Enhancement of Nationally Determined Contributions (NDCs) and National Adaptation Plans (NAPs) for the Southern and Eastern Mediterranean (SEMed) region

Regional Analysis on Nationally Determined Contributions (NDCs) – 2nd phase

May 2020

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Contents

1. Executive summary

In this report, we are trying to give insights on three issues:

- How to get synergies amongst the Union for the Mediterranean (UfM) member countries in the South and East of the Mediterranean (SEMed)?

- How to get ready for the new Enhanced Transparency Framework (ETF) and update of Nationally Determined Contributions (NDCs)first in 2020 and, beyond in 2025?

- Which are the gaps and needs to achieve a higher level of ambition?

How did we proceed?

- **I. Reviewing the SEMed NDC** landscape and declared intentions to update them, surveying literature, initiatives and build-on previous Global CAD report, requested by UfM in September 2019 (*done*),

- **II. Identifying cross-cutting clusters of countries** who share similar issues (gaps & needs) and ambitions, on mitigation and/or adaptation:

    - in order to recommend **synergies**,

    - focusing on those **adaptation actions leading to co-benefits**: mitigation ambition as well as alignment with the **Sustainable Development Goals (SDGs),**

    - Using innovative **statistical analysis**.

- **III.** Suggestions on how to **update next NDCs for the 2020 submission:**

    - **Interfacing** bottom-up planning with strategic top-down,

    - **Enhanced Transparency Framework** and tools,

    - **Collaborating with other main initiatives** in the region towards NDCs: UfM, UNDP, NDC Partnership, CLIMA MED, OME, MedECC, etc.*,*

    - Architecting **climate finance** according to clusters?

At COP 25 in Madrid, Jordan made the introduction of the side-event on Friday December 13: *NDC in the south and eastern Mediterranean* (NDC-P pavilion). *The study should identify c*ommon goals that could lead to joint approaches, regional approaches, and furthermore to clearly motivate cooperation in the region.

Our main findings:

- This study relies on the 2015 versions of the NDCs.Enhanced ambition in national strategies that have occurred ever since have not been taken into account.Updates in 2020 and 205 should allow to improve the analysis.

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- Adaptation should drive climate action in the South and East of the Mediterranean.

- A new metric has been developed to compare the relevance of adaptation projects.
- Through different types of priorities and cross-cutting issues, identified at country level, as well as statistics made on a set of economic and environmental indicators, we suggested preliminary "SEMed-clusters" of countries sharing similar issues and needs.
- Based upon synergetic approach, cross-cutting issues, interfaces between regional and State perimeters, and an overarching perspective, we provide insights on how SEMed could organize themselves to implement ambitious NDCs.
- We also indicate how such an approach can interact and collaborate with other initiatives such as CLIMA MED, NDC Partnership, UNDP, OME, MedECC, ANME, ADEME, AFD, or the World Bank.
- Follow-up studies should be undertaken as to validate and organize SEMed clusters as well as ensure NDC's alignment with Sustainable Development Goals (SDGs).

2. Introduction

Collectively, if commitments, policies and action can deliver a 7.6% emissions reduction every year between 2020 and 2030, Parties to the UNFCCC can limit global warming to 1.5°C[1]. Today, even the most ambitious national climate action plans are far short of a 7.6% reduction. It might however stress the need for efficient adaptation programs, as specified by the Paris agreement (article 2) signed at COP-21 in December 2015. Annex I of Decision 4 / CMA.119 of "Katowice climate package" brings more information on these elements. Information within NDC must also be provided for adaptation measurements that have beneficial effects in mitigation. Furthermore, the latest risk assessment from MedECC (issued October 2019) stresses that the Mediterranean region will be even more strongly impacted by climate change than other regions of the globe[2].

For instance, according to MedECC, "*In the Mediterranean region, average annual temperatures are now approximately 1.5°C higher than during the preindustrial period (1880-1899) and well above current global warming trends (+1.1°C). Also, climate models clearly indicate a trend towards reduced rainfall in coming decades. The combination of reduced rainfall and warming generates strong trends towards drier conditions. Again, the projections* (of Mediterranean Sea temperature) *for 2100 vary between +1.8°C and +3.5°C in average compared to the period between 1961 and 1990. Even if global warming was limited to 1.5°C, (…) a potential of multi-meter rises in sea level. Finally, regarding acidification, (…) for the Mediterranean, which is currently estimated to decrease by 0.018 to 0.028 pH units per decade*".

Apart from the various COP agreements in the framework of the United Nations Framework Convention on Climate Change (such as the Kyoto Protocol or the Paris Agreement) all dedicated to climate change, the bureau of the UN environment assembly is considering consensual nature-based solutions in the context of sustainable development, several of them closely related to climate change impacts, for

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[1] *Gap report, UNEP, December 2019*
[2] RISKS ASSOCIATED TO CLIMATE AND ENVIRONMENTAL CHANGES IN THE MEDITERRANEAN REGION*A preliminary assessment by the MedECC Network Science-policy interface, October 2019*

instance : *promoting pathways to prevent land degradation and desertification, and achieve sustainable land use*[3].

Besides, several countries from SEMed region link development objectives, the fight against poverty with climate change issues[4]. Even, in some instances, they derive, in their NDC, adaptation from development. We will discuss if this logic can be reversed, suggesting climate actions can be way forward development.
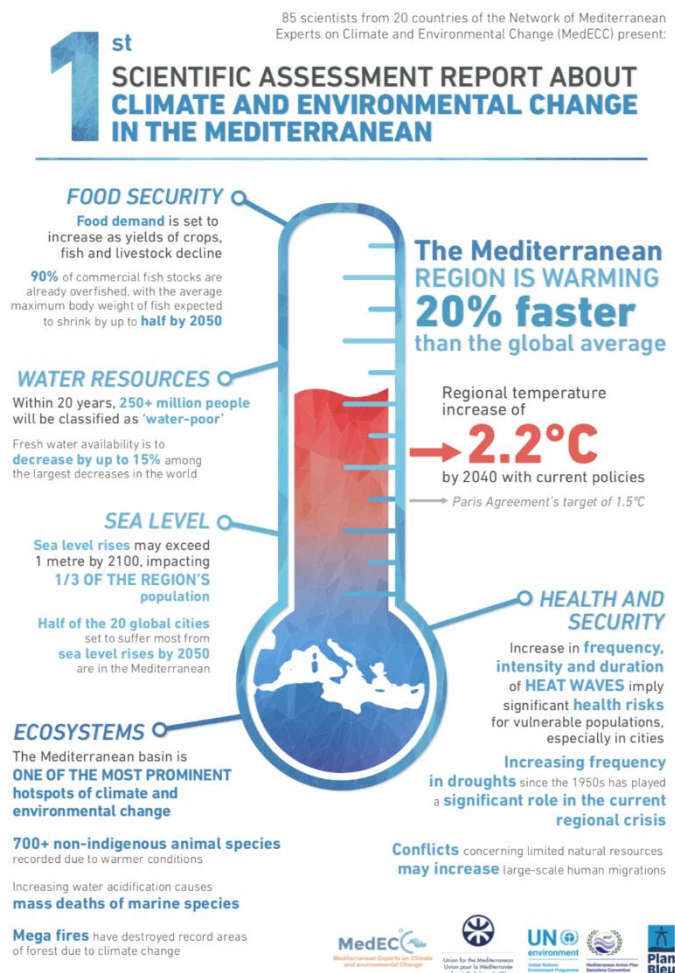
Figure 1 - First scientific assessment report about climate and environmental change in the Mediterranean

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[3] *Revised consensual elements for the theme for the fifth Session of the UN Environment Assembly, updated on 28 November 2019.*
[4] *Mise en œuvre de l'Accord de Paris sur le climat en Afrique de l'ouest : état des lieux des CDN et des besoins en renforcement de capacités ; CEDEAO, 2019, for Expertise France.*

We therefore strongly suggest in the present report, to put adaptation ahead of SEMed countries' agenda and focus on those particularly sensitive and key adaptation actions, which are mitigating as well and are sustainable.

If Measurement, Reporting and Verification (MRV) systems can be provided to enhance the transparency framework of national greenhouse gas (GHG) inventories, similarly, the Paris agreement encourages the integration of the transparency of adaptation (also called Monitoring & Evaluation (M & E) of adaptation)in the national plans process adaptation[5].

3. Setting the stage for this study

3.1 Scope and objectives for this study

All Parties agreed to either communicate their current NDCs or submit new or updated NDCs by 2020, and to do so every five years thereafter. Each successive NDC is expected to represent a progression beyond the current NDC and reflect the Party's highest possible ambition. This upward spiral of ambition underpins the achievement of the goals agreed to in Paris[6].

There could be, under confirmation, a good time frame coincidence between the updates of the NDCs on the one side, and the submission of the first BTR (which will include an update of the national inventory). All Parties are requested to submit the next round of NDCs (new NDCs or updated NDCs) by 2020 and every five years thereafter (e.g. by 2020, 2025, 2030), regardless of their respective implementation time frames.

Indeed, in accordance with the modalities, procedures, and guidelines (MPGs), Parties must submit their first biennial transparency report (BTR) and national inventory report (if submitted separately from the BTR), from 31 December 2024.

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[5]**European Capacity Building Initiative 2019.** PocketGuide to Adaptation under the UNFCCC.
https://ecbi.org/sites/default/files/PGAdaptation.pdf
[6] WRI. ENHANCING NDCS BY 2020: ACHIEVING THE GOALS OF THE PARIS AGREEMENT

With respect to reporting and review of national communications under the Convention every four years, starting from the date first report under the Paris Agreement is due:

Biennial transparency report

- National inventory report of anthropogenic emissions by sources and removals by sinks of greenhouse gases
- Information necessary to track progress made in implementing and achieving nationally determined contributions under Article 4 of the Paris Agreement
- Information related to climate change impacts and adaptation under Article 7 of the Paris Agreement
- Information on financial, technology development and transfer and capacity-building support needed and received under Articles 9–11 of the Paris Agreement
- Information on financial, technology development and transfer and capacity-building support provided and mobilized under Articles 9–11 of the Paris Agreement

Using ETF MPGs

National communication

Research and systematic observation; education, training and public awareness

Plus adaptation if not reports in BTR

using relevant NC Guidelines

Above: document edited by UNFCCC.

Starting in 2023 and then every five years, governments will take stock of the implementation of the Agreement to assess the collective progress towards achieving the purpose of the Agreement and its long-term goals. The outcome of the global stocktake (GST) will inform the preparation of subsequent NDCs, in order to allow for increased ambition and climate action to achieve the purpose of the Paris Agreement and its long-term goals.

Third round NDCs could therefore coincide Party's first BTR and feed each other. In addition, if a Party submits an adaptation communication as a component of or in conjunction with a BTR, it should clearly identify which part of the report is the adaptation communication.
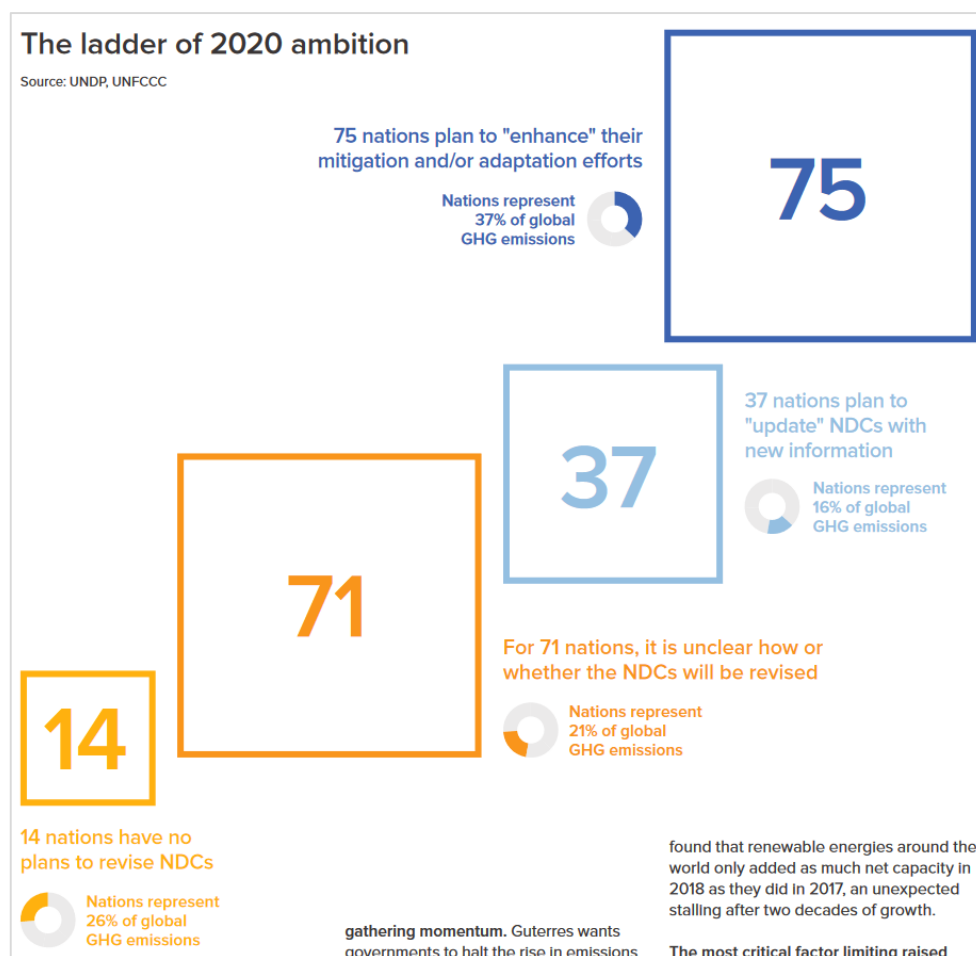
Figure 2 - The ladder of 2020 ambition

Source: NDC Global Outlook Report 2019 "The heat is on - Taking Stock of Global Climate Ambition" - UNDP

As of April 14th 2020, 34 countries have stated their intention to update an NDC by 2020 (including the European union), representing 9.3% of global emissions; 107 countries have stated their intention to enhance ambition or action in an NDC by 2020, representing 15.1% of global emissions ; lastly, 7 countries have submitted a 2020 NDC, representing 2.8% of global emissions. These figures are reported by the World Resources Institute[7].

