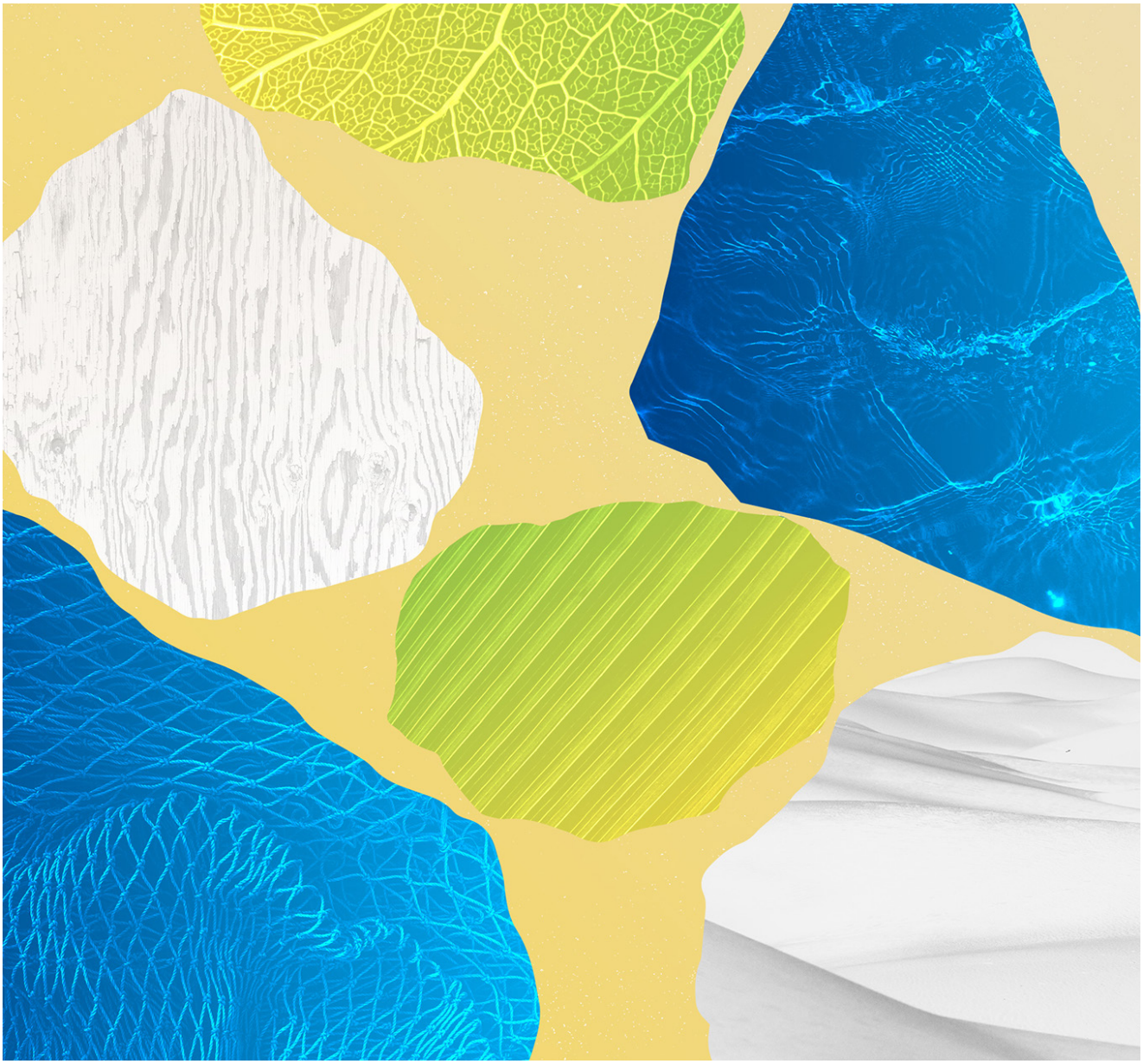
MED 2050

THE MEDITERRANEAN BY 2050

A foresight by Plan Bleu



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MED2050 Building the Mediterranean future together Construisons ensemble l'avenir de la Méditerranée لنبنِ معًا مستقبل المتوسّط

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FOREWORD

In early 2020, Plan Bleu launched its third foresight exercise, MED 2050. Since then, a number of steps have been taken and the report has been completed following wide-ranging discussion involving all the shores of the Mediterranean.

It presents the results of the first three phases of this collaborative foresight exercise (1. Foresight Base; 2. Visions; 3. Scenarios), which led to the production of six scenarios for the Mediterranean by 2050.
The Board and the entire Plan Bleu team join us in warmly thanking the many contributors to this joint project. It carries the voices of the Mediterranean, whose destiny is neither fixed nor imposed. This region will be what we make of it, but it was important to leave sufficient time to listen to and hear from players in this diverse region in order to think about it together.

This work may be rich, but it is not an end in itself, but instead the first part of a wider project. We have committed to thinking about "transition pathways", with various stakeholders from the three shores of the Mediterranean, in order to promote collective thinking on the best pathways towards desirable scenarios and/or to avoid less desirable scenarios. With those who wish, we will continue this mission and begin to promote this foresight exercise to different audiences, so that everyone can grasp the challenges of sustainable development facing the region. Let's not forget that the Mediterranean context is more exposed to climate change acceleration than the rest of the world. This situation makes it all the more necessary to work together to build positive, inspiring scenarios.

Without waiting for the results of these "transition pathways", which will be explored in 2025, it is worth mentioning that this report will be useful for thinking about the desirable futures of Mare Nostrum and finding concrete solutions within the governance framework offered by the Barcelona Convention (1976). This report is a timely contribution to preparatory work for the revision of the Mediterranean Strategy for Sustainable Development (MSSD 2026-2035), which will be formally adopted at COP25 of the Convention, in Egypt in December 2025. It will also be an original Plan Bleu contribution to the Oceans Conference (UNOC3) in Nice next June.

Marseille, 8 October 2024

Guillaume Sainteny,
Chairman of Plan Bleu

Robin Degron,
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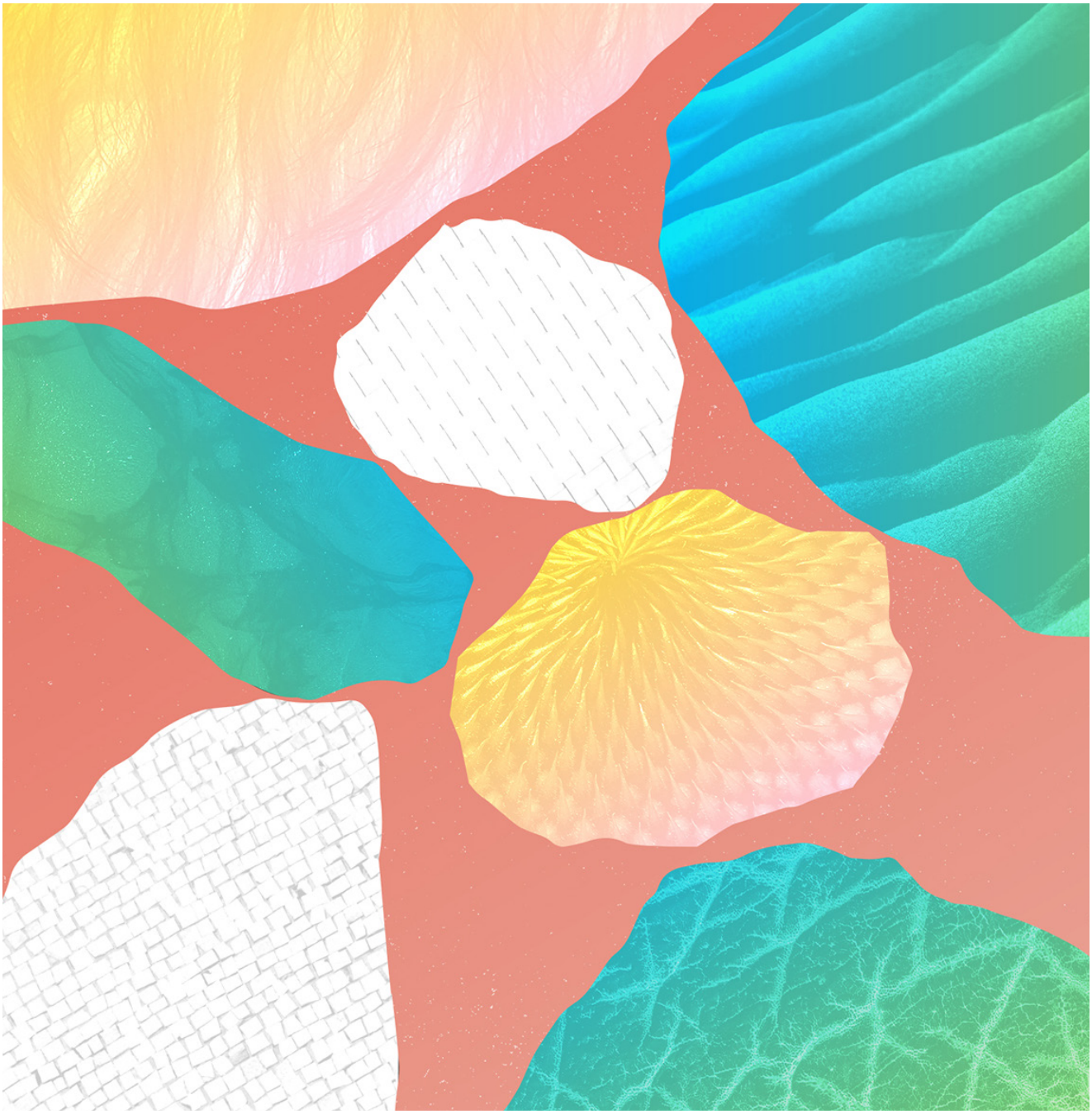
LIST OF ACRONYMS

