A few examples include: Casablanca – Mohammedia in 1996, Tétouan/Northern Morocco in 2000, Mohammedia in 2002, Errachidia in 2006, Northern Morocco, Al Gharb, Al Haouz and Le Sous in 2009 and 2010, Casablanca/region in 2010 (SEEE, 2010).

This flooding is linked with a change in the rainfall regime, with rainfall episodes becoming intense, repeated and concentrated over short periods. This concurs with the situation described in the latest IPCC report for the region.

All the models used for the climate simulations in Morocco predict a decrease in total annual precipitation of between 10% and 40% by the end of the 21st century (MEMEE, 2015). The fifth IPCC report (2013) confirms these trends. It also predicts a modification in the precipitation regime with extreme episodes that are likely to become more intense and frequent over medium latitudes, including Morocco. The report also states that the impacts of such flooding should become more serious in these regions owing to their increased exposure and vulnerability.

The predicted impact of precipitation and extreme floods on ports includes the following:

- Impact on port reclamation drainage networks;
- Increase in sediment transport in the wadis: it may cause a possible associated increase in sediment transport towards some ports.

The Moroccan shore is experiencing erosion under the effect of natural factors or human pressure. This affects the coastal dunes and farmland along the coastal strip. It is aggravated by the steep gradients and nature of the soil.

The coastal dunes, which are essential components of the dynamic equilibrium of the shoreline, are under serious attack, making the environment highly vulnerable. They are subject to longshore currents, to the rise in sea level and to wind erosion, in particular in areas with little plant cover. The extent of these effects (which was hardly perceptible until recent years) has become more visible with the strong waves that have struck the Moroccan shore in recent years.

Two thirds of the beaches in Morocco are being eroded. Practically the entire Mediterranean coast is affected by this phenomenon: out of 47 beaches identified along the Mediterranean coast, 7 have already disappeared and 16 are in an advanced state of deterioration.

The areas most affected are the western end (Tétouan, Mdiq, Restinga-Smir) and eastern end (Nador, Saidia) as well as the central-northern area (Al Hoceima, Cala Iris), and eastern part of Tangiers bay.

Fissures and rockfalls can be seen on the cliffs, particularly those along certain parts of the Atlantic coast, leading to a serious retreat in the coastline and demonstrating the extent of marine action. The coastal cliffs at Rabat and Salé, and those between Jorf Lasfar and Oualidia, are the ones that most clearly illustrate this phenomenon (Laouina, 2010).

Air and sea temperatures

Air temperature: It is predicted that air temperature along the coast will increase by +1.5°C in 2050 and +3°C on average in 2100 compared with 2015, which is consistent with the scenarios involving the stabilization of CO2 emissions (RCP4.5 and RCP6.0).

Analysis of the annual average temperatures observed over the 1961-2008 period shows that they have risen throughout Morocco (see Figure here below). On average, the rise in temperature has been between 1° and 4°C depending on the region (MEMEE, 2015).

The temperature in Morocco has risen steeply over the past 30 years or so (1971/1980 to 1998/2007). Three areas can be distinguished along the Moroccan coast where the increase in temperature has been particularly steep, exceeding 1°C:

- Between Tangiers and Safi on the northern Atlantic coast
- Between Agadir and Laâyoune on the northern Atlantic coast
- East of Al Hoceima on the Mediterranean coast.

It should also be noted that the rise in temperature in Morocco is well above the average values given in the IPCC report for the world as a whole: the aggregate global average surface temperature data show a rise of 0.85 [0.65 to 1.06]°C over the 1880-2012 period (IPCC, 2013).

The models used to simulate the climate of Morocco predict a rise of between 1.5 and 5°C by the end of the 21st century, or even more in the south-eastern regions. The rise will be between 1.5 and 4°C in the Mediterranean and central regions and between 1.5 and 3°C along the Atlantic coast and in the Saharan provinces (MEMEE, 2015).

Sea temperature: It is expected that the temperature of coastal waters in Morocco will rise by +1°C over the first 100 meters by the end of the 21st century. This is the upper part of the predicted range, to be on the safe side.

Over the past 40 years from 1971 to 2010, which are relatively well documented, more than 60% of the net increase in energy absorbed by the climate system has been stored in the surface ocean (0-700 m), and about 30% in the ocean below 700 m (IPCC, 2013) (see next Figure). Globally, the ocean temperature has risen more close to the surface. The temperature of the first 75 m rose by 0.11[0.09-0.13]°C per decade over the 1971-2010 period.