The study covers 13 countries of the SEMed Region: Albania, Algeria, Bosnia-Herzegovina, Egypt, Israel, Jordan, Lebanon, Mauritania, Montenegro, Morocco, Palestine, Tunisia, and Turkey. Below, are summarized the different situations concerning the NDC update for the 13 SEMed countries concerned in the study:

	INDC	NDC 1	NDC2
Albania	24/09/2015	21/09/2016	NA
Algeria	01/10/2015	20/10/2016	Intends to update 2020 NDC
Bosnia-Herzegovina	08/10/2015	16/03/2017	Intends to update 2020 NDC
Egypt	16/11/2015	29/06/2017	NA
Israel	30/09/2015	22/11/2016	NA

[7] https://www.wri.org/stepping-2020-ndcs

Jordan	30/09/2015	04/11/2016	NA
Lebanon	30/09/2015	-	Intends to update 2020 NDC
Mauritania	30/09/2015	27/02/2017	Intends to update 2020 NDC
Morocco	05/06/2015	19/09/2016	Intends to update 2020 NDC
Montenegro	23/09/2015	21/12/2017	Intends to update 2020 NDC
Palestine	-	21/08/2017	Intends to update 2020 NDC
Tunisia	16/09/2015	10/02/2017	Intends to update 2020 NDC
Turkey	30/09/2015	-	NA

Table 1 - NDC status

Source: WRI NDC tracker (April 2020)
NA: no information available
Intends to update 2020 NDC: intends to enhance ambition or action in 2020 NDC

The analysis conducted by the Citepa can be useful to the countries, to locate and compare themselves with other countries in the region, or even countries sharing similar issues and constraints outside the region. Our analysis could also be used in the current process of updating NDCs and to support the UfM in its regional approach, to enhance ambition for the NDC in their next submission. Beyond the analyses and suggestions specific to each country, the focus will be put, when justified, on common approaches and seeking synergies.

We synthetized NDC messages in a joint Excel file. This analysis was conducted on the 2015 version of the NDCs and INDCs. It includes an extensive analysis of the documents, as well as other information, such as the synergies between NDC and Sustainable Development Goals (SDGs)[8] and key energy statistics from the International Energy Agency.

3.2   Background

3.2.1   Review of "Regional Analysis of (I)NDCs in the SEMed Region" by GlobalCAD

The GlobalCAD report represents an important descriptive analysis both in quantity and quality. The description of the issues and the mitigation and adaptive solutions of the 13 SEMed countries is based on NDC and NAP "mandatory" key documents and on more confidential and detailed documents as well, which have usefully completed the panorama. In many cases, the analysis that has been done provided us with fruitful elements for our report, either by starting from macroeconomic indicators or by having comparative tables of the countries with regard to the solutions envisaged regarding climate change.

3.2.2   Complementary literature: main feedback

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[8]*From the joint initiative of the German Development Institute and the Stockholm Environment Institute*

We are mentioning a set of complementary literature that has been useful to our report:

Energy efficiency and renewable energy strategies and policies

Mitigation Enabling Energy Transition in the MEDiterranean region (meetMED)

2019

Assessment of the impacts of Climate Change on the Agriculture Sector in the Southern Mediterranean: foreseen developments and policy measures

Union for the Mediterranean

February 2019

Climate Change impact on the tourism sector in the Southern Mediterranean: Foreseen developments and policy measures

Union for the Mediterranean

July 2018

Regional analysis of the nationally determined contributions of the countries in southern Europe, eastern Europe and central Asia - Gaps and opportunities in the agriculture sectors

Food and Agriculture Organization of the United Nations

2019

Regional Hub for Arab States - DRAFT Policy brief: Resilience to Climate Change in the Arab Region: Trends and Priorities

Kishan Khoday, Regional Team Leader in the Arab Region

Walid Ali, Regional Climate Change Specialist

UNDP

May 2019

Enhancing NDCs: a guide to strengthening national climate plans by 2020

WRI, UNDP

2019

Risks associated to climate and environmental changes in the Mediterranean region - A preliminary assessment by the MedECC Network Science-policy interface

MedECC, UfM, Sweden Sverige, UNEP, MAP, Plan Bleu

2019

3.2.3   Adaptation issue: fitness coefficient

Water availability in the Mediterranean Basin will reduce because of three main factors: (i) precipitation decrease, (ii) temperature increase, and (iii) population growth, especially in the countries already presently short in water supply (MedECC October 2019).

Country adaptation strategies and projects are recent compared to mitigation. The first PNACCC (*Plan National d'Adaptation au Changement Climatique*, or National Adaptation Plan for Climate Change) in France, for example, was published in 2011; similarly, the UNFCCC Parties agreed to develop their first National Climate Adaptation Plans (NAPs) at the 2010 Cancun Summit. Adaptation have a distant realization horizon. Their impacts will not be judged until 2030 or even 2040. The ex-ante evaluation of projects and strategies for the future often remains the only relevant evaluation in order to guide financing (termed conditional in NDCs) to adaptation intentions (planned projects in contributions and adaptation plans).

The methodology that would allow this assessment, relative to a baseline scenario, through indicators of adaptive effectiveness, is still at the research stage (example of IDDRI publications). Several authors have stressed the difficulty of collectively agreeing on a battery of reliable indicators that would be used *ex-ante*.

The prospects for *ex-ante* evaluation and comparability of projects, beyond the diversity and even the specificity of local situations, are considerable. As part of the 2020 update of the NDCs (in their version 2 for several countries), and even more to develop the version 3 (due end of December 2024 in all cases), the challenge is to be able to guide, arrow and mobilize the financing of development (AfDB for example), and climate (AFD, GCF) towards effective adaptive projects.

Citepa has developed an indicator of universal relevance (called *adaptive fitness coefficient*), adaptive solutions to the issues at stake. The adaptative fitness coefficient makes it possible, on the one hand, to compare ex ante the relevance of the adaptive choices made by the 192 Parties in their NDC (version 1), on the other hand, to predict to which climatic risks and vulnerabilities, such an adaptive fits in and answers best. Conversely, what would be the most relevant adaptive solutions to solve a climate issue?

3.3 Methodological overview

3.3.1 Plan

The first step was to review and analyze the Final report on "Regional Analysis of (I)NDCs in the SEMed Region" by GlobalCAD for UfM (*December 2019*). Complementary literature has also been examined.

The second step is to conduct complementary analysis of NDCs, and also analyse additional indicators covering the SEMed region countries and also countries around the world to provide a map of the region concerning the main components of the NDC: regional circumstances, mitigation (targets, baseline, actions), adaptation (climate change main issues, adaptation actions), transparency, institutional framework, support needs (financial, technology transfer, capacity building). As it is mentioned in the latest risk assessment report by MedECC: *there are important discrepancies between Mediterranean countries. Despite a significant progress made in countries on the southern shore, in general northern Mediterranean countries perform better on several indicators of well-being, economic development, government effectiveness and social networks than southern Mediterranean and Middle East countries (with some exceptions both ways)[9].*

To avoid drawing wrong conclusions from heterogenous situations, we worked on clusters of countries. The aim of this analysis is to collect data for all countries in the world (when available) in order to benchmark, position and gather countries into relevant clusters according to similar situations, issues, needs, NDCs priorities (thanks to statistical analysis), and, if possible, to highlight the main challenges and options in order to consider NDC enhancement.

Finally, the third step is to provide perspectives and recommendations for the SEMed clusters defined in order to go further in the ways to be considered to improve and enhance NDCs in the future.

3.3.2 Methodological views

A new, larger work has been done on emission indicators (historical, present, projective), and macroeconomic factors, for countries in the region, as well as for all countries in the world (Parties to the UNFCCC). This allows to reveal links, and country clusters conceivable through criteria cross-references (for example on the price of solar KWH versus GDP / capita, GVA, density), or to allow multivariate statistical analysis (principal component analysis in the case mitigation and economics, factorial correspondence analysis in the case of adaptation). This analysis reveals explanatory variables of observed trends as well as coefficients of relevance of adaptive solutions.

- Use of the latest MedECC report for adaptation, or OME statistics for energy, etc.
- Improve the accuracy or precision, as well as the completeness, of emission data (years or reference scenario, sectors covered, information system, actualization), etc.
- An application and synergies are proposed with the *Clima MED* initiative, when it will be used for synergies and to propose.
- Regarding the financing of climate actions, we issued a first recommendation to the countries of the zone, on the priorities that they would want to finance (November 2019, CAEP of the NDC Partnership).

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[9] See also Grasso M, Feola G (2012) Mediterranean agriculture under climate change: adaptive capacity, adaptation, and ethics. Regional Environmental Change, 12(3), 607-618

- The LULUCF sector must be treated separately, and in connection with mitigation-adaptation and energy issues.
- The agricultural sector should allow to distinguish several MED Clusters.
- The climate actions envisaged are considered not only at the level of the sectors (NAMA approach) but also for territories (LEDS), as the latter allows more synergies and coherence between mitigation and adaptation and involve local knowledge and actors.
- In terms of energy mix, special attention is paid to solar, wind, hydraulics and even hydrogen. This analysis is based on a study of territories and habitats where this is favorable.
- Methane deserves a separate analysis: the challenges of the waste sector, biomass, recycling, the circular economy.
- A crossover between the best available technologies, air pollution and GHGs, will be made in the industrial sector, because of feasible co-benefits.
- It will be wise to exclude or at least discriminate against developments that are not climate-related, when they are only related to human activity or growth.
- A territory particularly interests us, that of the coastal zones (Mediterranean and Atlantic in the case of Mauritania), which appear fragile according to the MedECC, homogeneous in terms of biomes and of high density). The fossil energy resources coming mainly from the interior territories (Algeria with its gas for example), whereas the renewable energies will be produced preferentially on the coastal zones (presence of wind and high flows of river, sun with networks of distribution of short electricity compared to territories where energy is consumed). This is less true, however, for the "interior" forest (in the case of Bosnia and Herzegovina and the potential wood energy sector) or some "interior" dams.

3.3.3   Questionnaires

Citepa elaborated questionnaires which have been submitted to all SEMed countries on 2019 December 6, as to collect updated information regarding their intention to enhance their objectives or revise their climate (mitigation plus adaptation strategies).

The questionnaire format was designed by Citepa and approved by UfM secretariat before COP-25. By the submission of this report, and despite various reminders, only three countries have answered.

We used a common format to all countries hoping the feedbacks could be usefully benchmarked (Office 365 forms).

The questionnaires were inspired by GlobalCAD report, Countries' comments, technical surveys by ECOWAS, WRI, GIZ; CGE technical handbook for ETF[10],as well as our own ground experience in several developing countries.

The questionnaire is articulated on the main components of governance, transparency/MRV, mitigation, adaptation, implementation and finance.

It was our initial intention to add the results of the questionnaires to the present report. The results were to be added to each country profile. Therefore, SEMed clusters would be confirmed or modified

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[10]*Jérôme Boutang, Citepa, is also member of CGE and participated in the elaboration of that technical handbook before it was presented at COP-25 on December 4, 2019*

or even results could feed-in existing clusters. They would have been used also to define priorities regarding the updating of 2024's NDCs.

Questionnaires were briefly presented by Citepa, during an NDC Partnership and UfM side event at COP-25, on December 19.

The questionnaire can be found online at:
https://forms.office.com/Pages/ResponsePage.aspx?id=2txz8WSYAk-laTLvTZQodxfewDdxsN1OkZ8lEyVcF1VUMURIOUNQWUJWWFFWTkJJMlNUUk5ZRUNKSy4u

Context of the questionnaire:

The Paris Agreement established a series of five-year cycles to increase ambition, including through NDCs that would grow more ambitious over time. Countries also specifically agreed on 2020 as a critical next step in the Paris process. Countries with an NDC time frame ending up to 2025 are requested to communicate new ones by 2020 (UNFCCC 2015a). Those countries whose NDCs have a time frame ending up to 2030, in turn, are requested to communicate or update their NDCs by 2020.

Preliminary questions:

- Which is your country?
- Who is answering this questionnaire (name, first name, position, organization)?

1. Taking stock of progress to date

- Does your country envisage to revise your NDC by COP-26...?
    - ...In order to enhance, ...in order to update
    - ...Others/I don't know
- Will the next NDC review be based upon feedbacks coming out the implementation of your last NDC?
    - If you answered NO to previous question, please specify why.

2. Mitigation component of the NDC

- Will you modify the way to account for your NDC mitigation target?
    - If you answered YES to the previous question, please specify:
        - BAU scenario
        - Absolute baseline year
        - Other
- Do you intend to enhance unconditional mitigation targets?
    - If you answered YES to previous question, please specify the activity sector which is targeted:
        - Energy
        - Transport
        - Agriculture
        - Waste
        - LULUCF

- In order to design local mitigation plans, are there specific public bodies and schemes interfacing local actors with national entities:
  - Region
  - City
  - District
  - Others
  - NO

- Which kind of indicators will you use for mitigation purposes apart from CO_2eq?

3. Adaptation component of the NDC

- What would be your top priority for adaptation actions which would be mitigating CO_2eq emissions at the same time?

- In order to design local adaptation plans, are there specific public bodies and schemes interfacing local actors with national entities?
- Which main climate change issues do those local adaptation plans address?
  - Air temperature
  - Precipitation
  - Sea level
  - Sea acidification
  - Sea temperature

4. Institutional arrangements and stakeholders' engagement

- What is the national institutional organization put in place to update your NDC?
- How do you intend to align the NDC with SDGs?

5. Monitoring, Reporting, Verification and Evaluation system

- Have you implemented an operational, sustainable, scalable MRV tool?
  - If yes, please specify:
    - GHG inventory
    - Mitigation actions
    - Adaptation actions
    - Support (financial, capacity-building, technology transfer, etc.)
    - Others

6. Options identified to enhance the NDC (barriers and needs)

- Which recent shifts in real economy (in-country or worldwide) would you intend to reflect in the next version of NDC?
- As for adaptation purposes, would you require additional and updated information on trends, impacts &vulnerabilities?
  - If so, which main ones?
  - Would you require international support for your next NDC, in order to raise capacity?

- • In compliance with the ETF, and as for communicating the NDC, which kind of information would you deliver to enhance clarity, transparency and understanding?

Results will be added to other types of information in order to get a view on:

- Singularities as well as climate change commitments, stakes, methods among SEMed countries
- State-of-the-art regarding the NDC update
- Needs.

In our conclusion, we suggest ways to get the most of forthcoming questionnaires.

3.4 Adaptation metrics and benchmark

The fitness coefficient of adaptive actions makes it possible to judge whether, for a certain level of vulnerability to a danger caused by climate change (drought, flood, heat wave, sea level rise, storm, temperature increase), the undertaken action is relevant. This is an ex-ante evaluation, aiming to assess the relevance of the choices, based on the choices made by all Parties in the NDCs. It does not aim to replace monitoring and evaluation processes, which would assess ex-post the performance of the undertaken actions. Monitoring and evaluations are essential to improve the knowledge and allow to better identify what actions should be undertaken.

The relevance of the choice of the adaptation action is judge devaluated according to the actions decided by the countries for the same level of vulnerability to a certain danger caused by climate change. If the countries have chosen the same answer to a danger posed (for the same intensity), the chosen action will have a high fitness coefficient. Conversely, if an action does not return often among the choices of the countries, this one will have a low fitness coefficient. The fitness coefficient is based on the assumption that the countries, in their NDC, NAP, NAPA, have made the best choices with regard to their adaptation actions.
The fitness coefficients of the different adaptive actions chosen by SEMed countries will be presented in the report. We have built taxonomies associated with various risks posed by climate change through a statistical study of adaptive projects contained in the NDCs and the National Adaptation Programs of Action (NAPA).

We then compared the categories of these taxonomies using a Factorial Correspondence Analysis (FCA). The Euclidean distance of adaptive actions in relation to the intensities of vulnerabilities posed by climate change, represents the attraction of an action vis-à-vis a degree of vulnerability. This distance was then transformed into a coefficient between 0 and 1 in order to be easily readable. The closer the coefficient is to 1, the more the adaptive action would be statistically attracted by a level of vulnerability, suggesting a high correspondence between the two features.