ADEME – French Environment and Energy Management Agency
AFD - French Development Agency
AI - Artificial Intelligence
AMU - Arab Maghreb Union
ALENA - Accord de libre-échange nord-américain
ASCAME - Association of Mediterranean Chambers of Commerce and Industry
ASEAN - Association of South East Asian Nations
BaU - Business-as-Usual (tendanciel)
BRICS - Brazil, Russia, India, China, South Africa (BRICS+: extended in 2024 to include Saudi Arabia, Egypt, United Arab Emirates, Ethiopia and Iran)
CBD - Convention on Biological Diversity
CIHEAM - International Centre for Advanced Mediterranean Agronomic Studies
CIRAD - French Agricultural Research Centre for International Development
CMI - Center for Mediterranean Integration
COP - Conference of the Parties
CRPM - Conference of Peripheral Maritime Regions
DEGEST - Demography, Environment, Governance, Economy, Society and Technology
EC - European Community
EEZ - Exclusive Economic Zone
EIB - European Investment Bank
ENSA - French Higher School of Architecture
ENSSMAL - National School of Marine Science and Coastal Planning - Algeria
ETC-UMA - European Topic Center, University of Malaga
ETS - Emission Trading System
EU - European Union
FAO - Food and Agriculture Organisation of the United Nations (en français OAA : Organisation des Nations Unies pour l'Alimentation et l'Agriculture)
GAFAM - Big Five Tech giants: Google, Amazon, Facebook, Apple, Microsoft
GDP - Gross Domestic Product
GHG - Greenhouse gas
ICES - International Council for the Exploration of the Sea
ICZM - Integrated Coastal Zone Management
IEMED - European Institute of the Mediterranean
IFREMER - French Institute for Ocean Science
IIASA - International Institute for Applied Systems Analysis
IMO - International Maritime Organization
IPBES - Intergovernmental science and policy platform on Biodiversity and Ecosystem Services
IPCC - International Panel on Climate Change
IRES - Royal Institute for Strategic Studies - Morocco
ITES - Tunisian Institute of Strategic Studies
IUCN - International Union for Conservation of Nature
KIC - Knowledge and Innovation Community
MAP - Mediterranean Action Plan
MEDECC - Mediterranean Experts on Climate and Environmental Change
MENA - Middle-East and North Africa
MERCOSUR - Southern Common Market (South America)
MIO-ECSDE - Mediterranean Information Office for the Environment, Culture and Sustainable Development
MPA - Marine Protected Area
MSSD - Mediterranean Strategy for Sustainable Development
MTES - Ministry of Ecology, Energy and the Territories
Mtoe - Million tonnes of oil equivalent
NAFTA - North American Free Trade Agreement
NATO - North Atlantic Treaty Organization
NDC - Nationally Determined Contributions
NGO - Non-Governmental Organisation
NICT - New Information and Communication Technologies
OECD - Organisation for Economic Cooperation and Development
OME - Mediterranean Energy Observatory
PAP/RAC - Priority Action Programme/Regional Activity Centre
PET - Polyethylene terephthalate
RAC/SPA - Regional Activity Centre for Specially Protected Areas
RAED - Arab Network for Environment and Development
R&D - Research and development
RE - Renewable Energies
REMPEC - Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea
SCP - Sustainable Consumption and Production
SCP/RAC - Sustainable Consumption and Production Regional Activity Centre
SDG - Sustainable Development Goals
SEMc - Southern and Eastern Mediterranean Countries
SoED 2020 - State of the Environment and Development in the Mediterranean report
TEU - Twenty-foot equivalent unit
UfM - Union for the Mediterranean
UN - United Nations
UNDP - United Nations Development Programme
UNEP/MAP - United Nations Environment Programme Mediterranean Action Plan
UNESCO - United Nations Educational, Scientific and Cultural Organization
WB - World Bank
WRI - World Resources Institute
WTO - World Resources Institute
WWF - World Wide Fund

INTRODUCTION



In December 2019, the Contracting Parties to the United Nations Environment Programme Mediterranean Action Plan (UNEP/MAP)[1] definitively decided, after a long preparation phase, to launch a foresight study on the Mediterranean by 2050, with three objectives:

1

Analyse the conditions for effective protection of the Mediterranean marine ecosystem over the next 30 years;

2

Provide long-term insights that will help the region make the transition to sustainable development;

3

And lastly, prevent major risks of crisis or disruption that could have a major future impact on these two objectives of protecting the sea and ensuring the sustainable development of the region.

The task of carrying out this foresight exercise - entitled MED 2050 - was entrusted to Plan Bleu, whose initial purpose was to carry out foresight work on the Mediterranean. This remains one of its permanent functions as a UNEP/MAP Regional Activity Centre.

This report summarises most of the work completed under MED 2050 since early 2020, during a period marked by Covid, which has severely limited the face-to-face exchanges that are, in principle, essential to such an exercise. It focuses on the scenarios that have been produced, since the work carried out prior to this was already covered in a detailed report in 2022[2].
Parts One to Three outline the method used and the main elements of the initial foresight work done to underpin the assumptions in the scenarios, with distinctions made between trends to 2050 and the visions or issues expressed by stakeholders. Part Four presents these scenarios, before a summary and final conclusion.

Box 1.

BARCELONA CONVENTION MEDITERRANEAN ACTION PLAN PLAN BLEU

The Mediterranean Action Plan (MAP) was established in 1975 as a multilateral agreement on the environment under the Regional Seas Programme of the United Nations Environment Programme (UNEP). The Mediterranean countries and the European Community approved the MAP as an institutional framework for cooperation to meet the common challenges of the degradation of the marine environment.
Under the auspices of UNEP/MAP, a framework convention for the protection of the Mediterranean Sea against pollution was adopted in 1976, and then revised two decades later to incorporate the key concepts adopted at the Rio conference in 1992, and to include the coastline within its scope. The Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention) was therefore adopted in 1995.

UNEP/MAP and the Contracting Parties to the Barcelona Convention - 21 Mediterranean countries and the European Union - have gradually put in place an institutional, legal and implementation framework incorporating the essential elements of sustainability in the Mediterranean.
The basic text of the Barcelona Convention is supplemented by seven protocols: the "Dumping" Protocol, the "Prevention and Emergency Protocol", the "Land-Based Sources" Protocol, the "Specially Protected Areas and Biological Diversity" Protocol, the "Offshore" Protocol, the "Hazardous Wastes" Protocol, and the "Integrated Coastal Zone Management (ICZM)" Protocol. Secretariat functions are carried out by the MAP Coordinating Unit (UNEP/MAP), based in Athens, Greece. The MAP's work programme is implemented with the support of six Regional Activity Centres (RACs) based around the Mediterranean Basin.

Plan Bleu, a French association under the law of 1901, is one of these RACs. Created in 1977, it is a centre for expertise on development and the environment in the Mediterranean, whose main mission is to produce studies on the state of the environment and foresight reports to inform stakeholders about environmental issues and guide public authorities in making informed decisions.
This mission is divided into five areas of activity: 1. Monitor the environment and development to provide governments and the general public with information; 2. Produce socio-economic and environmental studies to inform policymakers; 3. Support the transition to a green and blue economy; 4. Design possible futures for sustainable development; 5. Facilitate a science-policy and civil society interface on the study of impacts and responses to climate change.

[1] At the UNEP/MAP COP 21 in Naples (Italy).
[2] Plan Bleu. MED 2050 - *Module 1: The Foresight Base, Preliminary Report.* Plan Bleu, 2022.

THE SPECIFIC FEATURES OF MED 2050 COMPARED TO PREVIOUS FORESIGHT EXERCISES

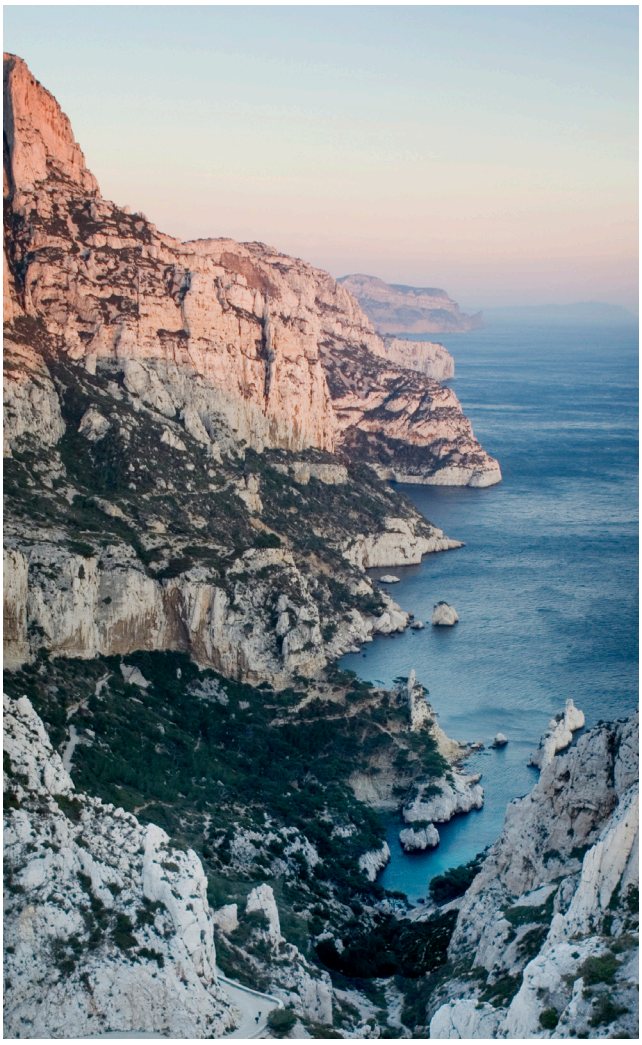
MED 2050 is not the first foresight exercise carried out by Plan Bleu. Two other foresight reports were published in 1989 and 2005[3]. These served as a reference for preparing environmental and sustainable development policies in the Mediterranean, including the Mediterranean Strategy for Sustainable Development (MSSD).