According to the IPCC, it is very likely that regions of very high salinity dominated by evaporation, such as the Mediterranean, have become more saline while regions of low salinity dominated by precipitation have become fresher since the 1950s. These regional trends in ocean salinity provide indirect proof that evaporation and precipitation on the oceans have changed.

In the absence of temperature monitoring for Moroccan coastal waters, these general and average indications for the planet as a whole suggest that the water temperature will probably rise and that the Mediterranean will become more saline.

The ocean will continue to heat up during the 21st century. Heat will be absorbed at the surface and will penetrate to the deep ocean: about 0.6°C (RCP2.6) to 2.0°C (RCP8.5) over the first 100 metres, and about 0.3°C (RCP2.6) to 0.6°C (RCP8.5) to a depth of about 1000 m towards the end of the 21st century (IPCC, 2013).

Acidification of the ocean

The oceans have absorbed about 30% of CO2 emitted, causing them to become more acidic. This acidification is quantified by falling pH levels. The pH of ocean surface water fell from 8.12 to 8.06 between 1990 and 2010, corresponding to an increase of 26% in hydrogen ion concentration (see next Figure 31, taken by IPCC, 2013). This acidity makes sea water more corrosive. In view of the lack of local data, global average data could be adopted for the coastal waters of Morocco.

The models predict an overall increase in ocean acidification in all the RCP scenarios. The pH at the surface of the oceans should fall by the end of the 21st century, between 0.06 and 0.07 for RCP 2.6, 0.14 and 0.15 for RCP 4.5, 0.20 and 0.21 for RCP 6.0, and 0.30 and 0.32 for RCP 8.5 (IPCC, 2013). Specifically for Morocco it is predicted that there will be a reduction of 0.15 in 2100 (hence, pH = 7.92) in comparison with the present pH value of around 8.07.

Impact of an increase in temperatures and acidification rate:

- Possible impact on the sustainability of materials used for maritime structures
- Possible impact of an increase in air temperature on port equipment.

Winds

Analysis for the wind climate shows very different observations off the Atlantic and the Mediterranean coasts and illustrate the two climate from two different seaboards and illustrate the variability of wind regimes throughout the country. The 5th IPCC report (2013) does not provide any precise indications on the expected changes in average winds. Such predictions must necessarily form part of a wider study of modifications in general atmospheric circulation and of the impact of climate change on natural climate variability cycles (North Atlantic Oscillation (NAO), Atlantic Multi-

decadal Oscillation (AMO), El Niño Southern Oscillation (ENSO)). The short-term and long-term trends provided therefore concern essentially the storm regime, which is discussed in the next section.

No reliable information is available on the expected modifications of winds, so for the purpose of the study it will be assumed that this wind will not impact ports as a factor modified by climate change.

Waves (operational waves)

Wave regimes on the Atlantic coast are characterised by long Atlantic swells. The Moroccan shore is often struck by waves propagating far from the storm-affected area in which they were generated. During exceptional storms, the significant height of offshore waves can reach 8 to 10 m. There is no centralised, coordinated national wave measurement network in Morocco. It should be noted that in its report on the storm of 6 and 7 January 2014, the Ministry of Equipment, Transport and Logistics recommended that such a national network should be set up.

The predicted changes in waves off the Moroccan coast depend directly on changes in the atmosphere. In particular, the expected changes in extreme waves depend on those of the storm regime. In addition, the effect of waves on the coast will also depend in the future on changes in sea level, the expected rise in which will encourage the propagation of waves as far as the port infrastructure and thus increase their potential to cause damage. This predicted change in the wave climate is consistent with the expected change in the storm regime, which also shows a downwards trend along the coast of Morocco.

In Morocco the expected change is a very slight fall, so it will be assumed that this factor is not modified by climate change.

Storms

In the metocean sense, a storm is a meteorological event of limited duration, characterised by high or extreme values of at least one of the following parameters: winds, waves, meteorological set-up. The Moroccan coasts are exposed to Atlantic storms, which are the source of the most severe conditions in terms of waves and winds. These storms vary naturally over a timescale of several decades. In particular, the storm regime in Morocco is largely influenced by the North Atlantic Oscillation (NAO), an atmospheric and oceanic phenomenon affecting the climate system in the North Atlantic Ocean. The NAO describes the variations in the oceanic and atmospheric regime over the region and expresses the extent of the difference in pressure between the Azores High and the Icelandic Low in comparison with the average situation.