We have identified two categories of climate risks, the first grouping the problems of resilience, the others of disaster.

Resilience problems are those that we can adapt with, others are disaster or catastrophic magnitude events, it is impossible to really adapt, they are too extreme events, we have to deal with them "To cope with", reduce vulnerability to these events.

SOLUTIONS/ ACTIONS	TO ADAPT WITH	TO COPE WITH
Climate event	Temperature rise	Drought
		Heat wave
	Higher frequency and volume of precipitations	Flood
	Sea level rise	Storm and cyclone
	Multi risk	Multi Risk
	Unknown hazard	Unknown hazard

Table 2 - Climate change induced hazards

In order to allow a quantitative comparison of adaptive projects, we have associated with each climatic phenomenon, a level of intensity of this phenomenon, as estimated by the Climate Vulnerability Monitor developed by DARA and the Climate Vulnerable Forum.

The method consists in calculating the distance between all the keys and all the locks (vectoral distance), then to build a score by using the minimum and maximum distance to normalize the coefficient between 0 and 1. The method is detailed in the 5.2 section "Priorities regarding adaptation"

4. Multi indicators analysis of the SEMed region NDCs: seeking for relevant synergies

4.1 The search for a clustering approach

Gathering countries sharing common issues, as well as a common ambition, is a powerful approach when it comes to obtain sustainable results, sharing the burden of investments, sharing knowledge. "Pooling efforts to create economies of scale" has for instance been stressed by ECOWAS[11].

Several existing initiatives convey powerful synergies in the Mediterranean region:

- MedECC;
- UfM climate action especially on adaptation and mitigation (from the declaration of the UfM Ministerial Meeting on Environment and Climate Change). The present report is part of its action regarding the assessing of the state of play of NDCs implementation in the UfM SEMed countries.
- CLIMA MED: the CLIMA MED project supports the transition of eight South-Mediterranean countries towards establishing a sustainable low-carbon and climate resilient development model by enhancing their energy security and strengthening their capacity to adapt to the impact of climate change. The project's activities benefit government agencies, local authorities, non-State and global climate actors in Algeria, Egypt, Israel, Jordan, Lebanon, Morocco, Palestine and Tunisia. CLIMA MED project also includes a work-package on NDCs. It is funded by the European Union.

Research stressed that adaptation and management of Mediterranean habitats such as protected areas depends upon the consideration of landscape connectivity and interconnected areas, at a scale which is much larger than individual States[12].

When based on a selection of significant economic, nature-based and technical indicators, statistical analysis such as multivariate analysis can provide useful insights on how to gather countries according to real issues. Sometimes such an analysis can come up with counter-intuitive gatherings or even pairings which are not based exclusively on geographical neighboring.

By a statistical analysis called *principal component analysis* (PCA), the objective is to identify groups of countries that share characteristics. By determining which factors (the components of the database) have the most influence on the variance of values, one can determine groups of individuals (countries) that look alike (clusters) from a set of characteristics (the indicators). The aim is not to be limited to a single variable (CO_2 emissions or GDP for example) to determine these clusters of countries, but to incorporate several features in order to identify trends that are based on more than one information.

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[11] *ECOWAS, M. Sékou Sangare, 2019,Mise en œuvre de l'Accord de Paris sur le climat en Afrique.*
[12] *José L. Barredo, GuivanniCaudullo, Alessandro Dosio, Mediterranean habitat loss under future climate conditions: Assessing impacts on the Natura 2000 protected area network. Applied Geography 75 (2016) 83-92.*

4.2 Macroeconomic and technical indicators

Here is a list of macroeconomic and technical indicators:

1. Percentage change in GDP, in 2017 compared to 2016 (constant prices). Source: IMF, World Economic Outlook
2. GDP, in USD in 2017 (current prices). Source: IMF, World Economic Outlook
3. GDP per capita, in USD in 2017 (current prices). Source: IMF, World Economic Outlook
4. Total investment, in% of GDP in 2017. Source: IMF, World Economic Outlook
5. Gross national savings, in% of GDP in 2017. Source: IMF, World Economic Outlook
6. Percentage change in imports of goods and services in 2017. Source: IMF, World Economic Outlook
7. Percentage change in exports of goods and services in 2017. Source: IMF, World Economic Outlook
8. Unemployment rate in 2017. Source: IMF, World Economic Outlook
9. Revenue collected by the state, in% of GDP in 2017. Source: IMF, World Economic Outlook
10. Public expenditure as% of GDP in 2017. Source: IMF, World Economic Outlook
11. Net debt, in% of GDP in 2017. Source: IMF, World Economic Outlook
12. Gross debt, in% of GDP in 2017. Source: IMF, World Economic Outlook
13. Balance of accounts, in% of GDP in 2017. Source: IMF, World Economic Outlook

Regarding those indicators, IMF (International Monetary Fund) data can be incomplete. Data are not available for all countries in the world. There are 73 countries for which data are available. All the SEMed countries are included in the 73 above-mentioned countries.

4.3 Other indicators

Here is a list of other indicators which can be considered:

14. Population in 2017. Source: IMF, World Economic Outlook
15. Per capita CO_2 emissions in 2017. Source : https://ourworldindata.org/co2-and-other-greenhouse-gas-emissions#per-capita-co2-emissions
16. Cumulative CO_2 emissions in 2017 in tons since 1751. Source:https://ourworldindata.org/co2-and-other-greenhouse-gas-emissions#cumulative-co2-emissions
17. Share of cumulative CO2 emissions in 2017, since 1751, among total cumulative emissions in 2017, since 1751. Source:https://ourworldindata.org/co2-and-other-greenhouse-gas-emissions#cumulative-co2-emissions
18. CO_2 emissions in 2017, in tons. Source:https://ourworldindata.org/co2-and-other-greenhouse-gas-emissions#annual-co2-emissions
19. Share of CO_2 emissions in 2017, among global emissions in 2017. Source:https://ourworldindata.org/co2-and-other-greenhouse-gas-emissions#annual-co2-emissions

20. Energy intensity in 2014. Source: https://datacatalog.worldbank.org/dataset/world-development-indicators

21. Unconditional GHG emission reduction ambition towards 2030, compared to 1990 level, in % (a positive number describe a decrease in emissions). Source: JRC's EDGAR for GHG emission values for the different years.

4.4 Statistical analysis

A Principal Component Analysis (PCA) has been chosen to allow to go further in the analysis. The 21 above-mentioned indicators are complete for 73 countries. The PCA has been performed on this database.

From the database we elaborated, the PCA allows to define as many dimensions as variables. Each variable contributes to the composition of each dimension, with a different level of contribution. Each dimension explains a share of the database variance. The 21 dimensions define 100% of the variance. Keeping a certain number of dimensions that contributes to a high share of the total variance is an important PCA's feature. This means that we reduce the vectoral space from a number of dimensions that is equal to the number of variables to a lower number of dimensions. In our analysis, we chose to keep the first 6 dimensions, which contribute to 79.65% of the database's variance. We then have a simplified reality, but most of the information (79.65%) is kept.

In the composition of each dimension, the variables do not contribute at the same level. The criteria to decide if a variable is significant in the dimension's composition is to check whether the variable has a higher contribution than the average. As we have 21 quantitative variables, the average contribution is 4.8%.

We have the following table, displaying the contribution of each variable to each of the 6 kept dimensions:

	Dim,1	Dim,2	Dim,3	Dim,4	Dim,5	Dim,6
Cumulated CO2 emissions (M tonnes)	14,41	0,66	2,26	1,60	1,12	0,05
% Cumulated CO2 emissions	14,41	0,66	2,26	1,60	1,12	0,05
CO2 emissions (M tonnes)	14,60	2,86	0,00	0,13	0,04	0,28
% of global CO2 emissions	14,60	2,86	0,00	0,13	0,04	0,28
Per capita CO2 emissions (t/cap)	3,95	7,36	0,20	6,31	1,51	1,34
GDP, constant prices (% change)	0,35	0,92	7,02	21,86	0,07	2,52
GDP, current prices (USD)	15,05	0,87	2,26	0,75	0,31	0,18
GDP per capita, current prices (USD)	1,93	13,86	0,09	0,47	0,00	0,17
Total investment (% GDP)	1,22	1,52	7,54	2,06	19,07	23,74
Gross national savings (% GDP)	3,70	1,00	15,30	3,64	3,43	0,00
Volume of imports of goods and services (% change)	0,11	2,51	0,01	1,78	32,25	10,88
Volume of exports of goods and services (% change)	0,02	2,82	0,70	17,33	22,16	0,56
Unemployment rate	2,71	2,95	4,14	0,01	3,87	9,19
Population (millions)	7,68	4,99	0,44	3,10	0,36	0,01
General government revenue (% GDP)	0,36	13,38	2,65	10,58	0,12	4,89
General government total expenditure (% GDP)	0,25	10,02	6,25	10,11	0,00	11,09
General government net debt (% GDP)	0,04	2,38	20,49	4,70	3,25	2,98
General government gross debt (% GDP)	0,02	0,23	23,06	3,11	4,66	2,91
Account balance (% GDP)	1,53	6,08	4,20	0,74	4,15	23,81
Unconditionnal reduction (%)	0,54	11,77	1,10	7,90	0,05	1,10
Energy (kg oe/cap)	2,53	10,30	0,03	2,07	2,42	3,98

Table 3 - Principal component analysis coordinates

For the first dimension, the variables that are important to explain the positioning in the 6-dimension space are the following: CO_2 emissions in 2017 (M tons), percentage of global CO_2 emissions in 2017, GDP (current prices, in USD), percentage of cumulated global CO_2 emissions, from 1751 to 2017, cumulated global CO_2 emissions, from 1751 to 2017 (M tons) and country's population (Millions).

For the second dimension, the variables that are important to explain the positioning in the 6-dimension space are the following: GDP per capita (current prices, in USD), general government revenue (in % of GDP), unconditional emission reduction objective towards 2030 compare to 1990 (in %), general government total expenditure in (% of GDP), per capita CO_2 emissions (tCO$_2$/cap), account balance (in % of GDP), country's population (Millions) and the energy intensity (kg oil equivalent/capita).

The first 2 dimensions, which explain 46,8% of the total variance (26,06% + 20,73%) are composed of different contributions from all variables. Below, the graph shows the PCA for those two dimensions.
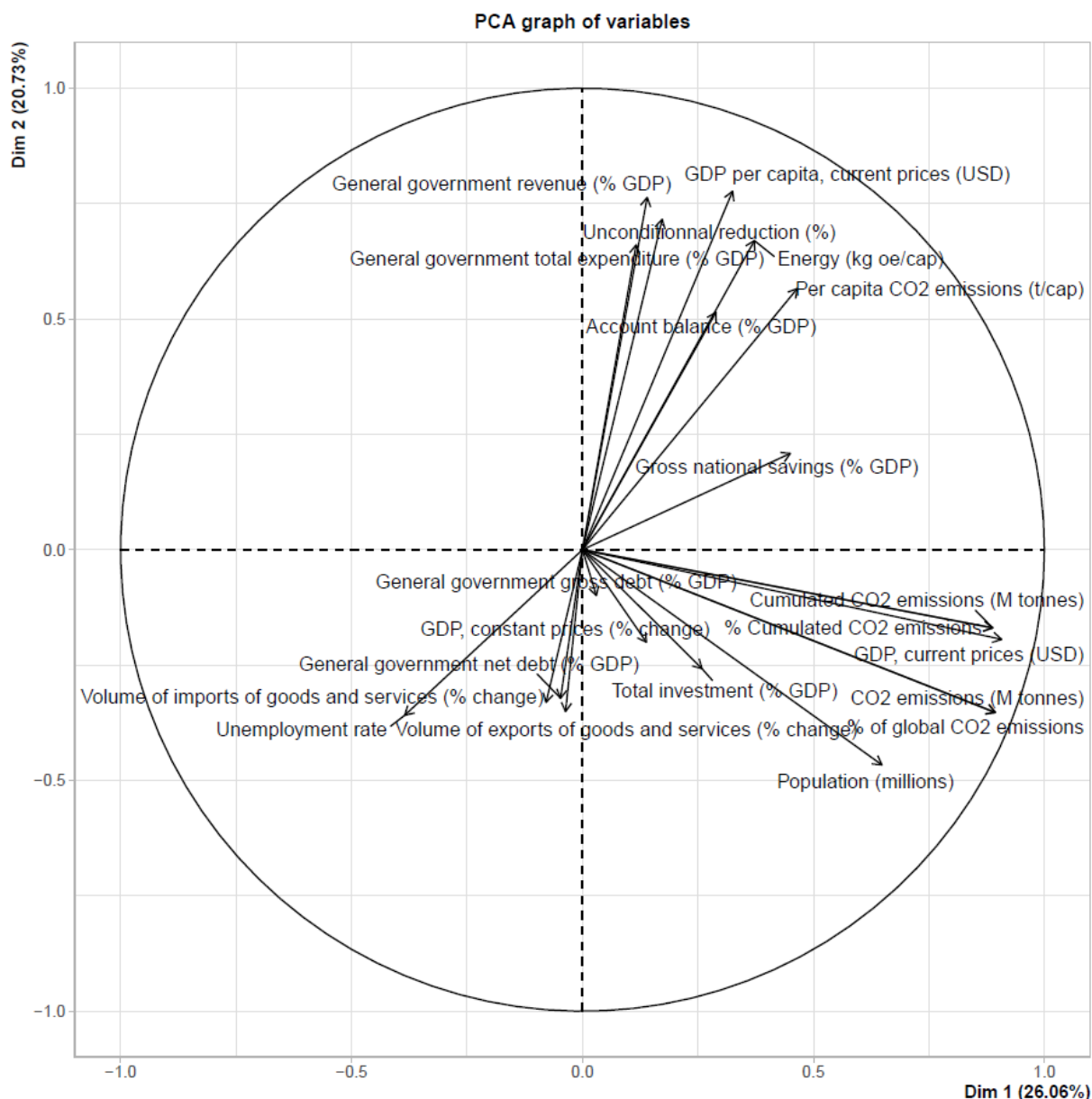
Figure 3 - Principal component analysis mapping of indicators on the first two dimensions

The first dimension is represented on the east-west axis.
The second dimension is represented on the north-south axis.
The larger the arrow of the variable, the bigger is its contribution.

We see on the graph above that the environmental variables (related to CO_2 emissions) are not pointing in the same direction as variables related to economic growth. What is interesting is the fact that unconditional reduction ambition is more correlated with economic growth variables than with emissions variables. Meaning that countries that have significant economic power have shown more ambition in their NDC or INDC, regardless of their contribution to global emissions. Also, the energy intensity (energy consumption per capita) is related to those variables.

This shows that countries with lower economic resources have less ambitions regarding their emission reduction. This can be explained by the fact that they do not necessarily have the means to achieve

emission reduction and not jeopardizing their economic development. These countries need technology transfers, capacity building and financial support. It is only logical that they tend to have lower emission reduction ambition and that they focus on adaptation, as they are facing the consequences of climate change, but they do not necessarily have the means to have significant impact on global warming.