However, **the approach used in this new exercise differs significantly from those used previously** for a number of reasons:

- First of all, the Mediterranean context has changed considerably since 2005 (considerable acceleration of climate and environmental change; national, regional and global geopolitical upheavals; the Arab Springs; new digital economy, etc.). Since then, the world has entered a period of turbulence and accelerated risks of disruption, making the outlook for the future much more uncertain. For example, regarding the climate, what was anticipated for 2100 may now be possible as early as 2050, which is bound to cause a great deal of instability over the next thirty years. In this context, it is no longer essential to predict precisely what is going to happen in 2050 in all areas, but to be able to adapt to very different possible futures, and potentially unforeseen shocks.
- Second, the way of considering the sea and the oceans has changed, with much greater international concern about the challenges they represent, their long-term transformations and the threats they face. This is the reason behind the decision to focus MED 2050 on the marine ecosystem more than any previous foresight exercise.
- Third, difficulties in the Mediterranean context and the trend of increasing fragmentation have made it more necessary now than ever before to give an important place to the diversity of expectations and visions expressed by Mediterranean stakeholders. This explains the initial ambition of a more participatory approach, which has only been partially achieved.
- Lastly, the exercise was conducted with a view to going beyond building alternative scenarios for the future, with their risks and opportunities, but to also produce the materials needed to debate realistic transition pathways to achieve them. Debates in the various Mediterranean sub-regions should be able to get underway in 2025.

A FORESIGHT RATHER THAN FORECASTING APPROACH

For all these reasons, the decision was made to opt for a foresight approach rather than a forecasting approach[4]. The two mechanisms are often confused, and foresight, like forecasting, is often expected to provide figures about what will happen as precisely as possible (e.g.: in 2030, 2040, 2050, etc.). But foresight differs from forecasting in two ways. Firstly, it is as interested in uncertainties as certainties. Secondly, it focuses as much on what is going to happen (exploratory foresight) as on what one might want or not want to happen (normative foresight). **Foresight is therefore about exploring all the possibilities (and not just what is probable), and finding the right balance between the four different dimensions set out in Table 1:**



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[3] Grenon, Michel, and Michel Batisse. *Futures for the Mediterranean basin: The Blue Plan.* Plan Bleu, 1989. ; Benoit, Guillaume, and Aline Comeau. *A sustainable future for the Mediterranean: the Blue Plan's environment and development outlook*. Earthscan, Plan Bleu, 2005.
[4] Unlike the 2005 exercise, which included a business-as-usual scenario based on forecasted figures in a number of areas, as well as an alternative scenario.

Table 1.
THE FOUR DIMENSIONS OF FORESIGHT
Source: Jacques Theys, Revue Technique Territoire, et Société No. 37, Ministère du Développement Durable, 2010

Relationship to uncertainty / Relationship between present and future	Exploratory approach (from the present → to the future)	Normative approach (from the future → to the present)
Focus on certainty	**Forecasts** What is probable	**Visions of the future** What is desirable or unacceptable
Identifying and taking account of uncertainties	**Foresight of disruptions** What is possible or not impossible.	**Strategic foresight** Pathways and transitions towards an objective within an uncertain context

Although MED 2050 is based on figures and uses monographs to produce data for numerous variables, its main objective is not to predict energy consumption, quantities of fishing catches or the distances travelled by different modes of transport in 2050. Instead, it is a matter of intelligently articulating the four approaches described in the previous table (forecasts, visions, disruptions and transition pathways) in order to build essentially qualitative scenarios anticipating the main possible futures for the Mediterranean over the next thirty years, and the pathways to achieve or avoid them. This openness is particularly important because simply extrapolating quantitative trends leads to a very pessimistic outlook for the Mediterranean, and the context of the next 30 years will be marked by very profound uncertainties.

THE FUTURE OF THE SEA SEEN THROUGH ALL ITS INTERDEPENDENCIES

In line with the MAP's mandate, MED 2050 focuses on the future of the sea. However, it does not produce a scientific model of the marine ecosystem. Instead, it takes into account all factors that may have an influence on its development, and all its interdependencies, so that they can be acted upon with a view to preservation and sustainable development. **One of the major changes with the MED 2050 approach is the growing weight of a new category of interdependencies, i.e. the dependence of the Mediterranean Sea on changes that are largely external to the Mediterranean area.**

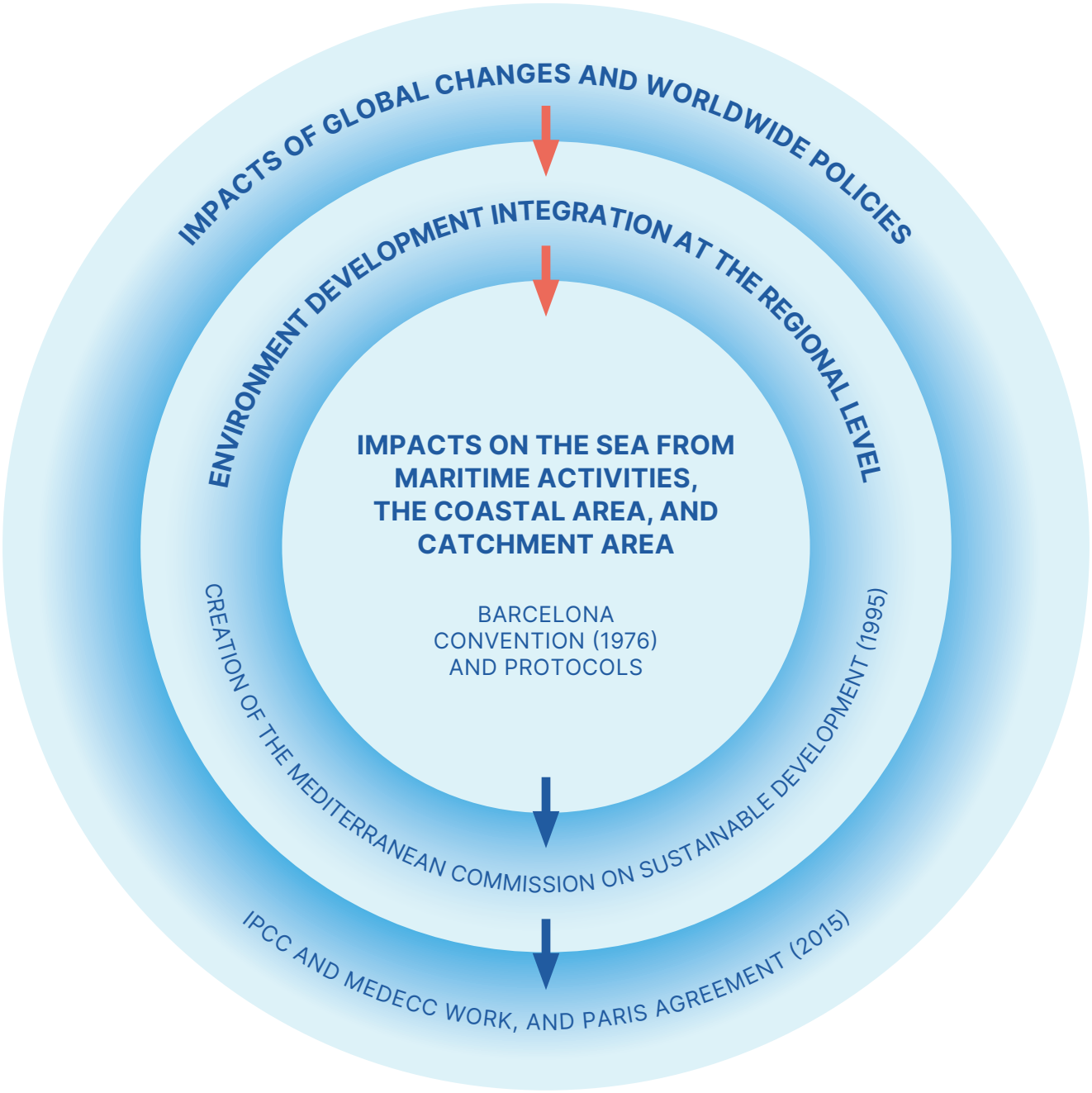
Since the mid-1970s, the Barcelona Convention has made it possible to take into account an initial form of interdependence, linking the state of the sea to the activities and territories that have a direct impact on it, including fisheries and the use of marine resources, maritime transport, pressure from coastal territories, pollution in catchment areas, protection policies, etc.

With the creation of the Mediterranean Commission for Sustainable Development (MCSD), a link was then established between these direct impacts and existing modes of development within countries and territories in the region - macroeconomic but also sector-specific development (industry, energy, agriculture, tourism, transport, etc.), with sustainable development and environment-development integration at its core.