Clearly in terms of emphasizing a risk based management approach it is important to take into account long cycles of natural variability in the storm regime, in particular when sizing harbour infrastructure. A design based on the wave climate over the past 20 years could thus lead to metocean risks being under-estimated.

The 5th IPCC report (2014) looks at the changes in atmospheric circulation and in the extratropical storm regime in the short term (2050) and long term (2100), while examining the situation at regional scale. In the short term, i.e. by the middle of the 21st century, several general atmosphere-ocean circulation models tend to indicate that the jet streams and associated track taken by westerly storms will shift towards the pole, and that westerlies will become stronger. It should be noted that a northerly shift in the storm track would lower the frequency of storms on the Moroccan coast. However, these conclusions are severely affected by the remaining uncertainties and by the fact that the models are sensitive to minor modifications in their formulation. In particular, the effect of climate change on the organisation of the main centres of action and of their various oscillations (NAO, AMO) is very difficult to determine. The report therefore expresses *moderate confidence* in the northward shift of the westerly storm track and stresses the influence of natural variability that could remain the dominant factor up to 2050.[41] In the long term, i.e. the end of the 21st century, the models

[41] IPPC 2014 / AR5 / WG1 / Chapter 11 / section 11.3.2.4.1

agree in predicting a decline in storm frequency in the northern hemisphere and attenuate the shift in storm tracks towards the pole.

Clearly in terms of emphasizing a risk based management approach it is important to take into account long cycles of natural variability in the storm regime, in particular when sizing harbour infrastructure. A design based on the wave climate over the past 20 years could thus lead to metocean risks being under-estimated.

The expected change in storm regime is a very slight decrease in the latitudes where Morocco is situated, while an increase is predicted in the northern part of the Atlantic, so it will be assumed that this factor is not modified by climate change.

Sedimentology and coastal erosion and predicted changes

Longshore drift: Figure here below illustrates the intensity of longshore drift along the southern Atlantic coast of Morocco. The values are relatively constant from Agadir to Laâyoune: between 400,000 and 500,000 m3 per year.

The variation in longshore drift depends on the variation in the wave regime. At this stage it is difficult to predict a future trend.

Coastal erosion: The Moroccan shore is experiencing erosion under the effect of natural factors or human pressure. This affects the coastal dunes and farmland along the coastal strip. It is aggravated by the steep gradients and nature of the soil.

The coastal dunes, which are essential components of the dynamic equilibrium of the shoreline, are under serious attack, making the environment highly vulnerable. They are subject to longshore currents, to the rise in sea level and to wind erosion, in particular in areas with little plant cover. The extent of these effects (which was hardly perceptible until recent years) has become more visible with the strong waves that have struck the Moroccan shore in recent years.

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Annex 5. Soft adaptation measure

Soft adaption measures are a more managed approach, changing procedures or acceptance of down time. Soft measures could include:

Contract additional insurance for damaging events
By contracting insurance to cover the damage or down time associated with climate change, the owner of the port infrastructure can transfer the risk to the insurance company and can obtain an amount of cost certainty over the insured period.

Develop knowledge of and/or trade in climate resilient commodities
With a high level of uncertainty remaining in the area of climate change, by ensuring awareness of the causes and effects of climate change, including up to date research, can allow the asset to offset the cost of some adaption measures by trading in climate resilient commodities.

Managing energy costs for refrigeration
An increase in average temperature may lead to an increase in the costs for the refrigeration containers. This increase in costs will need to be managed in order to pass on the associated costs to the end user so that the infrastructure owner isn't responsible for the costs.

Managed coastline retreat
An approach of managed coastline retreat, using beach nourishment or redistribution of material for example, could provide protection to certain infrastructural assets while not majorly impacting on the existing coastal processes.

Allowing for increased downtime in financial predictions
By allowing for and justifying an increase in downtime in financial plans, the infrastructure owner can adjust arrangements to minimise disruption to any turnover generated by the infrastructure.

Flood management plans
A well-conceived flood management plan can contribute to a significant reduction in adaption measures due to climate change by prioritising measures or providing alternative flood alleviation routes.

Sustainability programme
While a sustainability programme will attempt to minimise the causes of climate change rather than adapting to the effects, it should be considered where appropriate.

Soft measures could also include changes in the management of hard measures, such as changes to dredging areas, or maintenance regimes.

Soft adaption measures normally would have a lifetime cost associated with them that is more evenly spread over the life span of the adaption measure.