Dimension 3 is mostly composed by: GDP, GDP per capita, gross national savings (%GDP), general government total expenditure (%GDP), general government net debt and gross debt (%GDP).

Dimension 4 is composed with per capita CO_2 emissions, GDP, unemployment rate, general government revenue (%GDP), total expenditure (%GDP), unconditional GHG emission reduction ambition.

Dimension 5 is composed with the change in volumes of imports and exports of goods and services (% change) and total investment (%GDP).

Dimension 6 is composed with total investment (%GDP), account balance (%GDP), total expenditure (%GDP), change in volume of imports of goods and services (% change), unemployment rate and government revenue (%GDP).

To define the unconditional emission reduction ambition, we rely on figures stated in the INDCs.

To allow comparison, and to use the same reference year, the ambition is calculated compared to the 1990 levels. When the baseline year use to target an emission reduction in the INDC is not 1990 (e.g. Business As Usual projection for 2030, or 2005 levels), we used figures from the JRC's EDGAR[13] database (Emission Database for Global Atmospheric Research). The EDGAR database provides figures for CH_4 emissions (expressed in CO_2 equivalent), N_2O emissions (expressed in CO_2 equivalent) and CO_2 emissions. We then have a sum of GHG emissions, expressed in CO_2 equivalent. In our database, a positive value for the variable "Unconditional reduction (%)" means that, towards 2030, emissions should be lower than in 1990.

One important assumption is that regarding the reduction ambition of EU countries, we considered for each country the EU target, which is a GHG emission reduction of 40% compared to 1990 levels overall.

4.5   Which country clusters regarding GHG emissions?

Projecting the 73 countries according to their values in the different variables along the first two dimensions, we obtained the following graph:

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[13]*Available here : https://edgar.jrc.ec.europa.eu/overview.php?v=CO2andGHG1970-2016&dst=GHGemi*
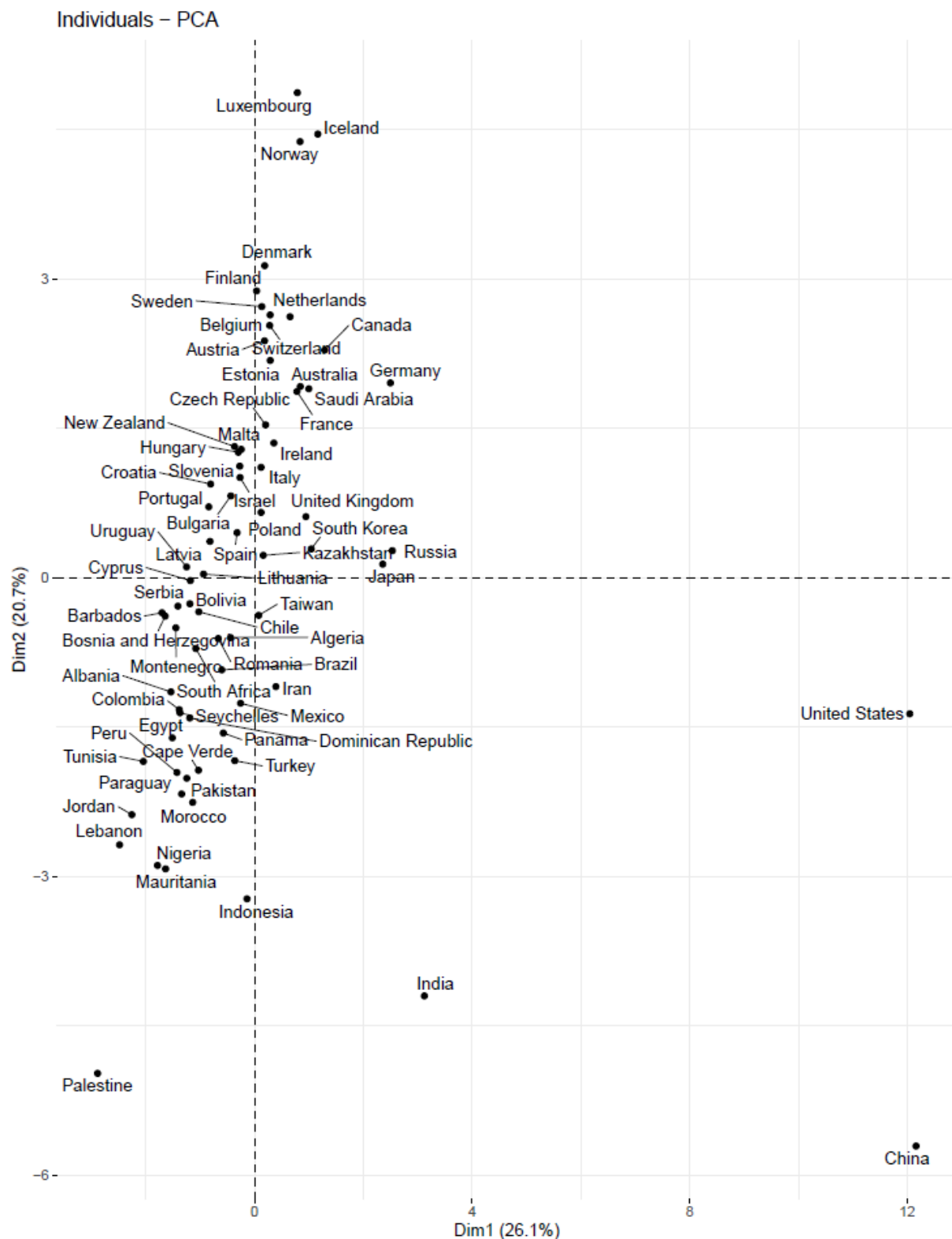
Figure 4 - Principal component analysis of countries on the first two dimensions

With this graph, it is important to bear in mind that it does not represent the full principal component analysis, as only two dimensions are considered.

To get a clearer idea of the mapping of our countries of interest we can zoom in the picture:

Figure 5 - Principal component analysis of countries on the first two dimensions (zoomed-in)

On the graph above, SEMed countries are highlighted. Regarding the positioning of Palestine, the actual position is further down the north-south axis (see the "unzoomed" graph). India, China and the United also are out this zoomed-in graph.

We can see that SEMed countries are concentrated in the south-west region of the graph. The only exception is Israel. This can be explained by Israel's high economic wealth.

The graphic visualization of the first two dimension allows to picture the situation, but only partially, as these dimensions explain only 46,8% of the variance. The analysis will be conducted in the 6-dimension space, to keep most of the information (80%).

Each *individual* (the countries) has coordinates for each of the 6 dimensions. Below, the coordinates of the SEMed countries for each dimension.

	Dim. 1	Dim. 2	Dim. 3	Dim. 4	Dim. 5	Dim. 6
Albania	-1,54	-1,14	0,60	1,00	0,24	-0,21
Algeria	-0,45	-0,61	-1,55	-0,85	-3,70	3,19
Bosnia and Herzegovina	-1,65	-0,39	0,94	0,63	2,45	1,12
Egypt	-1,52	-1,62	1,88	-0,10	-0,55	-1,22
Israel	-0,27	1,00	-0,11	0,06	-0,06	-0,45
Jordan	-2,27	-2,40	2,05	-1,19	-0,24	0,46
Lebanon	-2,49	-2,72	4,34	-2,39	-2,52	0,70
Mauritania	-1,64	-2,93	-0,21	1,16	-1,06	0,79
Montenegro	-1,45	-0,52	1,36	1,02	-0,88	2,25
Morocco	-1,14	-2,26	-0,98	0,81	-0,45	0,39
Palestine	-2,90	-4,99	1,08	-0,14	4,81	2,88
Tunisia	-2,05	-1,86	1,42	-1,04	-0,15	0,21
Turkey	-0,37	-1,84	-1,95	1,18	0,38	0,99

Table 4 - Principal component analysis coordinates of the SEMed countries

As we have the coordinates for the 73 countries, we can calculate the distance between each country in the vectoral space and compare the distances. Distance between country A and country B can be calculated as follows:

$$D_{AB} = \sqrt{(A_1 - B_1)^2 + (A_2 - B_2)^2 + (A_3 - B_3)^2 + (A_4 - B_4)^2 + (A_5 - B_5)^2 + (A_6 - B_6)^2}$$

With A_1 being the coordinate of country A for the first dimension, and with B_1 being the coordinate of country B for the first dimension.

Lower distance means that the countries have similar values in the different variables, as those variables compose the vectoral space.

Below, we have the table of vectoral distances for each SEMed countries, with the 73 countries considered:

	Albania	Algeria	Bosnia and Herzegovina	Egypt	Israel	Jordan	Lebanon	Mauritania	Montenegro	Morocco	Palestine	Tunisia	Turkey
Albania		6,05	2,73	2,17	2,79	3,11	6,11	2,57	2,88	2,18	6,97	2,43	3,13
Algeria	6,05		7,21	6,62	5,66	6,25	7,30	5,03	4,67	4,97	10,26	5,87	5,22
Bosnia and Herzegovina	2,73	7,21		4,17	3,75	4,08	7,19	4,53	3,57	4,05	5,66	3,60	4,08
Egypt	2,17	6,62	4,17		3,64	2,30	4,59	3,46	3,86	3,49	7,71	1,91	4,84
Israel	2,79	5,66	2,54	3,64		4,76	7,21	4,60	3,84	3,69	8,90	3,92	3,87
Jordan	3,11	6,25	4,08	2,30	4,76		3,48	3,48	3,63	3,81	6,37	0,91	5,12
Lebanon	6,11	7,30	7,19	4,59	7,21	3,48		6,02	5,61	6,70	8,92	4,14	8,13
Mauritania	2,57	5,03	4,53	3,46	4,60	3,48	6,02		3,24	1,39	6,93	3,16	2,82
Montenegro	2,88	4,67	3,57	3,86	3,84	3,63	5,61	3,24		3,50	7,50	3,33	4,13
Morocco	2,18	4,97	4,05	3,49	3,69	3,81	6,70	1,39	3,50		7,04	3,21	1,71
Palestine	6,97	10,26	5,66	7,71	8,90	6,37	8,92	6,93	7,50	7,04		6,57	7,10
Tunisia	2,43	5,87	3,60	1,91	3,92	0,91	4,14	3,16	3,33	3,21	6,57		4,47
Turkey	3,13	5,22	4,08	4,84	3,87	5,12	8,13	2,82	4,13	1,71	7,10	4,47	

Table 5 - Principal component analysis distances between SEMed countries, computed with all 73 countries

To better identify possible SEMed country clusters, let us focus on the vectoral distances between SEMed countries only. By normalizing those distances between 0 and 1, we can more easily compare the correspondence between the countries. The transformation is done with the following computation:

$$D'_{AB} = \frac{D_{AB} - D_{Min}}{D_{Max} - D_{Min}}$$

With D_{AB} being the vectoral distance between SEMed country A and SEMed country B, D_{Min} being the minimum distance between two SEMed countries, and D_{Max} being the maximum distance between two SEMed countries.

The correspondence (fitness) between SEMed countries A and B is then calculated with the following transformation:

$$Fitness_{AB} = 1 - D'_{AB}$$

SEMed countries having a correspondence of 1 (Tunisia and Jordan) are the closest SEMed countries in the 6-dimension vectoral space. As opposed the countries with a correspondence value of 0 are the two countries that share the least similarities (Palestine and Algeria).

	Albania	Algeria	Bosnia and Herzegovina	Egypt	Israel	Jordan	Lebanon	Mauritania	Montenegro	Morocco	Palestine	Tunisia	Turkey
Albania		0,45	0,80	0,87	0,80	0,76	0,44	0,82	0,79	0,86	0,35	0,84	0,76
Algeria	0,45		0,33	0,39	0,49	0,43	0,32	0,56	0,60	0,57	0,00	0,47	0,54
Bosnia and Herzegovina	0,80	0,33		0,65	0,70	0,66	0,33	0,61	0,72	0,66	0,49	0,71	0,66
Egypt	0,87	0,39	0,65		0,71	0,85	0,61	0,73	0,68	0,72	0,27	0,89	0,58
Israel	0,80	0,49	0,83	0,71		0,59	0,33	0,61	0,69	0,70	0,15	0,68	0,68
Jordan	0,76	0,43	0,66	0,85	0,59		0,73	0,72	0,71	0,69	0,42	1,00	0,55
Lebanon	0,44	0,32	0,33	0,61	0,33	0,73		0,45	0,50	0,38	0,14	0,65	0,23
Mauritania	0,82	0,56	0,61	0,73	0,61	0,72	0,45		0,75	0,95	0,36	0,76	0,80
Montenegro	0,79	0,60	0,72	0,68	0,69	0,71	0,50	0,75		0,72	0,29	0,74	0,66
Morocco	0,86	0,57	0,66	0,72	0,70	0,69	0,38	0,95	0,72		0,34	0,75	0,91
Palestine	0,35	0,00	0,49	0,27	0,15	0,42	0,14	0,36	0,29	0,34		0,39	0,34
Tunisia	0,84	0,47	0,71	0,89	0,68	1,00	0,65	0,76	0,74	0,75	0,39		0,62
Turkey	0,76	0,54	0,66	0,58	0,68	0,55	0,23	0,80	0,66	0,91	0,34	0,62	

Table 6 - Relative distance between SEMed countries, computed with all 73 countries

With the following legend:

```
Legend :     Red : below 0.30
             Yellow : between 0.30 and 0.60
             Green : between 0.60 and 0.75
             Blue : between 0.75 and 0.90
             Purple : betwen 0.90 and 1
```

This is only a partial analysis of the economic and environmental situations, as it considers a limited number of variables, and except for the variables "Cumulated emissions" and "Unconditional GHG emission reduction ambition towards 2030", dynamics are not considered.

This means that if structural changes are taking place but are not yet fully into force (e.g. share of use of RES in the energy mix), the analysis would not be able to identify such planned changes. A deeper analysis would allow to include dynamics and hence identify efforts put in place through time. Also, the unconditional GHG emission reduction ambitions are those stated in the (I)NDCs submitted in 2015, for the COP-21. It is likely that those numbers are enhanced with the NDC submitted in 2020, before COP-26.

The objective is to objectivize the analysis, to reduce the bias that would arise from a strictly qualitative approach and to propose a methodology to identify synergies and define clusters to avoid duplicating effort where countries could share knowledge and good practices.

The Med clusters that we can propose based on our analysis are the following:

- Egypt, Jordan, Lebanon, Palestine, Tunisia;
- Mauritania, Morocco, Turkey, Algeria;
- Albania, Bosnia and Herzegovina, Israel, Montenegro.

Considering all SEMed countries, we can see that there is a rather high correspondence between them, showing that they share similarities when considering economic and environmental characteristics.

The proposed clusters should be confirmed with deeper analysis and is subject to political agreement. Hence, the composition of the clusters could evolve in the future.

5. SEMed NDCs: country-specific state of play and priorities

5.1 Priorities regarding GHG emissions

GHG emissions derive mainly from two major sources: energy production and consumption coming out from fossil fuels (in every activities) on the one hand, and agricultural and land use and forest (AFOLU), on the other[14].Considering their predominant role, they have been carefully examined in this report.