With global change, geopolitical upheavals, energy and food security issues and competition for global resources, a third form of interdependence is emerging more strongly than in the past. **The futures of the sea and the region can no longer be considered independently of their relationships with the global level and with transformations in the relationships between people and nature at the biosphere level.**

This new form of interdependence introduces an additional factor of instability and raises the issue of coordination between regional and international policies. In addition, climate change will be a determining factor in the future, meaning that the sea will no longer simply be under the influence of human activities, but will itself have an increasingly significant impact in transforming the physical conditions of the region: reconfiguration of coasts under the influence of rising sea levels, changes in the water cycle linked to sea warming, etc. If we add to this the vital role that the Mediterranean Sea already plays in the region's identity and living conditions, we have yet another factor that justifies analysing the respective impacts of human activities and the sea in both directions.

Figure 1.
THE THREE STAGES IN TAKING INTO ACCOUNT THE INTERDEPENDENCE BETWEEN THE SEA AND HUMAN ACTIVITIES



MED 2050 has endeavoured to take these three levels of interdependencies into account. This need has complicated the system analysed in the exercise and led to an increase in the number of variables, as shown in the second part of this report. Factors of change outside the region played a greater role than in previous exercises. Nevertheless, in all the scenarios developed, the concerns of the Barcelona Convention remained central.

AN OVERALL APPROACH TO THE FUTURE OF THE MEDITERRANEAN, WITH ITS ADVANTAGES AND ITS LIMITATIONS

Sharing a threatened sea justifies the development and discussion of scenarios that cover the whole region in an undifferentiated manner. Considering the sea in the light of all its interdependencies provides a rare opportunity to carry out a foresight exercise for the Mediterranean in all its dimensions. This is a significant contribution to action. **However, summarising the possible futures of the Mediterranean in a series** of fifteen-page narratives (see Part 4) **necessarily has major limitations, in a region marked more than anywhere else by enormous differences and inequalities** in demographic, economic, social, political, cultural and other aspects. The descriptions of the six scenarios try as far as possible to specify these differences. To overcome this difficulty, the initial plan was to organise foresight workshops around the major Mediterranean sub-regions (North-West, Balkans, East, South), but this was not possible for a number of reasons (Covid, travel difficulties, etc.). The consultations with key figures on visions of the future Mediterranean[5] (generally organised remotely), workshops for debate with Mediterranean young people, and the geographical diversity of the experts involved in the project[6] were no replacement for these sub-regional workshops.

For this reason, following this lengthy process of building a foresight base and overarching scenarios, it is essential that the work on transition pathways, which has only just begun, now be continued in each of these sub-regions, and even in willing local or national territories, involving a diversity of stakeholders, as proposed in the conclusion of this report. This document should therefore be seen as a stage in a process, not as a end in itself.

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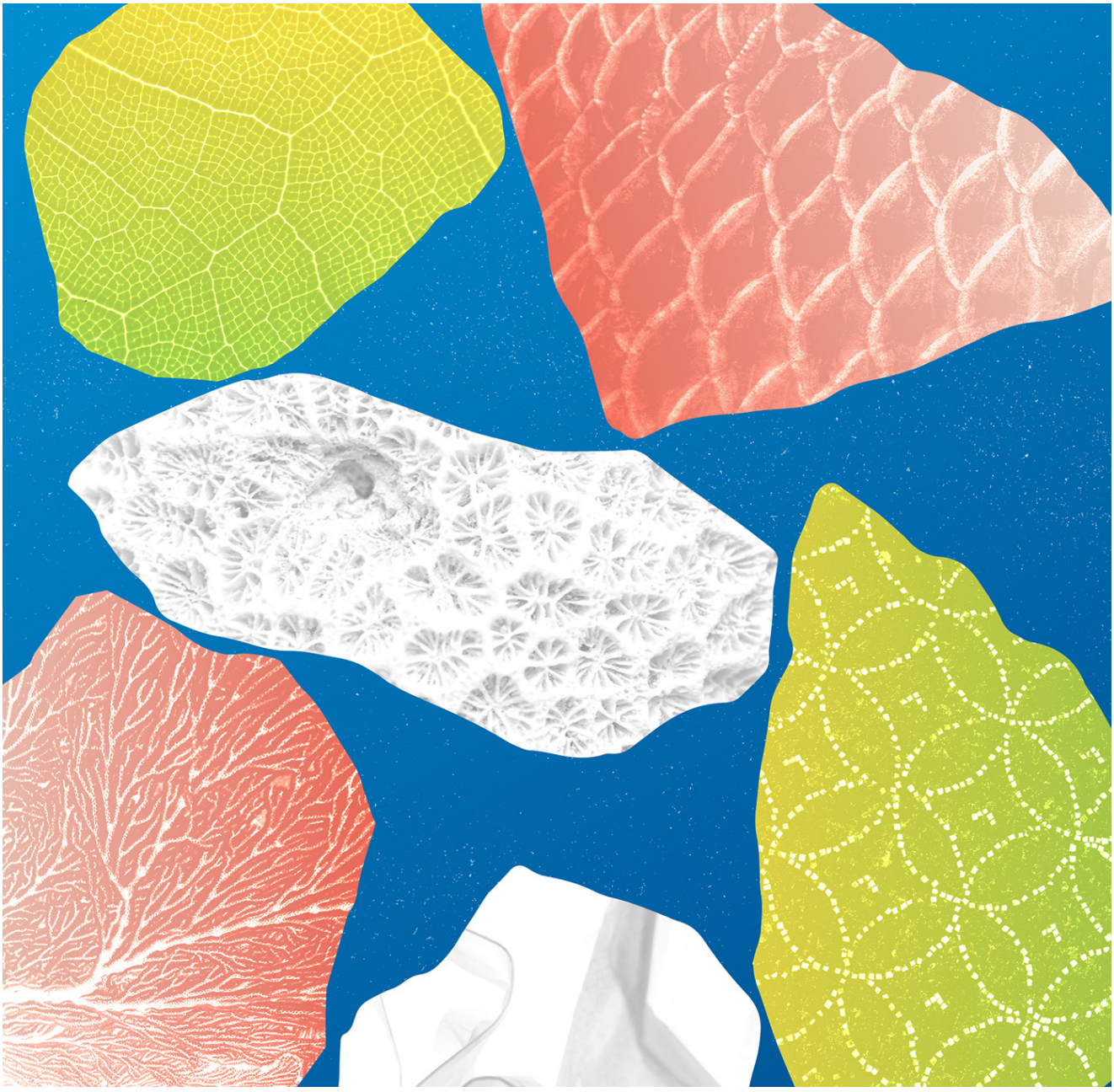
[5] See Annex 4. List of key figures interviewed (and their geographical distribution), and respondents to the online questionnaire.
[6] See Box 4. Permanent members of the foresight group and Annex 1. List of experts supporting the foresight group for Module 1: building the foresight base.

PART 1

ORGANISATION OF THE EXERCISE AND METHODOLOGY



I. PROJECT STRUCTURE

1. A five-phase, ten-step approach

A) GENERAL APPROACH

The approach adopted for MED 2050 has been structured around five successive phases:

- First, a quantitative and qualitative phase, for building the foresight base, designed to analyse the Mediterranean system in order to explore the trends, disruptions and weak signals impacting any changes, and rank the issues for the environment and sustainable development in 2030– 2050, on the basis of a more detailed analysis of around thirty variables;
- A second phase of consultation with stakeholders regarding their visions of the future development and environment of the Mediterranean, involving very diverse stakeholders (e.g. representatives from the political, economic and scientific spheres, environmental associations, youth networks, etc.) and experts from the three sub-regions - South, East and North;
- A third phase for the development of contrasting scenarios for 2030 - 2050, building on the previous work;

This will be followed by:

- A fourth strategic phase focusing on reflection and comparison of possible transition pathways towards sustainable development, based on the previous scenarios and involving both experts and stakeholders from the Mediterranean sub-regions. The concluding section of this report looks at ways of approaching this phase;
- A final results dissemination phase, with several potential audiences: the UNEP/MAP-Barcelona Convention system, the countries concerned, the general public, the media, business representatives, civil society, the scientific community, etc.

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Figure 2.
MAIN PROJECT PHASES

B) A TEN-STEP METHODOLOGY

This five-phase approach has been broken down into ten successive steps, which provide a more methodological framework for the continuity of the exercise. These ten steps are presented in Table 2, which details the objectives for each step, the method(s) proposed, the means, people or groups involved, and finally the expected final outputs.

Table 2.
A TEN-STEP METHODOLOGY

Step	Objectives	Methods	Means	Outputs
1	Build a foresight **database**.	Collect retrospective and foresight documents and statistics.	Plan Bleu internal work and specific studies.	A few monographs and projections for 2050. Analysis of 2005 project results. Comparison of 2005 project projections with current status. Major trend database.
2	Find consensus on **trends, disruptions, weak signals and major issues.**	Expert consultation method (Régnier abacus, etc.) and discussions.	Foresight group meetings and questionnaire analysis.	List of trends, disruptions, weak signals and issues classified in several levels and qualified.
3	**Break down the system** into major components and driving variables.	Analysis of results from Steps 1 and 2.	Foresight group meetings with the support of Plan Bleu.	Production of a system framework and a list of components to be used as a basis for the scenarios.
4	Analyse the components and **make assumptions** about their changes.	Write factsheets on about thirty components.	Involvement of the group, Plan Bleu and other experts.	Approximately 30 sheets of about 10 pages each, concluding with 4 to 5 assumptions for 2050.
5	Produce **exploratory scenario** outlines based on the assumptions about the variables.	One- and two-round morphological analysis (based on component assumptions).	Foresight group meetings with the support of the Plan Bleu team.	Scenarios from the morphological analysis - summarised in a few lines and key words.
6	Produce contrasting **normative visions** for development and the environment **by sub-region** - East - North - South.	Prepare visions for the future of development and the environment by sub-region.	Consultation of players or experts from the 3 zones or work in workshops.	Report on the differences in eastern, northern and southern visions, and enrichment of exploratory scenarios.
7[7]	Production of **regional sub-scenarios** (North - South - East).	One-round morphological analysis: 3 to 5 assumptions per sub-region.	Work in workshops with or without specific studies.	4 to 6 scenarios applying the scenarios in step 5 territorially, taking into account geopolitical aspects.
8	Develop the **final scenario**s (4 to 6) by integrating the above mentioned research.	Group work.	Foresight group meetings extended to other stakeholders with the support of Plan Bleu.	4 to 6 scenarios integrating exploratory and normative dimensions and sub-regions.
9	Develop **transition pathways to achieve desirable scenarios** or prevent the major risks of others.	Backcasting method on the scenarios considered the most useful in relation to sustainable development or crisis risks.	Extended foresight group including experts and stakeholders.	Production of strategies adapted to the different possible change scenarios for the Mediterranean.
10	**Write recommendations** and key messages for stakeholders and develop a strategy for promoting the work.	Develop recommendations. Write the report. Select communication media and strategies for each target group.	Ad hoc working group. Advisory committee and MAP bodies, Plan Bleu, Communication Services.	Complete final report. Executive Summary. Communication strategy and associated media. An effective communication strategy.