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[14] *Christian de Perthuis, Le tictac de l'horloge climatique, Novembre 2019*

The rapid development of the South and East Mediterranean countries is leading to a significant increase in energy demand and is changing the economic and energy landscape of the region (OME[15]). *The North countries are undergoing different changes, with a diversification of energy sources through the increased introduction of renewable sources and implementing stronger and effective energy efficiency measures, also thanks to the growing investment in digital technology.*[16]

The next NDC will likely refer to a proactive scenario based upon the implementation of strong energy efficiency programs, increased diversification in the energy mix in addition to renewable energy stations on different scales (small-medium-large).

Regardless of the scenario, energy demand in the SEMed countries will exceed that of the North (OME).

5.2   Priorities regarding adaptation

5.2.1   Basic statistical analysis of enumeration

Once we have defined the different clusters within the SEMed group, we would like to assess whether the adaptation actions proposed by the countries in the different national communications are relevant or not. The relevance evaluation will be explained later in this report.

From the World Bank's Adaptation content of NDCs and countries' NAPAs, we extracted all the adaptation projects. Overall, we extracted 1562 actions, which are composing 45 adaptation keys. Those keys allow comparison between context-specific adaptation actions. These keys have been defined using a text-mining program, by analyzing links between words describing the adaptative projects. It allowed us to design 45 categories, the "adaptation keys".

From those 45 keys, we define 12 meta-keys, describing the sector on which the adaptation action is aimed to have an impact.

On the other hand, we have 7 climate change induced hazards, divided into 2 categories. First category is named "To adapt with" hazards, describing phenomenon that are a change of the average, over a relative long time period, to which human society can adapt. In this category, we include the following hazards: temperature increase, rainfall increase (volume and frequency) and sea level rise. The second category groups the "to cope with" hazards. Those hazards are major stress, impossible to prevent even with a higher level of resilience, the only alternative being to deal with the consequences. It includes storms, floods, droughts and heat waves.

The DARA's Climate Vulnerability Monitor[17] defines for each country an intensity for each climate change induced hazard. We have an intensity gradient for hazards: "low and moderate", "high", "severe" and "acute". To each intensity, is assigned a + or – characteristic, allowing to have a gradient composed of 8 different intensities.

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[15] *Observatoire Méditerranéen de l'Energie (OME) : Mediterrananenergy perspectives 2018.*
[16]*Mettling, Bruno, BoomingAfrica, Le Temps de l'Afrique Digitale, Débats Publics Ed., 2019.*
[17]https://daraint.org/

Below we have a contingency table for occurrences of key for the drought hazard, considering all 1562 projects:

Drought	LowModerate	High	Severe	Acute	Total
Resistant variety	4	24	2	3	33
Forest management	1	14	2	2	19
Wetland management	4	12	1	0	17
Forest fire	1	14	0	1	16
Warn system	2	8	1	2	13
Irrigation system	3	6	0	3	12
Agricultural production	1	8	0	1	10
Water storage	0	8	0	2	10
Livestock production	4	6	0	0	10
Rangeland management	3	4	1	0	8
Public awarness	0	7	0	0	7
Fish production	0	6	1	0	7
Rainwater harvest	3	4	0	0	7
Epidemic disease	0	6	0	0	6
Water drink	0	5	0	1	6
Groundwater	1	3	0	1	5
Insurance program	0	4	0	0	4
Develop infrastructure	0	2	0	0	2
Capacity build	1	1	0	0	2
Surface water	0	1	0	1	2

Table 7 - Contingency table for the hazard "Drought" for all NDCs

A simple statistical analysis could lead to count the occurrences for each intensity. Another possibility would be to compute the share of countries facing a certain hazard that chose to implement a certain adaptation solution. This could allow us to have a country-wise analysis, to understand the dynamics of the choices.

We opt to use a different criterion rather than the number of occurrences or weight to assess whether there is attraction between keys and lock intensity. We need to consider all the information that is included in the contingency tables.

We propose to assess the relevance of adaptation action choices made by countries all over the world by performing a Factorial Correspondence Analysis (FCA). The correspondence analysis allows to define several dimensions lower or equal to the number of variables, and extract most of the information that is contained in the different contingency tables. This analysis would provide different features, allowing us to define a fitness coefficient of each adaptation key for a certain context (hazard and intensity considered) to assess the relevancy of this key.

- Goal: assess the relevance of countries' adaptation action choices, as communicated in their NDCs.

A quantitative fitness coefficient

- Method: link climate change induced hazards (locks) with a taxonomy of adaptation actions(keys)
- Databases: World Bank's Adaptation content of NDCs, NAPAs
- Hypothesis: choices stated in the NDC are the best representation of mankind's knowledge about adaptation

- Statistics: correspondence analysis and use of geometric distance in a defined 6-dimensions space. From 0 (lowest fitness) to 1 (highest fitness)
- Results: for 7 SEMed countries who sufficiently informed their NDC on adaptation actions, fitness coefficient of their adaptation actions.

5.2.2   Realization of the FCA

We propose here the application of the Factorial Correspondence Analysis method to compare adaptive solutions listed by class of solution according to hazard intensity. We base our analysis on the environmental keys we constructed, and on risk intensity matching to define contingency tables (as displayed above).

A short summary of the data that are being used for this analysis:

The taxonomy for the keys

- From World Bank and Climate Watch databases on adaptation: 1562 adaptation projects among the 140 Nationally Determined Contributions
- From those 1562 actions, we created 45 adaptation keys, to allow comparison between context-specific adaptation actions.
- The 45 keys compose 12 meta-keys, describing issues at higher level

Categories of locks:

- 2 categories of locks
  - « **To adapt with** »:
    - *Temperature increase*
    - *Rainfall increase (volume and frequency)*
    - *Sea level Rise*

  - « **To cope with** »:
    - *Storms*
    - *Floods*
    - *Droughts*
    - *Heat waves.*

- From the Climate Vulnerability Monitor (DARA), intensity gradient of hazards: « Low and Moderate », « High », « Severe » and « Acute ».   Two characteristics + &-, for each intensity →**8 different intensities***(one intensity +or-, per hazard, per country).*

The Correspondence Analysis (CA) can be deconstructed with the following steps:

From the contingency tables, we define 4 dimensions (the number of hazard intensity, as the two characteristics of each hazard have been merged). Each key contributes with a certain degree to the construction of each dimension. The vectoral space is reduced to three dimensions, which explain 100% of the contingency table variance.

Each hazard intensity and each key has coordinates in this three-dimension space. Given those coordinates, we can calculate a distance between each key and each hazard intensity. Vectoral distance between environmental key i and hazard intensity j is calculated as follows:

$$D_{ij} = \sqrt{(I_1 - J_1)^2 + (I_2 - J_2)^2 + (I_3 - J_3)^2}$$

With I_1 being the coordinate of environmental key i for the first dimension, and with J_1 being the coordinate of hazard intensity j for the first dimension.

At this point, we have vectoral distances that are expressed numerically. The lower the distance, the greater the attraction between key and hazard intensity.

To have an easy-to-read coefficient, we normalize the values between zero and one, with the following transformation:

$$X'_{ij} = \frac{X_{ij} - X_{Min}}{X_{Max} - X_{Min}}$$

With X_{ij} being the vectoral distance between environmental key i and hazard intensity j. The maximum (X_{Max}) and minimum (X_{Min}) vectoral distances are taken for one hazard, with the four intensity features characterizing it.

Hence, we can define the fitness coefficient, expressed between zero and one, with the following:

$$Fitness_{ij} = 1 - X'_{ij}$$

The fitness coefficient aims to allow comparison between adaptation projects for one single climate change-induced hazard. The key and the intensity with the smallest distance value get a coefficient value of 1. On the contrary, the pair with the largest distance, will get a coefficient value of 0.

The fitness coefficient does not assess the efficiency of the adaptation action. Indeed, *ex-post* evaluation would be necessary to assess the ability of the solution to solve the issue it has been designed for. As the fitness coefficient is based on the number of occurrences of the different adaptation action for a certain hazard, and on a transformation of the contingency tables to take into account multiple variables, it rather assesses the relevancy of the choice made by the country, based on the hypothesis that countries made the best choices they could. This analysis goes deeper than only enumerate the choices by hazard intensity. It also considers the distribution of the environmental key. That is, a project that has been chosen for only one intensity will get a higher fitness coefficient value than a project that has been chosen to solve different intensities, even if the latter have a larger number of occurrences for the intensity than the former. This allows for environmental keys that have been chosen fewer times to still be considered as good choices.

On the contingency table above, we see that the key "Public awareness" gets 7 occurrences, all of them for the "high" intensity in the "Drought" hazard. On the other hand, the key "Warn system" (for warning systems) gets a total of 13 occurrences. Those occurrences are distributed across the four different intensities: "Low and Moderate": 2; "High": 8; "Severe": 1; "Acute": 2.

On the table below, which reports fitness coefficients for the drought hazard, "Public awareness" gets the highest fitness value, showing that if the project has been clearly identified by countries worldwide to face a certain hazard intensity, the fitness is higher.

Fitness	LowModerate	High	Severe	Acute
Agricultural production	0,509	0,958	0,312	0,441
Capacity build	0,906	0,389	0,095	0,039
Develop infrastructure	0,287	0,676	0,639	0,199
Epidemic disease	0,651	0,843	0,284	0,244
Fish production	0,932	0,550	0,185	0,132
Food security	0,554	0,933	0,496	0,434
Forest fire	0,325	0,826	0,248	0,228
Forest management	0,325	0,826	0,248	0,228
Groundwater	0,569	0,794	0,531	0,533
Insurance program	0,325	0,826	0,248	0,228
Irrigation system	0,448	0,959	0,298	0,365
Land management	0,416	0,811	0,616	0,432
Livestock production	0,591	0,597	0,235	0,623
Public awarness	0,499	1,000	0,429	0,347
Rainwater harvest	0,755	0,492	0,485	0,118
Rangeland management	0,720	0,788	0,441	0,240
Resistant variety	0,325	0,826	0,248	0,228
Surface water	0,600	0,728	0,283	0,592
Warn system	0,006	0,240	0,000	0,876
Water drink	0,236	0,480	0,283	0,943
Water management	0,946	0,504	0,161	0,108
Water storage	0,333	0,817	0,277	0,539
Water supply	0,318	0,770	0,268	0,600
Wetland management	0,517	0,950	0,313	0,451

Table 8 - Fitness coefficient for the hazard "Drought" for all NDCs

Below, are displayed the different tables concerning the different hazards faced by the SEMed countries, with the fitness coefficient for the chosen action.

First, we have the "to cope with" hazards (flood, drought, heat waves and storm) and afterwards the "to adapt to" issues (temperature increase and sea-level rise).

- Flood:

Country	Key	Intensity	Fitness
Algerie	Health system	LowModerate	0,59
Algerie	Restore ecosystem	LowModerate	0,61
Egypt	Infrastructure construction	LowModerate	1,00
Jordan	Disease prevention	LowModerate	0,70
Mauritania	Coastal protection	LowModerate	0,89
Mauritania	Coastal protection	LowModerate	0,89
Mauritania	Disease prevention	LowModerate	1,00
Mauritania	Infrastructure construction	LowModerate	1,00
Morocco	Digue	LowModerate	0,85
Morocco	Restore ecosystem	LowModerate	0,61
Tunisia	Mangrove	LowModerate	0,67
Tunisia	Vector born disease	LowModerate	0,18

Table 9 - Intensities and fitness coefficients for SEMed countries adaptation for the hazard "Flood"

- Drought:

Country	Key	Intensity	Fitness
Algeria	Land management	High	0,811
Egypt	Food security	LowModerate	0,554
Egypt	Water management	LowModerate	0,946
Jordan	Public health	LowModerate	0,414
Lebanon	Forest management	High	0,248
Mauritania	Food security	LowModerate	0,554
Mauritania	Livestock production	LowModerate	0,591
Mauritania	Resistant variety	LowModerate	0,325
Morocco	Surface water	Acute	0,592
Morocco	Water management	Acute	0,108
Tunisia	Forest fire	High	0,826
Tunisia	Forest management	High	0,826
Tunisia	Land management	High	0,811

Table 10 - Intensities and fitness coefficients for SEMed countries adaptation for the hazard "Drought"

- Heat waves:

Country	Key	Intensity	Fitness
Algeria	Public health	High	0,886
Jordan	Public health	LowModerate	0,414
Mauritania	Public health	Severe	0,870

Table 11 - Intensities and fitness coefficients for SEMed countries adaptation for the hazard "Heat waves"

- Storm:

Country	Key	Intensity	Fitness
Egypt	Infrastructure capacity building	LowModerate	0,956
Mauritania	Coastal protection	LowModerate	0,836
Tunisia	Human settlement	LowModerate	0,978
Tunisia	Infrastructure capacity building	LowModerate	0,956

Table 12 - Intensities and fitness coefficients for SEMed countries adaptation for the hazard "Storm"

- Temperature increase:

Country	Key	Intensity	Fitness
Algeria	Ensure food security	LowModerate	0,797
Algeria	Health system	LowModerate	0,907
Egypt	Ensure food security	LowModerate	0,797
Egypt	Fishery sector	LowModerate	0,810
Egypt	Water management	LowModerate	0,483
Jordan	Disease control	LowModerate	0,905
Jordan	Vector born disease	LowModerate	0,973
Mauritania	Ensure food security	Acute	0,525
Mauritania	Fishery sector	Acute	0,459
Mauritania	Fishery sector	Acute	0,459
Mauritania	Livestock management	Acute	0,237
Mauritania	Livestock management	Acute	0,237
Mauritania	Resilient crop variety	Acute	0,420
Morocco	Land management	LowModerate	0,964
Morocco	Reforestation	LowModerate	0,761
Morocco	Watershed management	LowModerate	0,717
Tunisia	Capacity building	LowModerate	0,472
Tunisia	Disease control	LowModerate	0,905
Tunisia	Health system	LowModerate	0,907
Tunisia	Resilient crop variety	LowModerate	0,977
Tunisia	Vector born disease	LowModerate	0,973
Tunisia	Warning system	LowModerate	0,694

Table 13 - Intensities and fitness coefficients for SEMed countries adaptation for the hazard "Temperature increase"

- Sea-level rise:

Country	Key	Intensity	Fitness
Egypt	Information system	LowModerate	0,852
Mauritania	Coastal protection	Severe	0,705
Mauritania	Infrastructure management	Severe	0,896
Mauritania	Infrastructure management	Severe	0,896
Mauritania	Marine resources	Severe	0,687
Mauritania	Sea induced flood	Severe	0,471
Tunisia	Coastal protection	LowModerate	0,744
Tunisia	Erosion defense	LowModerate	0,855
Tunisia	Human settlement	LowModerate	0,882
Tunisia	Infrastructure management	LowModerate	0,757
Tunisia	Potable water	LowModerate	0,468

Table 14 - Intensities and fitness coefficients for SEMed countries adapatation for the hazard "Sea-level rise"

We see that countries' choices fitness coefficients differ a lot. Improvements could be made by the different countries regarding the adaptation actions. While some choices have a high coefficient, some improvements could still be made.

5.3 Which MED-clusters regarding adaptation?

We examined cross cutting issues regarding adaptation measures. It must be noted that six SEMed countries did not include adaptation projects in the NDC submitted in 2015. Those countries are Albania, Bosnia and Herzegovina, Israel, Montenegro, Palestine and Turkey. If those countries are planning to include adaptation projects in their next submission, we would be able to assess the relevance of their choices with the metric presented in this report.

On the table below, a summary of the actions taken by the countries for the different climate-change induced hazards is presented, allowing to picture the possible synergies that could be enhanced by the SEMed countries.

	Algeria	Egypt	Jordan	Lebanon	Mauritania	Morocco	Tunisia
Drought	OK	OK	OK	OK	OK	OK	
Comments	Land managt	Food security & water managt	Insurance	Forest managt	Food security	Water managt	
Flood	OK	OK	OK		OK	OK	OK
Comments	Health & ecosystem	Infrastructure	Disease		Disease & costal zones	Protection barrier	Health
Heat waves	OK		OK		OK		
Comments	Health		Health		Health		
Sea level rise		OK			OK		OK
Comments		Forestry			Coastal zones		Tourism, coastal zones
Storm		OK			OK		OK
Comments		Infrastructure			Coastal zones		Infrastrucutre
T° increase	OK	OK	OK		OK	OK	OK
Comments	Health & food security	Water managt & food security	Disease		Agriculture, fishery and food security	Water & land managt	Health

Table 15 - Summary of adaptation actions in the SEMed countries, as stated in the 2015 NDC version

As we have limited information regarding adaptation projects in the SEMed countries, it is difficult to define clusters for this part, and to validate economic and environmental clusters that are proposed in the previous part of the report.

In the tables in part 9 of this report, can be found for each country the different adaptations projects, along with the climate change induced hazard (and its intensity), as well as the fitness coefficient for each of the combinations.

6. Perspectives to get track on NDCs enhancement

6.1 Context of the Paris agreement

We are establishing with the present report a set of recommendations that can be made to update the NDCs of SEMed countries as soon as 2020 or by the end of 2024.

For the first NDC, each Party shall clearly indicate and report its accounting approach, including how it is consistent with Article 4, paragraphs 13 and 14, of the Paris Agreement. Parties may choose to apply accounting guidance contained in decision 4/CMA.1, annex II to its first NDC.

For the second and subsequent NDCs, the description of the NDC and the information on tracking of progress, including accounting of NDCs, must be consistent with the guidance contained in decision 4/CMA.1 and its annexes. Further, Parties must clearly indicate how their reporting is consistent with decision 4/CMA.1.

A Party must provide any definitions needed to understand its NDC, including definitions of indicators selected to track progress of implementation or achievement of the NDC; any sectors or categories

defined differently than in the national inventory report; and mitigation co-benefits of adaptation actions and/or economic diversification plans.

Parties must provide a description of each methodology and/or accounting approach used, as applicable, targets, construction of baseline targets, to the extent possible, and each selected indicator referred to earlier in this section.

The information on accounting shall also include, as applicable and available to an NDC:

- Key parameters, assumptions, definitions, data sources and models used;
- The IPCC guidelines used;
- The metrics used;
- Where applicable to its NDC, any sector-, category- or activity-specific assumptions, methodologies and approaches consistent with IPCC guidance, taking into account any relevant decision under the Convention, including as applicable:
  - The approach used to address emissions and subsequent removals from natural disturbances on managed lands;
  - The approach used to account for emissions and removals from harvested wood products;
  - The approach used to address the effects of age–class structure in forests;

- Methodologies used to estimate mitigation co-benefits of adaptation actions and/or economic diversification plans;
- Methodologies associated with any cooperative approaches that involve the use of internationally transferred mitigation outcomes towards the NDC, consistent with CMA guidance related to Article 6;
- Methodologies used to track progress arising from the implementation of policies and measures;
- Any other methodologies related to the NDC;
- Any conditions and assumptions relevant to the achievement of the NDC.

In addition, each Party shall also:

a) For each indicator identified, describe how it is related to its NDC;
b) Explain how the methodology in each reporting year is consistent with the methodology(ies) used when communicating the NDC;
c) Explain methodological inconsistencies with its most recent national inventory report, if applicable;
d) Describe how double counting of net GHG emission reductions has been avoided, including in accordance with guidance developed in relation to Article 6, if relevant.

All the information referred to above (including information related to the chosen indicator(s)) will be presented in a "structured summary" to track progress made in implementing and achieving the NDC. That information includes:

a) For each selected indicator:
   i. Information on the reference point(s), level(s), baseline(s), base year(s), or starting point(s);
   ii. Information on previous reporting years during the implementation period of the NDC, as applicable;

iii. The most recent information on each reporting year during the implementation period of the NDC;

b) Where applicable, information on GHG emissions and removals consistent with the coverage of the NDC;

c) The emissions contribution from the LULUCF sector for each year of the target period or target year, if not included in the inventory time series of total net GHG emissions and removals, as applicable;

d) Parties that participate in cooperative approaches that involve the use of internationally transferred mitigation outcomes towards their NDC, or authorize the use of mitigation outcomes for international mitigation purposes other than achievement of their NDC, must provide the following additional information:

   i. The annual level of GHG emissions and removals covered by the NDC on an annual basis, reported biennially.
   ii. An emissions balance reflecting the level of GHG emissions covered by the NDC adjusted on the basis of corresponding adjustments undertaken by effecting an addition for internationally transferred mitigation outcomes first-transferred/transferred and a subtraction for such outcomes used/acquired, consistent with guidance developed under Article 6;
   iii. Any other information consistent with guidance developed under Article 6, if relevant;
   iv. Information on how each cooperative approach promotes sustainable development; ensures environmental integrity and transparency, including in governance; and applies robust accounting to ensure, inter alia, the avoidance of double counting, consistent with guidance developed under Article 6.

Parties with an NDC that consists of adaptation actions and/or economic diversification plans resulting in mitigation co-benefits must provide the information necessary to track progress on the implementation and achievement of the domestic policies and measures implemented to address the social and economic consequences of response measures, including:

a) Sectors and activities associated with the response measures;
b) Social and economic consequences of the response measures;
c) Challenges and barriers to addressing the consequences;
d) Actions to address the consequences.

Other types of information necessary to tracking progress made in the implementation and achievement of the NDC concern PAMs related to implementing and achieving an NDC.

Parties should focus on information that has the most significant impact on GHG emissions or removals and that affects key categories in the national GHG inventory. This information shall be presented in narrative and tabular format.

Parties should organize the information submitted, to the extent possible, by the following sectors: energy, transport, industrial processes and product use, agriculture, LULUCF, waste management and other. While Parties are required to provide some information (i.e. the corresponding provision states that "Parties shall" provide such information), reporting of other types of information is recommended (i.e. Parties "should", "may" or "are encouraged" to report the information).

For Parties with an NDC goal that involves mitigation co-benefits resulting from adaptation actions and/or economic diversification plans consistent with Article 4, paragraph 7, of the Paris Agreement, information to be reported includes relevant information on policies and measures contributing to mitigation co-benefits resulting from adaptation actions or economic diversification plans.

Each Party shall provide, to the extent possible, estimates of the GHG emission reductions expected and achieved as a result of its PAMs. Those developing country Parties that need flexibility in the light of their capacities with respect to this provision are instead encouraged to report such information. When presenting the expected and achieved GHG emission reductions, Parties must describe the methodologies and assumptions used to estimate the GHG emission reductions or removals resulting from each PAM, to the extent available.

6.2 Gender

The gender parameter (feminine/masculine) is important in terms of climate policy, especially when considering mitigation and adaptive aspects on the ground of "proximity/local" versus "cross-systematization".

6.3 Transparency of processes and sources

6.3.1 As for GHG emissions (inventory and mitigation)

Consultative Group of Expert's technical handbook represents an effort by the CGE to help developing countries prepare for implementation of the ETF for action and support referred to in Article 13 of the Paris Agreement[18]. In this regard, the handbook aims to improve awareness and understanding of the ETF and its MPGs by national experts and practitioners from developing country Parties so that they may consider opportunities to improve current reporting and start planning for the establishment of institutional arrangements and reporting under the ETF.

The MPGs are guided by the principle of building on and enhancing the transparency arrangements under the Convention. Each Party will have a different starting point in the transition from the current MRV arrangements under the Convention to the ETF under the Paris Agreement. Therefore, continuing to enhance efforts to prepare and submit national communications and biennial update reports, and participate in the international consultation and analysis process will help developing country Parties develop their national capacity to prepare biennial transparency reports and participate effectively in the Technical Expert review (TER) process and the facilitative, multilateral consideration of progress.

In parallel to CGE's efforts, SBSTA follow their own program under the Convention:

I. The methodological work program, to be completed in November 2021, as COP-26 has been postponed due to the Covid-19 pandemic, which will cover:

a) Common reporting tables for the electronic reporting of the information in the national inventory reports of anthropogenic emissions by sources and removals by sinks of GHGs;

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[18]*CGE is a body from UNFCCC dedicated to raising the capacity of developing countries. Presentation of a draft of a technical handbook regarding transparency (COP-25, 3rd of December 2019).*

b) Common tabular formats for the electronic reporting of the information necessary to track progress made in implementing and achieving NDCs under Article 4 of the Paris Agreement;

c) Common tabular formats for the electronic reporting of the information on financial, technology development and transfer, and capacity-building support provided and mobilized, as well as such support needed and received, under Articles 9–11 of the Paris Agreement;

d) An outline of the BTR, the national inventory document and the TER report pursuant to the MPGs;

e) The training program for technical experts participating in the TER.

II. Matters relating to Article 6 of the Paris Agreement, to be completed in 2020, at COP26, which include:

a) Guidance on cooperative approaches referred to in Article 6, paragraph 2, of the Paris Agreement;

b) Rules, modalities and procedures for the mechanism established by Article 6, paragraph 4, of the Paris Agreement;

c) Work program under the framework for non-market approaches referred to in Article 6, paragraph 8, of the Paris Agreement.

The technical handbook on transparency, as for SEMed countries, will be up-dated according SBSTA's work, not before COP-26 in Glasgow.

Therefore, we think the present report would be more relevant for SEMed countries if it guides them in preparing for 2024 NDC's term than for COP-26.

Article 13 establishes the two clear purposes of the ETF, one on climate action and another on support for such action:

a) With respect to climate action, the purpose of the ETF is "to provide a clear understanding of climate change action in the light of the objective of the Convention as set out in its Article 2, including clarity and tracking of progress towards achieving Parties' individual NDCs under Article 4 of the Paris Agreement (herein after referred to as "NDCs)", and Parties' adaptation actions under Article 7, including good practices, priorities, needs and gaps, to inform the global stock take under Article 14";

b) Similarly, with respect to support for climate action, the purpose of the ETF is "to provide clarity on support provided and received by relevant individual Parties in the context of climate change actions under Articles 4, 7, 9, 10 and 11, and, to the extent possible, to provide a full overview of aggregate financial support provided, to inform the global stock take under Article 14". Linkages between adaptation and mitigation

In order to prioritize those adaptive actions, which are the same time mitigation and sustainable development actions.

6.3.2   For adaptation to climate change

Shift expertise and interpretation to the level of climate events/hazards (climate modeling, major risk factors) and not just vulnerabilities, which are dependent on the local context, ecosystems and human activity.

Article 13, paragraph 8, of the Paris Agreement stipulates that Parties should provide "information related to climate change impacts and adaptation under Article 7, as appropriate". This section describes the provisions and considerations relevant to reporting of information related to climate change impacts and adaptation under the ETF. Such information may be included in the BTRs on a voluntary basis,111 and chapter IV of the MPGs outlines a set of provisions that Parties should consider applying when preparing this section of their BTRs. An important aspect is the flexibility provided to Parties in terms of whether to include adaptation information, the types of information they should include in that respect and the reporting and communication instruments they choose to employ.
The MPGs provide some additional orientation as to the purpose of including adaptation information, noting that such information could "facilitate, inter alia, recognition of the adaptation efforts of developing country Parties".

Under the Convention and the Paris Agreement, Parties have developed a set of interconnected instruments for adaptation information. Additional information on these instruments and the linkages between them can be found in document AC/2019/9, *Mapping of relevant existing guidance to inform the preparation of draft supplementary guidance for voluntary use by Parties in communicating adaptation information in accordance with the elements of an adaptation communication,* and the forthcoming report, *25 Years of Adaptation Under the UNFCCC*, of the Adaptation Committee.

The specific types of information on climate change impacts and adaptation that Parties should include, where appropriate, in their BTRs are outlined in paragraphs 104 to 117 of the annex to decision 18/CMA.1. These include the general categories of national circumstances, institutions, legal frameworks, impacts and vulnerabilities, adaptation priorities and barriers, adaptation goals and efforts, progress on implementation of adaptation, monitoring and evaluation of adaptation, loss and damage, cooperation, good practices, experience and lessons learned.

6.4   Phasing local action plans with national strategies

The importance of non-state actors in shaping policy goals and commitments is commonly framed as a key defining characteristic of the international climate change regime. For the sake of the argument we will mainly focus here on national policymakers, city and regional governments. There are many others like non-government organizations, voluntary associations and private companies. But it is outside the scope of this study. We may be usefully inspired by existing thoughts and initiatives on how to cross align bottom-up knowledges and actions with national plans and climate strategies (such as NDCs).

For instance, CLIMA MED contribution includes *the strengthening of National Communication Groups (NCGs) at supranational, national and local levels, who will stimulate ownership to embed mainstreaming mechanisms, support policy-making process and lead climate coordination efforts.Fighting climate change is also about empowering Local authorities, establishing the SEACAP Support Mechanisms (SSMs) at the national level and supporting cities in the technical and organizational aspects to increase the number of local SEACAPs, and drive sustainable climate actions at the local level*. This includes a participatory learning approach (training, peer learning and regional workshops). The local authorities become so-called "awareness-raisers".

The example of France provides us with an interesting concept of a phasing between SRCAE (national strategy declined at regional level, *Schéma Régional Climat Air Energie)* and PCAET (local action plan

implementing the SRCAE, *Plan Climat Air Energie Territorial)*. One challenge is to strengthen this approach on mitigation and to extend the territorial declination of action to the adaptation component (PNACC2).

The example of the Covenant of Mayors, through CoM Med, in order to better implement SEACAP. SEACAP (Sustainable Energy Access and Climate Action Plan) is *a bottom-up ad voluntary initiative that invites cities to define and meet ambitious and realistic energy target and climate targets. Local authorities are encouraged to define long-term vision and actions towards a sustainable future based on the pillars of Climate change mitigation and adaptation, and sustainable, affordable and secure access to energy. The Covenant of Mayors concerns action at local level within the competence of local authority. COM SSA signatories commit to elaborate an implement a strategic and operational document SEACAP.* SEACAP covers the geographical area under the jurisdiction of the local authorities. However, it is no stipulated how local strategies are compatible with national strategies (unless a national SEACAP has also been designed)[19]. SEACAP is a European Commission and Joint Research Center contribution. This is crucial in our mind. Indeed, as the process is bottom-up and the initiative is directly supported by the EU, towards the Covenant of Mayors network of cities, there is a missing link to make sure those efforts are consistent with NDCs. Same observation applies to ECLEI (local governments for sustainability, e. g.CitiesWithNature).