[7] This stage could not be implemented due to travel difficulties linked to the Covid crisis.

2. Foresight methods used

Each of the ten stages presented in the table above is designed as an autonomous component that gives rise to specific outputs. However, they only make sense in relation to the main objective of building robust, plausible and contrasting scenarios for the future of the Mediterranean Basin up to 2050, including the marine domain.

Then, based on these scenarios, the aim is to propose transition pathways and recommendations for working towards one or more desirable scenarios and strengthening the resilience of the region in the face of likely future disturbances and major risks.

The essence of the approach is the standard scenario-based method, coupled with a system analysis framework derived from the DEGEST approach, and the implementation of a "backcasting" approach (i.e. working back from the future to the present), in order to define and compare transition pathways. Morphological analysis is also used to structure the framework of these scenarios around morphological charts that cross-reference the driving variables of the Mediterranean system and its development assumptions. The aim is also to combine overarching foresight across the basin with specific consultations or reflections to explicitly present the different visions for the future of the Mediterranean (particularly in terms of development and the environment) held by a variety of stakeholders and actors in the region, from both the North and South.

With the same idea of avoiding scenarios that are too abstract and general, the approach also focuses on basing them on a minimum of quantitative data, extensive consultation with experts or stakeholders, and the production of detailed thematic analyses, if possible at sub-regional level ("factsheets or thematic sheets").

Some of these tools are summarised in Box 2.

Box 2.

BRIEF DESCRIPTION OF THE MAIN TOOLS USED IN THE MED 2050 APPROACH

- **The scenario-based method.**
It uses assumptions about variables or components of a system to develop representations of possible futures (exploratory scenarios) or desirable and undesirable futures (visions or normative scenarios). It generally includes three phases: developing a database and analysis and identifying the essential variables and components of the system being studied; scanning the field of possibilities, first by variable and component and then, more globally, from a "composition" of these specific assumptions (i.e. "morphological analysis"); and finally developing the scenarios themselves - which may (or may not) include normative elements.

- **A system analysis framework: the DEGEST approach.**
The DEGEST approach was proposed by the American foresight expert, Cornish, in 2004, and suggests structuring analysis of the variables and components of the system studied around six major aspects: Demography, Environment (and resources), Governance, Economy (and finance), Society, and Technology (and science). It offers a useful analytical framework for organising the classification of components, then variables and trends or disruptions specific to the chosen foresight theme, at a more detailed level - and for building scenarios.

- **Backcasting scenarios.**
Unlike forecasting, which starts from the present to make projections or assumptions about the future, backcasting scenarios start from objectives or desirable visions for a given timeframe and work back to the present. They involve imagining the pathways required to reach a desired future or to avoid a feared future.

- **Morphological analysis.**
It explores possible futures in a systematic manner based on all the combinations identified by breaking down a given system. It is used to build scenarios in a progressive process that breaks down the system into more or less detailed levels (variables, components, subsystems), and then rebuilds it.

[8] Godet, Michel, and Philippe Durance. *Strategic foresight for corporate and regional development*. DUNOD, UNESCO, Fondation Prospective et Innovation, 2011.
[9] Cornish, Edward. Futuring: *The exploration of the future*. World Future Society, 2004.
[10] This combination of the scenario-based method, the DEGEST approach and backcasting has already been tested in several countries, including the PEGASO project focused on integrated coastal zone management (ICZM, 2010-2013), and in several European and bilateral training programmes in North Africa, Morocco and Egypt (2013-2018).

II. ORGANISATION AND PARTICIPATORY APPROACH

1. An organisation structured around three bodies

From the outset, the MED 2050 project has been organised around three complementary bodies.

A STEERING COMMITTEE

A Steering Committee comprising the Plan Bleu team dedicated to operational implementation of the programme, and three Plan Bleu executive committee members with good experience in the field of foresight.

Box 3.
MEMBERS OF THE MED 2050 STEERING COMMITTEE

AMINE Khadidja
Head of Foresight and Sustainable Development

DOLEZ Antoine
Foresight Researcher and Post-Doctoral Researcher in sociology (MESOPOLHIS Laboratory and SoMuM Institute)

GOUBERT Anna
Foresight Researcher and Doctoral Student in political science (MESOPOLHIS Laboratory)

GUERQUIN François
Director

LACROIX Denis
Plan Bleu Vice-President for Foresight (Executive Committee) - ScientificCo-Director of the MED 2050 project

THEYS Jacques
Plan Bleu Vice-President for Foresight (Executive Committee) - Scientific Director of the MED 2050 project

TODE Lina
Deputy Director

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A FORESIGHT GROUP

A foresight group that plays an essential role in the co-production of the exercise. It comprises experts from the three shores of the Mediterranean, specialising in themes considered important for the future of the Mediterranean Basin: economy, urban planning, coastline and sea, biodiversity, climate change, sociology, geopolitics, security, development, youth, agriculture, water, etc. Some experts are permanent members of the foresight group, while others assisted on an occasional basis[11]. The permanent members of the group (see Box 4) were directly involved in all phases of the exercise: identification of trends and disruptions, coordination and drafting of factsheets related to their area of expertise, conducting certain interviews, preparation and discussion of scenarios, participation in collective discussions throughout the process[12].

Box 4.
PERMANENT MEMBERS OF THE FORESIGHT GROUP

BERGERET Pascal
International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM)

BESSAOUD Omar
International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM)

BOERO Ferdinando
Federico II University of Naples

CAPPATO Alberto
Old Port, Genoa

CRAMER Wolfgang
Mediterranean Experts on Climate and Environmental Change (MedECC)

DE LATTRE-GASQUET Marie
French Agricultural Research Centre for International Development (CIRAD)

DE MONTGOLFIER Jean
Plan Bleu (Executive Committee)

FOSSE Jérémie
ECO-Union, Global Eco Forum

GIER Güzel Yucel
Institute of Technological and Marine Sciences (Turkey)

GRIMES Samir
National School of Marine Science and Coastal Planning (Algeria) - ENSSMAL

GUIOT Joël
Mediterranean Experts on Climate and Environmental Change (MedECC)

KRAEMER Andreas
Ecologic Institut gemeinnützige GmbH

LE TELLIER Julien
UNEP/MAP Coordinating Unit

LE VISAGE Christophe
Stratégies Mer et Littoral

MARKOVIC Marina
Priority Actions Programme / Regional Activity Centre (PAP/RAC)

MENICHETTI Emanuela
Mediterranean Energy Observatory (OME)

PARANT Alain
Mediterranean Demographic Observatory (Demomed), Futuribles

PARIENTE DAVID Silvia
Energy consultant (CMI, World Bank)

RODDIER-QUEFELEC Cécile
European Environment Agency (EEA)

SEGHIRATE Yasmine
International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM)

SPILANIS Ioannis
University of the Aegean

TSANI Stella
National and Kapodistrian University of Athens (Greece)

UHEL Ronan
European Environment Agency (EEA)

[11] See Annex 1. List of experts supporting the foresight group for Module 1: building the foresight base.
[12] Some fifteen one- to two-day sessions were held between the time the group was created in May 2020 and the final production of the scenarios.

Box 5.