Another example of articulating local actions with national strategy is provided by Lea Berrang-Ford et al.[20], in British Columbia. They define the leadership of adaptation. The concept of "leadership" in this approach is principally concerned with understanding who is responsible for, and driving, policy change in response to perceived climate change risk. Goals, tools, resources and networks (such as building robust observation networks adaptation planning tools…) are jointly defined by:

-   Climate change adaptation strategy for British Colombia (2010). It includes generalized adaptation objectives at province level but no study on vulnerabilities of sector-specific targets, is made,
-   Preparing for climate change: an implementation guide for local governments in BC (2012), including the mention of heat impact and example adaptation actions at the local level.

Suggesting a new phasing to think climate globally and mitigate and adapt locally. This could be achieved by various means: through high profile adaptation champions, indicators of vertical and horizontal coordinative mechanisms, like inter-ministerial teams, committees and task forces, considering adaptation as a new policy field.

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[19] *How to develop a SEACAP in sub-Saharan Africa; short starting guide, European Commission*
[20]*Lea Berrang-Ford et al, Tracking global climate change adaptation among governments, Nature Climate Change, vol. 9, June 2019, 440-449*

6.5   Synergies with existing capacity-building initiatives

The table below presents a summary of some of the existing capacity-building initiatives that are currently taking place all over the world. The numbers in the second and third columns are ranking on a scale from 1 (strategy in the second column, and seminars in the third column) to 5 (implementation in the second column, and peer-to-peer action in the third column).

Networks/Initiatives/clusters	From strategy to implementation	From seminars to peer-to-peer	Organizers/founders	When ?	Main actions
Partnership on transparency	2,5	3	Germany/South Africa/South Korea	Petersberg 2010	Peer-to-peer learning on transparency and NDC implementation.
French-speaking cluster (Cluster francophone)	2,5	3	GIZ/CITEPA/MEEM/Belgium	2011	Exchanges of best practices in Africa regarding NAMAS, MRV, NDC.
Cluster MED Climate Transparency initiative	1	5	CITEPA/MEEM/AZO/ANME/4C	2018	Transparency capacity building of non-Annex I countries through on-field Southern expertise.
NDC partnership	4	3	Germany/Morocco/WRI	2016, COP-22	To support international collaboration in the implementation of NDC
Climate Action Enhancement Package of NDC Partnership	3	4	Germany/Morocco/WRI		CAEP : delivers targeted, fast-track support to countries to enhance the quality, increase the ambition, and implement NDCs. Allows beneficiary countries to submit updated NDCs to the UNFCCC by 2020 as well as to accelerate NDC implementation.
CBIT Global Coordination Platform	1	2	UNEP/UNDP	2019	Gap analysis, web-platform, knowledge sharing.

Networks/Initiatives/clusters	From strategy to implementation	From seminars to peer-to-peer	Organizers/founders	When ?	Main actions
ENI CBC Med Program	5	5			Cross-border cooperation program under the Europe Neighborhood Instrument ; Algeria, Cyprus, Egypt, Greece, France, Israel, Italy, Jordan, Lebanon, Malta, Palestine, Portugal, Spain, Tunisia.
Climate Vulnerable Forum	1	2	43 countries coalition	2016, COP-22	Carbon neutrality and RES usage, support NDCs designing, speeding-up before 2020.
2050 Trajectory Platform	5	2	Germany/France/Morocco + coalition	2016, COP-22	Support information sharing, technology transfer, capacity building during NDC implementation.
Facilité 2050	1	5	AFD		Support countries in the elaboration of long-term mitigation strategies before 2020.
LEDS Global Partnership	3	2	USAID/EU/DFID/WB		Defining and implementation of local mitigation actions.
NAMA Facility	4	3	BMUB/DECC	Doha 2012	Select and finance ambitious and reliable NAMA and mitigation projects.
Consultative Group of Experts	2	3,5	UNFCCC	Warsaw 1999	Seminars, trainings on BURs, NC and transparency/MRV of NDC since 2018.
Climate Policy Initiative	3	1	DECC/BMU/USAID	2009	Energy and land use policies. To help nations grow while addressing increasingly scarce resources and climate risk.
GCCA+ West Africa	2	5	Expertise France/UE/ECOWAS	2007	Support West African countries by building capacities and knowledge regarding mitigation and adaptation policies ; Support the implementation of adaptation projects.

Networks/Initiatives/clusters	From strategy to implementation	From seminars to peer-to-peer	Organizers/founders	When ?	Main actions
Paris Committee Capacity Building	1	1	UNFCCC (COP-21)	2015	Address current and emerging gaps and need in implementing and further enhancing capacity building in developed countries. Ensuring coherence and coordination in capacity building activities under the Convention.
CLIMA MED (UfM labelled project)	4	5	EU	2018	Climate Action in the ENI Southern neighborhood.
Initiative Belge CDN.	2	5	Belgian government	2017	Support African and Middle East countries in the governance of NDC.
Adapt'Action	3	5	AFD/Expertise France	2018	Deliver a technical support in the governance, methods and actions of their NDCs.
CTCN	3	3			Operational arm of the UNFCCC Technology Mechanism hosted by the UN Environment Programme (UN Environment) and the UN Industrial Development Organization (UNIDO). The Centre promotes the accelerated transfer of environmentally sound technologies for low carbon and climate resilient development at the request of developing countries. We provide technology solutions, capacity building and advice on policy, legal and regulatory frameworks tailored to the needs of individual countries.
ICAT Initiative for Climate Action Transparency	4,5	3,5	Children's Investment Fund Foundation (CIFF) and the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB), Italian Ministry of Environment (IMELS) and the ClimateWorks Foundation	2015	The Initiative will improve the availability and quality of data, and enable countries to promote efficient, cost-effective policies. The Initiative will also provide a platform for countries to share lessons learned and build mutual confidence in their climate actions.

Global Support Program GSP	1	3,5	UNDP	2018	Provides support to non-Annex I Parties in order to prepare National Communications (NCs) and BURs ; trainings ; tools ; technical guidance.
… and NDC Cluster (IKI Germany + 10 implementing Partners); UNDC NDC support program, WB's NDC support facility; Intra-American development bank NDC invest; African Development Bank NDC hub; Asian Development Bank NDC advance, etc.					

Table 16 - Summary of existing capacity-building initiative

The picture below presents a graphical representation of the different capacity-building initiatives presented in the table above using two axes: support on strategy (1) to support on implementation (5) (west-east axis) and the way those initiatives are organized on the north-south axis (seminars (1) as opposed to peer-to-peer organizations (5)).
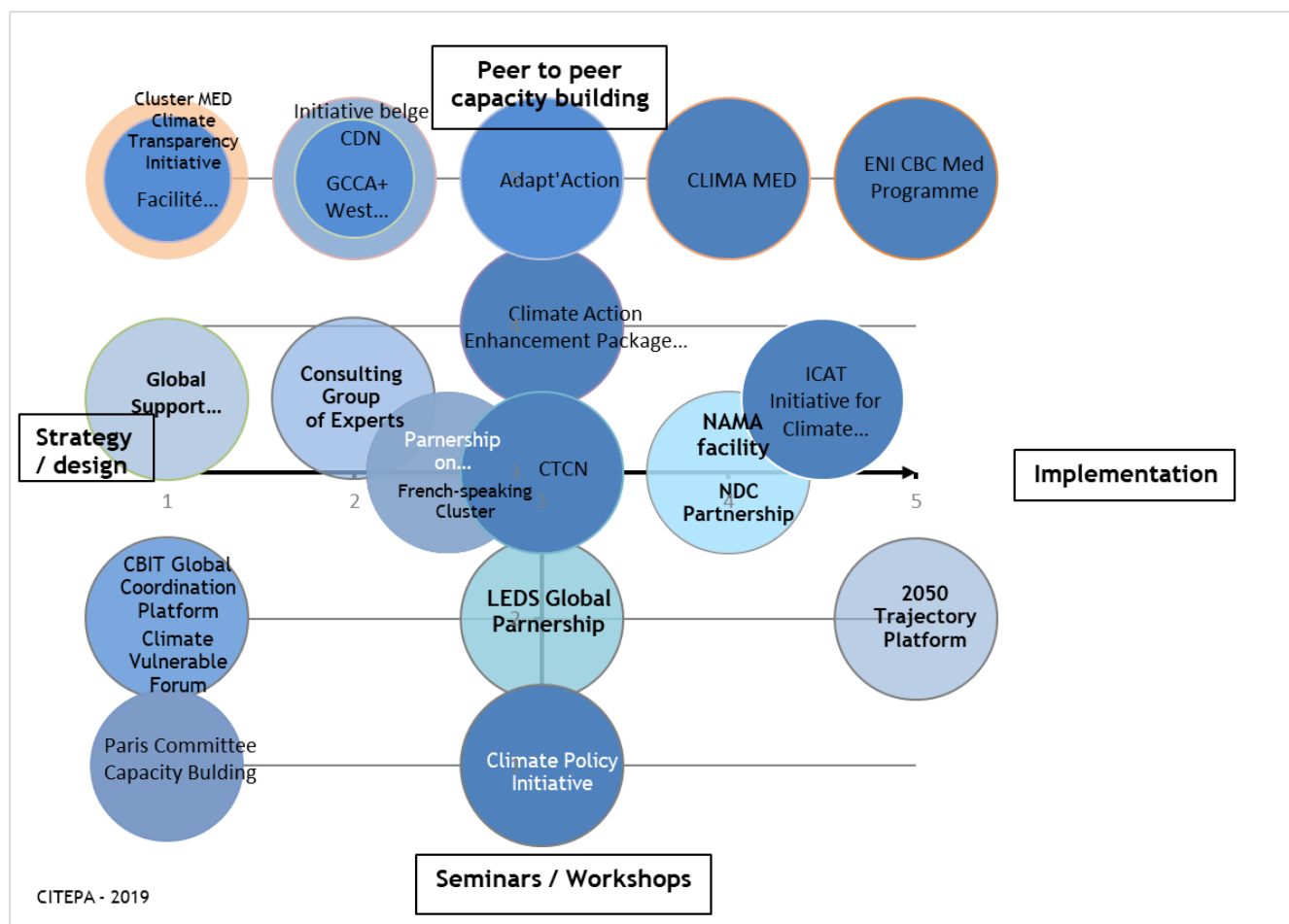
Figure 6 - Mapping of existing capacity-building initiatives

6.6 Financing the updating

Several initiatives are currently into action to support countries to finance the NDC updates. Below is a non-exhaustive list of those mechanisms:

- **ICAT** (Initiative for Climate Action Transparency) provides policymakers with tools and support to measure and assess the effects of their climate actions. See their calls for proposals such as the "technical support to increase the overall transparency capacities in developing countries under the initiative for Climate Action Transparency.
- **CAEP** (Climate Action Enhancement Package) from NDC Partnership aims to catalyze transformational change towards resilient, sustainable, and low-emission development,

supporting the objectives of the Paris agreement for member countries of NDC Partnership. It delivers fast track support regarding quality, increase the ambition, and implement NDCs. Four countries from SEMed belong to it: Lebanon, Tunisia, Morocco, Albania. We advised Albania on how to apply to round 2 of Objective One's funding. Objective one is on the design of NDC. Objective 2 will be devoted to NDC implementation. UfM is a member of the CAEP since 2019.

- **ADAPT'Action** from AFD.
- **Facility 2050** from AFD.
- **CBIT** from GEF.
- The open-source and publicly available **GCCA+ Index** allows for an evaluation of the key vulnerability features in line with the objectives of the initiative. It is made up of 34 country-specific indicators covering those social, economic and environmental aspects that are critical for 'climate-resilient' development. Morocco, Mauritania, Egypt and Syria, may benefit from the program.

7. Conclusion

Several findings and comments can be derived from our analysis:

- For all SEMed countries, **adaptation** efforts should be very high, as they are already highly impacted by climate change consequences (more than the "average" planet). On the other hand, mitigation efforts should remain a concern to, as to no diminish global efforts and collective ambition to achieve the temperature objective of the Paris Agreement (+1.5°C towards 2100). Thus, adaptation actions should be compatible with mitigation objectives.

- **Adaptation should drive** climate action in the South and East of the Mediterranean.
  - It is mainly about water and good land scarcities (population growth + climate change).
  - Adaptation actions should be **aligned with emission** reduction targets.

- We developed two methods allowing countries to identify synergies:
  - An **adaptation metric to prioritize** adaptation policies, as it assesses the choices' relevancy considering a certain context as well as it enables to define which actions have been undertaken in the world, given similar risks. The conclusions one can draw with this metric have their limits as data from the 2015 NDC have been used for our analysis. With updated NDC information, the fitness coefficient accuracy can be improved gradually.
  - Principal component analysis to allow countries **to identify structural synergies** based on data (economics, GHG emissions, energy intensity, etc.).

Preliminary suggestions of **three MED-Clusters**, based on principal component analysis using economic and environmental data:

- Egypt, Jordan, Lebanon, Palestine, Tunisia;
- Mauritania, Morocco, Turkey, Algeria;
- Albania, Bosnia and Herzegovina, Israel, Montenegro.

Those methods should be replicated in the future, along NDC updates, as they tend to objectivize choices and interpretations as they rely on science and data to submit.

- **Questionnaires** have been sent in December 2019, to obtain updated information from SEMed countries. As responses were not received from every country, we could not include the answers into the present analysis. Therefore, the present report is based on 2015 (I)NDCs and do not include progress which may have been made on adaptation and mitigation policies ever since by any SEMed countries. The submission of the new NDCs in 2020 would allow for a deeper analysis, with up-to-date information, regarding adaptation plans as well as mitigation ambition. Those questionnaires are very important as it would allow to take into consideration higher ambition and knowledge than shown in 2015, hence perform better and more accurate analysis.

In order to prepare ambitious version of their next NDC, SEMed countries must carefully plan their actions during the years to come, hence with sufficient anticipation. Synergies should be identified to replicate good practices and knowledge and avoid wasting precious time and scarce resources. In addition, **alignment with sustainable development goals (SDGs)** should be a criterion to define which actions (mitigation and adaptation) should be implemented.

On a broad perspective, **a synergetic global Mediterranean cluster** would be an efficient way to drive actions in order to fight more efficiently global warming and climate change induced consequences across the region. **Specific SEMed clusters, consisting of three to four countries sharing similar adaptation/mitigation concerns** are an innovative and efficient manner to build upon synergies.

In order to ensure collaboration and coordination between SEMed countries and more generally between countries around the Mediterranean Sea, **the Union for the Mediterranean (UfM) could align their action with the UNFCCC agenda, that is, the crucial updates of NDCs in 2020 and 2025. The European Union encourages all countries to present a more ambitious NDC by COP-26.** UfM could facilitate, coordinate and drive collective climate actions, by providing the set, the information in between public decision makers and funding bodies in the different countries to implement recommendations from the scientific body. UfM should also be able to propose and animate clusters of SEMed countries that share similar constraints or issues and who are therefore **willing to build solutions in synergy**, as it has an extensive knowledge of the ground and is a result of countries' willingness to work together.

We strongly recommend as a first step, to confirm the composition, rules, governance of such SEMed clusters, **using updated information coming out from our questionnaires and following the 2020 update of SEMed NDCs**. Those clusters, lodged within a global Mediterranean Cluster including all countries of the region, would then become the operational tools in which academic, expert and finance

will be provided, enabling those countries to update their NDC as soon as 2020, and also in 2025. **Key partners are UNDP, MedECC, NDC Partnership, Multilateral Development Banks and other experts.**

As a second step, or in parallel, we recommend the UfM, **to make sure that NDC updates are aligned with SDG objectives.**

8. Glossary

2006 IPCC Guidelines	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Annex I Party	Party included in Annex I to the Convention
BTR	Biennial transparency report
CGE	Consultative Group of Experts
CBIT	Capacity Building Initiative Transparency
CH_4	Methane
CMA	Conference of the Parties serving as the meeting of the Parties to the Paris Agreement
CO_2	Carbon dioxide
CO_2 eq	Carbon dioxide equivalent
COP	Conference of the Parties to the Convention
CSA	Climate Smart Agriculture
ETF	Enhanced transparency framework
GEF	Global Environment Facility
GHG	greenhouse gas
HFCs	hydrofluorocarbons
IPCC	Intergovernmental Panel on Climate Change
kg oe	kg oil equivalent
LDC	least developed country
LULUCF	land use, land-use change and forestry
MPGs	Modalities, Procedures and Guidelines for the transparency framework for action and support referred to in Article 13 of the Paris Agreement, contained decision 18/CMA.1 and its annex
MRV	Measurement, reporting and verification
N_2O	Nitrous oxide
NAP	National adaptation plan
NDC	Nationally determined contribution referred to in Article 4 of the Paris Agreement
NF_3	Nitrogen trifluoride
non-Annex I Party	Party not included in Annex I to the Convention
PAMs	Mitigation policies and measures, actions and plans, including those with mitigation co-benefits resulting from adaptation actions and economic diversification plans
PFCs	Perfluorocarbons
QA	Quality assurance
QC	Quality control
REDD-plus	Reducing emissions from deforestation; reducing emissions and forest degradation; conservation of forest carbon stocks; sustainable management of forests; and enhancement of forest carbon stocks (decision 1/CP.16, para. 70)
SBSTA	Subsidiary Body for Scientific and Technological Advice
TER	Technical expert review

9.

22. Tables

Countries concerned by the Principal Component Analysis:

Country	Country index	Country	Country index
Albania	ALB	Latvia	LVA
Algeria	DZA	Lebanon	LBN
Australia	AUS	Lithuania	LTU
Austria	AUT	Luxembourg	LUX
Barbados	BRB	Malta	MLT
Belgium	BEL	Mauritania	MRT
Bolivia	BOL	Mexico	MEX
Bosnia and Herzegovina	BIH	Montenegro	MNE
Brazil	BRA	Morocco	MAR
Bulgaria	BGR	Netherlands	NLD
Canada	CAN	New Zealand	NZL
Cape Verde	CPV	Nigeria	NGA
Chile	CHL	Norway	NOR
China	CHN	Pakistan	PAK
Colombia	COL	Palestine	PSE
Croatia	HRV	Panama	PAN
Cyprus	CYP	Paraguay	PRY
Czech Republic	CZE	Peru	PER
Denmark	DNK	Poland	POL
Dominican Republic	DOM	Portugal	PRT
Egypt	EGY	Romania	ROU
Estonia	EST	Russia	RUS
Finland	FIN	Saudi Arabia	SAU
France	FRA	Serbia	SRB
Germany	DEU	Seychelles	SYC
Hungary	HUN	Slovenia	SVN
Iceland	ISL	South Africa	ZAF
India	IND	South Korea	KOR
Indonesia	IDN	Spain	ESP
Iran	IRN	Sweden	SWE
Ireland	IRL	Switzerland	CHE
Israel	ISR	Taiwan	TWN
Italy	ITA	Tunisia	TUN
Japan	JPN	Turkey	TUR
Jordan	JOR	United Kingdom	GBR
Kazakhstan	KAZ	United States	USA
		Uruguay	URY

Table 17 - Countries used for the PCA

Countries coordinates in the 6-dimensionvectoral space (1/2):

	Dim,1	Dim,2	Dim,3	Dim,4	Dim,5	Dim,6
Albania	-1,539	-1,143	0,596	0,995	0,244	-0,212
Algeria	-0,446	-0,606	-1,552	-0,850	-3,700	3,188
Australia	0,843	1,917	-0,450	-1,457	0,452	0,865
Austria	0,187	2,373	0,589	0,971	-0,442	0,434
Barbados	-1,705	-0,369	4,209	-0,989	-1,260	-1,915
Belgium	0,289	2,624	1,854	0,684	-1,221	0,483
Bolivia	-1,191	-0,264	-0,036	-0,407	-1,221	-0,196
Bosnia and Herzegovina	-1,645	-0,393	0,940	0,633	2,449	1,123
Brazil	-0,606	-0,933	1,511	0,224	1,131	-0,531
Bulgaria	-0,433	0,836	-1,456	0,167	0,780	-0,752
Canada	1,291	2,275	0,651	-1,037	-0,094	0,840
Cape Verde	-1,036	-1,938	0,390	1,820	-1,527	0,620
Chile	-1,028	-0,337	-0,919	-2,276	-0,313	-0,205
China	12,151	-5,730	-1,878	1,995	-1,185	1,032
Colombia	-1,389	-1,327	-0,074	-1,404	-0,650	-0,291
Croatia	-0,808	0,937	0,931	1,512	0,310	0,110
Cyprus	-1,181	-0,038	1,626	0,988	0,292	0,311
Czech Republic	0,206	1,542	-1,215	0,632	0,139	0,165
Denmark	0,191	3,134	-0,370	0,725	0,019	0,156
Dominican Republic	-1,194	-1,395	-1,492	-0,920	-0,790	-1,870
Egypt	-1,517	-1,616	1,882	-0,100	-0,549	-1,217
Estonia	0,293	2,193	-1,971	-0,091	0,195	0,477
Finland	0,041	2,870	0,581	0,953	0,404	1,234
France	0,780	1,850	2,339	1,351	-0,463	0,775
Germany	2,501	1,951	0,621	0,133	0,615	-0,595
Hungary	-0,297	1,259	0,348	1,564	-0,337	-0,259
Iceland	1,169	4,449	-0,740	0,045	1,433	1,167
India	3,115	-4,200	-1,398	2,651	-0,306	-0,435
Indonesia	-0,146	-3,212	-3,041	0,264	0,098	-0,314
Iran	0,391	-1,078	-2,465	-0,687	-0,473	0,388
Ireland	0,360	1,370	-1,552	1,042	-0,950	-2,334
Israel	-0,267	1,004	-0,110	0,056	-0,063	-0,448
Italy	0,119	1,092	3,058	1,266	-0,041	-0,415
Japan	2,356	0,117	3,515	1,088	-1,320	-1,740
Jordan	-2,265	-2,398	2,053	-1,194	-0,236	0,456
Kazakhstan	0,161	0,240	-2,277	-1,187	0,709	0,061
Latvia	-0,818	0,371	-0,623	0,902	0,446	-0,162

Countries coordinates in the 6-dimensionvectoral space (2/2)

	Dim,1	Dim,2	Dim,3	Dim,4	Dim,5	Dim,6
Lebanon	-2,494	-2,719	4,340	-2,387	-2,524	0,704
Lithuania	-0,938	0,045	-0,552	1,032	1,764	-0,656
Luxembourg	0,795	4,872	-0,554	-1,873	0,002	0,301
Malta	-0,240	1,302	-1,309	1,625	-0,248	-1,918
Mauritania	-1,644	-2,930	-0,213	1,156	-1,064	0,791
Mexico	-0,262	-1,261	-0,459	-1,088	-0,352	-0,654
Montenegro	-1,451	-0,519	1,360	1,019	-0,875	2,252
Morocco	-1,144	-2,257	-0,978	0,812	-0,455	0,390
Netherlands	0,657	2,625	-0,336	0,589	0,331	-0,662
New Zealand	-0,367	1,315	-0,681	-1,077	-0,009	0,640
Nigeria	-1,790	-2,878	-0,928	-2,193	1,278	-1,499
Norway	0,844	4,382	-1,814	-0,432	-0,488	1,286
Pakistan	-1,250	-2,011	0,091	-0,746	-0,313	-1,457
Palestine	-2,899	-4,990	1,077	-0,143	4,812	2,877
Panama	-0,576	-1,547	-2,668	0,449	-1,985	0,683
Paraguay	-1,347	-2,161	-2,366	-0,576	0,864	-1,035
Peru	-1,432	-1,949	-1,517	-1,490	0,452	-0,753
Poland	0,120	0,657	-0,027	1,157	1,021	-0,233
Portugal	-0,842	0,701	2,458	1,556	0,188	-0,605
Romania	-0,668	-0,599	-1,315	1,374	0,735	-0,555
Russia	2,534	0,271	-0,591	-1,105	1,514	0,756
Saudi Arabia	1,001	1,903	-1,535	-3,178	-0,298	1,093
Serbia	-1,412	-0,294	1,207	0,507	1,100	0,825
Seychelles	-1,377	-1,371	0,339	0,261	-0,868	1,330
Slovenia	-0,269	1,127	-0,357	1,769	0,993	-0,776
South Africa	-1,083	-0,720	1,376	-1,677	0,450	0,885
South Korea	1,042	0,300	-2,498	-1,675	-0,438	-0,077
Spain	-0,322	0,445	1,646	0,852	0,154	-0,003
Sweden	0,137	2,720	-0,372	0,448	-0,103	0,970
Switzerland	0,284	2,543	-0,917	-0,786	-0,952	-1,030
Taiwan	0,147	-0,034	-2,369	-0,821	0,610	-2,558
Tunisia	-2,051	-1,856	1,421	-1,040	-0,153	0,213
Turkey	-0,370	-1,839	-1,947	1,180	0,381	0,990
United Kingdom	0,944	0,601	2,132	-0,330	0,232	-0,786
United States	12,041	-1,414	4,401	-3,001	1,571	-0,508
Uruguay	-1,250	0,111	0,382	-0,233	0,100	-1,215

Adaptation actions fitness coefficients:

- Algeria:

Sector	Action	Hazard	Vulnerability	Fitness coefficient
Environment	Restore ecosystem	Flood	Moderate	0,45
Environment	Land Management	Drought	High	0,81
Health	Health service	Temperature increase	Low	0,94
Health	Health service	Flood	Moderate	1,00
Health	Public health	Heat Waves	High	0,89
Agriculture	Ensure food security	Temperature increase	Low	0,80

Table 18 - Adaptation action fitness coefficients in Algeria

- Egypt:

Sector	Action	Hazard	Vulnerability	Fitness coefficient
Water	Water management	Temperature increase	Moderate	0,72
Water	Water management	Drought	High	0,50
LULUCF/Forestry	Fishery Sector	Temperature increase	Moderate	0,81
Agriculture	Ensure food security	Temperature increase	Moderate	0,80
Agriculture	Food security	Drought	High	0,93
Environmental disaster	Infrastructure construction	Flood	Moderate	0,85
Environmental disaster	Infrastructure capacity build	Storm	Moderate	0,96
LULUCF/Forestry	Information system	Sea level rise	Moderate	0,85

Table 19 - Adaptation action fitness coefficients in Egypt

- Jordan:

Sector	Action	Hazard	Vulnerability	Fitness coefficient
Health	Disease control	Temperature increase	Moderate	0,91
Health	Disease prevention	Flood	Moderate	0,92
Environmental disaster	Insurance program	Drought	Low	0,33
Environmental disaster	Public health	Heat waves	Moderate	0,41

Table 20 - Adaptation action fitness coefficients in Jordan

- Lebanon:

Sector	Action	Hazard	Vulnerability	Fitness coefficient
LULUCF/Forestry	Forest management	Drought	High	0,83

Table 21 - Adaptation action fitness coefficients in Lebanon

- Mauritania:

Sector	Action	Hazard	Vulnerability	Fitness coefficient
Agriculture	Livestock management	Temperature increase	Acute	0,24
Agriculture	Food security	Drought	Low	0,55
Physical infrastructures	Infrastructure management	Sea level rise	Severe	0,90
Agriculture	Resilient crop variety	Temperature increase	Acute	0,42
Agriculture	Resistant variety	Drought	Low	0,33
Agriculture	Livestock management	Temperature increase	Acute	0,24
Agriculture	Livestock production	Drought	Low	0,59
Coastal zones	Fishery sector	Temperature increase	Acute	0,46
Coastal zones	Marine ressources	Sea level rise	Severe	0,69
Physical infrastructures	Infrastructure management	Sea level rise	Severe	0,90
Physical infrastructures	Infrastructure construction	Flood	Moderate	0,85
Physical infrastructures	Coastal protection	Storm	Low	0,84
Physical infrastructures	Coastal protection	Flood	Moderate	0,79
Coastal zones	Ensure food security	Temperature increase	Acute	0,53
Environmental disaster	Coastal protection	Sea level rise	Severe	0,71
Environmental disaster	Coastal protection	Flood	Moderate	0,79
Social and institutionnal development	Disease prevention	Flood	Moderate	0,92
Social and institutionnal development	Public health	Heat waves	Severe	0,89

Table 22 - Adaptation action fitness coefficients in Mauritania

- Morocco:

Sector	Action	Hazard	Vulnerability	Fitness coefficient
Water	Protection barrier	Flood	Moderate	0,86
Environment	Watershed management	Temperature increase	Low	0,72
LULUCF/Forestry	Land management	Temperature increase	Low	0,96
LULUCF/Forestry	Reforestation	Temperature increase	Low	0,76
Water	Water management	Drought	Acute	0,11
Water	Surface water	Drought	Acute	0,59

Table 23 - Adaptation action fitness coefficients in Morocco

- Tunisia:

Sector	Action	Hazard	Vulnerability	Fitness coefficient
Tourism	Potable water	Sea level rise	Moderate	0,47
Tourism	Coastal protection	Sea level rise	Moderate	0,74
Health	Health system	Temperature increase	Low	0,91
Health	Disease control	Temperature increase	Low	0,91
Health	Vector bear	Temperature increase	Low	0,97
Health	Vector bear	Flood	Moderate	0,87
Agriculture	Capacity building	Temperature increase	Low	0,47
Agriculture	Resilient crop variety	Temperature increase	Low	0,98
Agriculture	Warning system	Temperature increase	Low	0,69
Coastal Zones	Erosion defense	Sea level rise	Moderate	0,86
Coastal Zones	Human settlement	Storm	Moderate	0,98
Coastal Zones	Human settlement	Sea level rise	Moderate	0,88
Coastal Zones	Infrastructure management	Sea level rise	Moderate	0,76
Coastal Zones	Infrastructure capacity building	Storm	Moderate	0,96

Table 24 - Adaptation action fitness coefficients in Tunisia

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