MEMBERS OF THE ADVISORY COMMITTEE

ADLY Emad
Arab Network for Environment and Development (RAED)

AYADI Rym
Euro-Mediterranean Economists Association (EMEA) - Morocco

BONNEL Alexis
Agence Française de Développement (AFD)

CLAUDIUS-PETIT Anne
Région Sud - France

DE JOUVENEL Hugues
Futuribles International

DOMINATI Laurent
"Save the Mediterranean" Association

ESCODA Anna
Association of Mediterranean Chambers of Commerce and Industry (ASCAME)

EVANGELOU Ellada
Anna Lindh Foundation

ELKAÏM David
Ministry of Ecological Transition and Solidarity (MTES), France

GIDRON Tsafrir
Plan Bleu Focal Point - Ministry of Environmental Protection, Israel

HAMIDI Samira
Plan Bleu Focal Point - Ministry of the Environment and Renewable Energies, Algeria

HEMA Tatjana
Mediterranean Action Plan Coordinating Unit (MAP/UNEP)

HUBERT Bernard
Agropolis International

INSALACO Eleonora
Anna Lindh Foundation

KAHIL Taher
International Institute for Applied Systems Analysis (IIASA) - Austria

KASTRINOS Nikos
European Commission

LEMAITRE CURRI Elen
International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM)

MASSET Philippe
French Environment and Energy Management Agency (ADEME)

MAURIELLO Valentina
Country Representative - Office of the Contracting Parties to the Barcelona Convention

MOUFARREH Amal
Plan Bleu Focal Point - Ministry of Energy Transition and Sustainable Development, Morocco

MONDIELLI Philippe
Prince Albert II of Monaco Foundation

MOULINE Mohammed Tawfiq
Royal Institute for Strategic Studies (IRES) - Morocco

NUNES ELodie
Conference of Peripheral Maritime Regions (CPMR)

RODRIGUEZ Benoit
Plan Bleu Focal Point - Ministry of Ecological Transition and Solidarity (MTES), France

ROQUE Maria-Angels
European Institute of the Mediterranean (IEMed)

SAMPSON Sonya
World Bank

STOJANOVIC Ivana
Plan Bleu Focal Point - Ministry of Ecology, Spatial Planning and Urbanism, Montenegro

TRUYOL Diana
Association of Mediterranean Chambers of Commerce and Industry (ASCAME)

TUNESI Leonardo
Italian national Institute for Environmental Protection and Research (ISPRA Ambiente)
Intergovernmental science and policy platform on biodiversity and ecosystem services (IPBES)

AN ADVISORY COMMITTEE

An Advisory Committee whose role was to ensure that the MED 2050 exercise achieves the objectives set by the Contracting Parties and partners. It is made up of people representing well-known organisations in the Mediterranean, working on themes such as the environment, development, and civil society organisations, as well as representatives of the Contracting Parties to the Barcelona Convention. Members of the Advisory Committee (see Box 5) also have a role in disseminating the results throughout the Mediterranean Basin. They can serve as relays for dissemination within the Mediterranean sub-regions, and may also identify relay networks within their respective networks as needed. At the end of the exercise, the Committee will be able to propose national and thematic extensions to the foresight exercise, as well as transition strategies within countries, so that the transition pathways proposed by MED 2050 are implemented in the most concrete and suitable way possible across the territories.

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2. A participatory approach

In addition to this organisation into three bodies, a participatory approach has also been adopted throughout the programme, through consultation with a wide range of stakeholders from around the Mediterranean in various forms: surveys, interviews, workshops, etc.

In particular:

- More than fifty interviews with leading figures;
- Several workshops aimed specifically at young people: The Youth Commission for the Future of the Mediterranean by videoconference (2022)[13], a TV show with the participation of young people from the Mediterranean Youth Council as part of the 5th edition of the Mediterranean of the Future in Marseille, France (2022), and a presentation and debate around the scenarios with young people from the eastern Mediterranean in Alexandria, Egypt (2023).

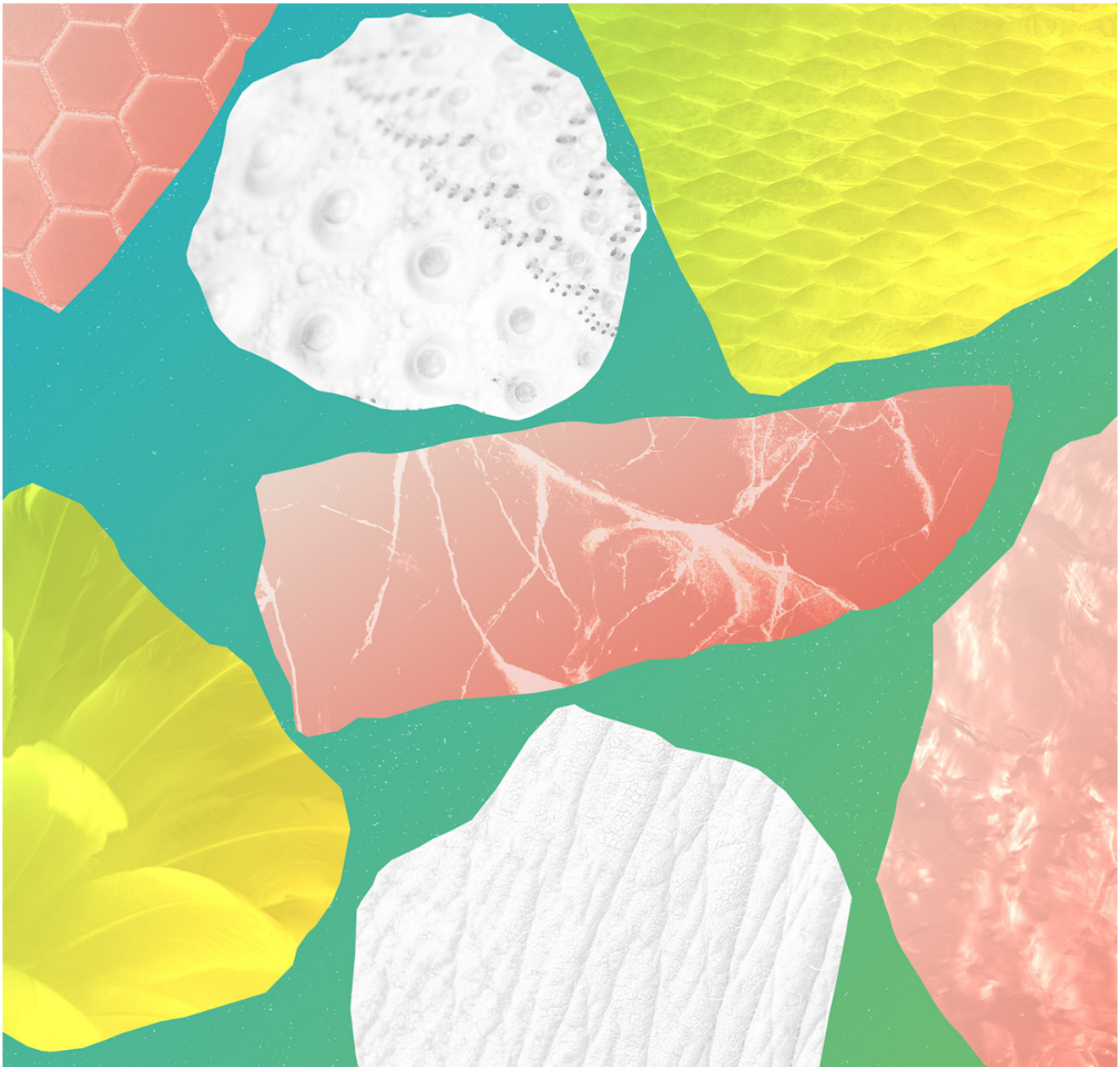
This participatory dimension was also deployed through the organisation or participation in multiple events enabling debate between a wide range of stakeholders, some of which were broadcast on social media:

- A workshop on the “Demographics - International Migration - Sustainable Development” nexus by videoconference (2021);
- Three workshops to adapt the MED 2050 foresight exercise to the French South Region (Région Sud), with elected representatives from the Region;
- A workshop on long-term sustainable water management in the Moulouya river basin in Morocco, by videoconference (2022);
- Presentation of MED 2050 scenarios at the World Sea Forum in Bizerte - Tunisia (2022 and 2023), and at the Mediterranean of the Future Forum in Marseille (2022).

[13] Workshop conducted as part of phase 2: Contrasting visions of the Mediterranean in 2050. See Part 2 of this report: “The Mediterranean up to 2050: trends and disruptions”.

PART 2

THE MEDITERRANEAN UP TO 2050: TRENDS AND DISRUPTIONS



A significant proportion of the MED 2050 exercise was devoted to building a foresight base prior to developing the scenarios.

This foresight base was structured around three components:

– First, a series of preparatory studies to situate MED 2050 in relation to other comparable studies and characterise the initial situation in 2020;
– Second, an analysis of the Mediterranean system and its evolution up to 2050 (trends, disruptions, weak signals) with a more detailed exploration of around thirty variables considered to be determining factors;
– And finally, consultation with a number of stakeholders and audiences on their visions for the future of the Mediterranean.

Part 2 of this report will focus on presenting the results of the first two components, and more specifically on the analysis of trends and disruptions.

I. PREPARATORY WORK AND SITUATION OF THE MEDITERRANEAN IN 2020

1. Preparatory work

Plan Bleu carried out several preparatory activities for the MED 2050 exercise. These studies provided useful insight into how the exercise should be designed, and helped illustrate the situation of the Mediterranean in 2020 with some key figures.
Three analyses were carried out specifically in preparation for the project:

- **A benchmark analysis of existing foresight studies on the Mediterranean**[14]: this document begins by identifying and classifying the relevant foresight studies. It then presents a comparative analysis of the content of these different studies, highlighting the major trends and uncertainties, the driving variables, and the major families of scenarios produced, and makes methodological recommendations. A final stage of the analysis discusses the observations made in the previous sections in order to identify the "blind spots" in the existing literature;
- **A study comparing projections made in 2005 with actual situations in 2020**[15]. This study had two objectives: assess the gap between the projections of the baseline scenario and alternative scenario in the 2005 foresight report with the actual development of the different variables and phenomena, and assess what the 2005 report correctly or incorrectly forecast, and the reasons for the gap;
- **Quantitative exploratory work on statistical series over a long period**, including economic, social and environmental variables and statistics dating back to the 1960s. These long data series come from international databases (United Nations, World Bank, etc.). A graphic presentation by country and, where possible, an analysis for each shore of the Mediterranean were produced.

Other studies were also used, in particular to characterise the initial situation:

- **Report on the "State of the Environment and Development in the Mediterranean"**, published in 2020[16]. This is the fruit of collaboration with over a hundred experts and scientists, and highlights the main pressures currently facing the Mediterranean Basin (biodiversity loss, plastic waste at sea, population concentration on the coasts and associated impacts, consequences of mass tourism, water scarcity, etc.).
- **The work of the regional Observatory on Environment and the sustainable development indicators linked to the MSSD**, which provides a strategic framework for the future of the region. A total of 28 indicators (24 of which are directly linked to the Sustainable Development Goals (SDGs)), listed on the MSSD dashboard, are kept up to date.

[14] Plan Bleu. *Towards a new foresight exercise on environment and development in the Mediterranean: Benchmark report of existing studies*. Plan Bleu, 2017.
[15] Miran, Patrice. *Etude comparative : environnement et développement en Méditerranée - Projections en 2005 et état actuel*. Plan Bleu, 2021.
[16] UNEP/MAP. *SoED 2020 - State of Environment and Development in the Mediterranean*. Plan Bleu, 2020.

2. The Mediterranean in 2020: forecasts and key figures

Table 3 and Box 6 illustrate some of the contributions from this preparatory work. Table 3 highlights the differences between the forecasts made in 2005 as part of the previous foresight exercise, and the situation in 2020. In particular, global warming, aquaculture production and marine pollution linked to containers were all underestimated; conversely, energy consumption and employment in the agricultural sector were overestimated. Box 6 provides numbers to describe the situation of the Mediterranean both as a region and as a sea at the end of the 2010s.

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Box 6.

THE MEDITERRANEAN IN 2020: SOME BASIC DATA

The Mediterranean as a region in 2020*:

- 5.7% of world land area.
- 7% of the world population (530 million), 63% of whom live in the South.
- 70% urban, 30% rural.
- Between a third and 40% of the population live on the coast.
- 10% of global GDP, of which 60% in the North.
- GDP per capita 3 times higher in the North than in the South i.e: 360 million international tourists.
- The world's leading tourist destination: 30% of the world's total tourist flows
- 7% of global energy demand and 5% of global oil reserves.
- 5% of global CO2 emissions.
- The region of the world which, after the Arctic, is warming the fastest (20% faster than average - warming of 1.5°C in 2020).
- 220 million people (42%) suffer from water shortages, including 180 million in the South and East.
- 60% of the world's water-poor population lives in the Mediterranean.
- 2% of the world's forests.
- One of the world's 10 biodiversity hotspots - 25,000 species, of which 1/3 of fauna species and 60% of flora species are endemic - 20% of species are threatened.
- Air pollution standards are exceeded in 2/3 of Mediterranean countries.
- 160 million people have no access to safe sanitation.

The Mediterranean as a sea in 2020:

- 0.8% of the world ocean surface area.
- A semi-enclosed sea - with close shores and 5,000 islands - but connected to the Black Sea, the Atlantic and the Red Sea.
- 130,000 migrants crossed the sea in 2022.
- 27% of global maritime transport in transit.
- The world's second-largest cruise destination (11.5% of the 27 million cruise passengers in 2022).
- 80% of pollution comes from inland (catchment areas).
- The world's highest density of plastic waste.
- Very low levels of wastewater treatment in towns and cities on the southern coast (44% of towns with more than 10,000 inhabitants have no wastewater treatment network).
- More than 20% of the sea surface is covered by offshore exploration contracts.
- 1.5 million tonnes of fish caught, 80% of which is overfished.
- A global hotspot of marine biodiversity under serious threat: 17,000 marine species listed - 28% of which are endemic.
- 18% of the world's known species in 1% of the oceans.

** N.B.: many of these statistics relate to the countries bordering the Mediterranean and not to the Mediterranean region in the strict geographical sense.*

Table 3.

DEVELOPMENTS IN THE MEDITERRANEAN SINCE 2005: WHAT WAS FORECAST AND WHAT HAPPENED

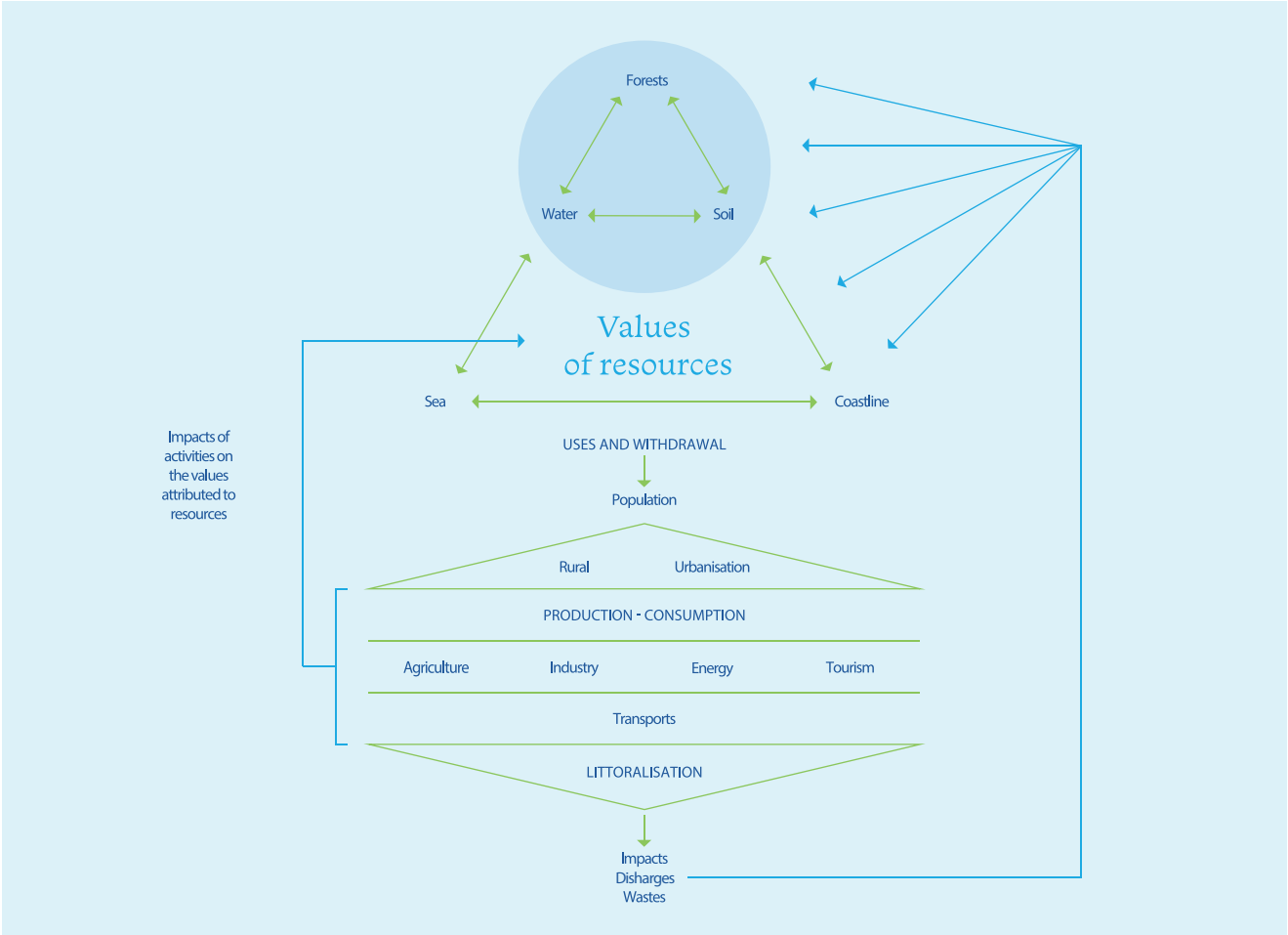
Variables	Estimate for 2025 based on the 2005 baseline scenario	Current data 2020	Comments on 2005 projections compared with current data
Temperature, global warming	+1°C	+1,6°C	Warming was **greatly underestimated** (while CO2 emissions were greatly overestimated). Relatively faster changes in the Mediterranean not foreseen. Acidification, sea level rise, precipitation changes not foreseen. Knowledge on the subject has greatly increased.
Population (number of inhabitants in Mediterranean countries)	513 M	515 M	**Underestimated,** because the jump in fertility in some countries was not foreseen (demographic transition not achieved).
Economy (GDP of all Mediterranean countries)	$7 trillion	$8.5 trillion	**Underestimated.** The Mediterranean economy (like the rest of the world) has grown faster than projected, despite the economic and financial crisis of 2008.
Water demand	210 km3 (at watershed level)	309 km3 (at national level)	Watershed / national data bias. If projected increase is calculated based on historical national data, the actual change is **between the baseline and alternative scenarios**.
Primary energy	1,380 Mtoe	959 Mtoe	**Overestimated.** Energy demand was lower than expected despite higher population and economic growth.
CO2 emissions from energy	3,200 million tonnes	1,935 million tonnes	Correspondingly, CO2 emissions from energy production have grown less quickly than expected and were **overestimated**.
International air and land traffic	350 billion passengers per kilometre	320 billion passengers per kilometre	Traffic growth in line with projections.
Maritime container traffic	65 million TEU	70 million TEU	The containerisation of maritime traffic and its expansion were **underestimated** in 2005.
Maritime pollution linked to containers	1,456 tonnes	17 000 tonnes	Very strong growth **not forecast** in 2005.
Urban population	371 million	355 million	**In line with** 2005 **forecasts.**
Municipal Waste	400 million tonnes	230 million tonnes	**Significantly overestimated** in 2005.
Agricultural labour force	30 million	25 million	**Underestimated drop.** The agricultural labour force declined faster than expected due to changes in North African countries and Turkey.
Use of pesticides	6.2 kg/ha	6,4 kg/ha	**In line with forecasts.**
Population density in coastal areas	156 inhabitants/km2	186 inhabitants/km2	**Underestimated.** The coastal development already identified in 2005 was stronger than expected.
International tourist arrivals	396 million	360 million	**Slightly overestimated.** Tourist boom already identified in 2005.
Aquaculture production	0.718 million tonnes	2.2 million tonnes	The boom of the sector was **not foreseen** in 2005.

II. THE MEDITERRANEAN SYSTEM AND ITS VARIABLES

1. The Mediterranean system

Before analysing trends and disruptions up to 2050, significant work was put in to defining the scope considered and its main dimensions, and more broadly the system on which the foresight exercise should focus. This definition of the Mediterranean system was led by the Plan Bleu team from the beginning of the exercise. Discussion was then enriched by consultation with the members of the foresight group on trends and disruptions. Equivalent work had already been carried out in previous foresight exercises, and the core part of the proposed "Mediterranean system" remains very similar to the one used in the first exercise carried out in 1989. As shown in the figure below, the core of the Mediterranean system, inspired by the DPSIR model (Driver - Pressure - State - Impact - Responses)[17], is based on a looped interaction of six dimensions: (1) demographics, (2) the production-consumption system, and (3) the spatial distribution of activities which have impacts on (4) the environment and resources, particularly marine and coastal resources which, depending on (5) how they are used and the policies implemented, have (6) more or less positive or negative knock-on effects on development and the population.

Figure 3.
THE CORE OF THE MEDITERRANEAN ENVIRONMENT-DEVELOPMENT SYSTEM (1989 FORESIGHT EXERCISE)



[17] DPSIR: Driver - Pressure - State - Impact - Responses

With regard to this basic diagram, it was considered necessary to add three major dimensions:

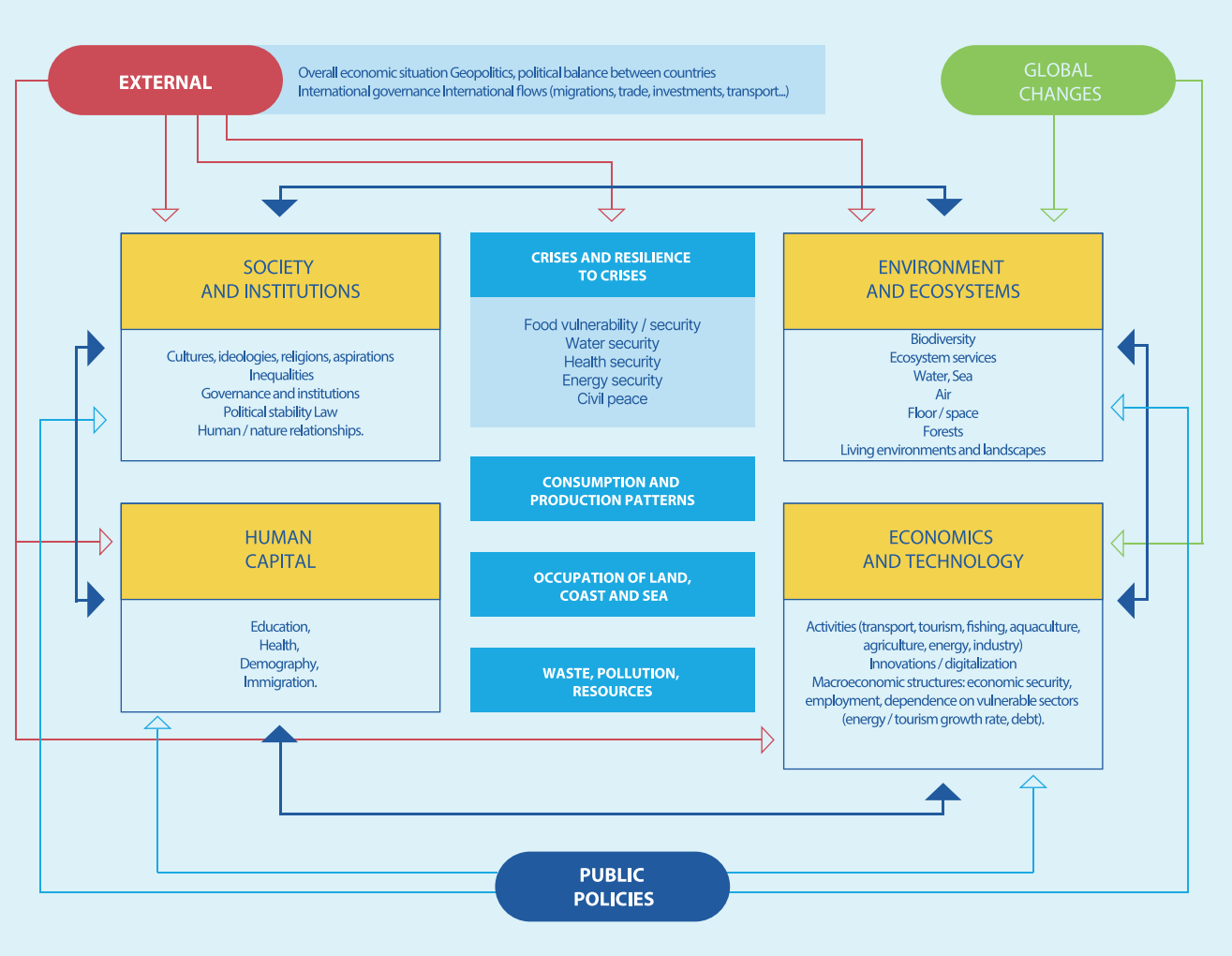
– Firstly, the influence of factors external to the Mediterranean, from global changes such as climate change, to international capital flows, global trade in goods and services, new technologies, extra-Mediterranean migration, geopolitical developments and changes in international governance;

– Then internal changes within Mediterranean societies: aspirations, social and cultural changes, changes to law and institutions, relationship with nature, education and training;

– And lastly, issues of security and vulnerability (energy, food, water, etc.) and the risks of crisis, with a specific focus on resilience and adaptation capacities.

Integrating these three dimensions into the initial core produces the **diagram of the Mediterranean system** (Figure 4) :

Figure 4.
ANALYTICAL DIAGRAM OF THE MEDITERRANEAN SYSTEM



This analytical diagram was used as a reference to define the driving variables of the system and to organise the work on trends and disruptions.

To build the scenarios, this diagram was later combined with the DEGEST structure, adding in two dimensions specific to MED 2050 - “the international context” and “regional geopolitics and governance”.

These scenarios are therefore built around eight key aspects:

- Global context,
- Regional geopolitics and governance,
- Demographics,
- Economy,
- Science and technology,
- Terrestrial and marine environment,
- Society,
- Governance and national policies.

2. Driving variables and analysis

Analysis of the system and discussions within the foresight group led to the identification of a number of driving variables likely to play a decisive role in developments in the region up to 2050.

These "structuring variables" (or system components) were grouped into the eight key aspects mentioned above and underwent specific detailed analysis through the drafting of "**factsheets**". There are 37 factsheets, and the themes were all chosen collectively[18].

Box 7.

DRIVING VARIABLES GROUPED BY KEY COMPONENTS

Context

- Global trends
- Major global trends and their impact on the Mediterranean
- Global climate change scenarios

Demographics and regional planning

- Population growth
- Migration dynamics
- Urban transition

Environment

- Human activities in coastal and maritime areas
- Climate change and its effects on terrestrial and marine ecosystems
- Biodiversity and marine ecosystems
- Land resources and biodiversity
- The link between water, soil, agriculture and the environment
- Water resource management

Economy

- Public and private financing for development
- Exploitation of marine mineral and energy resources
- Fisheries and aquaculture
- Economic growth and the economy-environment trade-off
- Blue economy
- Maritime transport
- Tourism
- Inequalities, poverty and social mobility
- Production and consumption patterns

Society

- Mediterranean identities
- Value systems and religiosity
- Young people in society
- Status of women
- Environmental awareness

Global and regional governance

1. Regional governance

- Geopolitics and security
- The Mediterranean in European policies - Green Deal
- Governance of the marine environment
- Multi-scale, multi-stakeholder governance
- Policy coherence and regional cooperation

2. National or local governance

- Adaptation and mitigation policies
- Energy transition policies
- The role of civil society in public policy
- Risks and crisis prevention

Science and technology

- Knowledge-based society
- Observation, surveillance and warning systems

The factsheets follow a common framework structured into five sub-sections:

- Definition of the variable and description of its scope;
- A retrospective analysis of past trends for the variable, based on (quantitative or qualitative) data available in the scientific literature. Drawing on this objective basis, the authors can then propose the trends and disruptions that will structure foresight;
- An assessment and ranking of the issues associated with each theme (risks and threats to avoid, obstacles to overcome, objectives to achieve). Some issues may overlap with the sustainable development goals;
- Assumptions about trends up to 2050: major trends and disruptions for the variable, with an assessment of plausibility;
- And, finally, proposed scenarios for the same timeframe (between three and five scenarios).

A partial summary of these sheets is available in the report published in 2022 on the "foresight base"[19].

[18] See Annex 2. List of variables: part of the foresight base.
[19] Plan Bleu. *MED 2050 - Module 1: The foresight base, preliminary report*. Plan Bleu, 2022.

III. MEDITERRANEAN TRENDS UP TO 2050

Two approaches were used to determine major trends in the Mediterranean between now and 2050 - both as a sea and as a region.

- Initially, a qualitative consultation using a questionnaire was carried out with the members of the foresight group - extended to include a few additional experts. They were asked to name and rank the trends they considered to be the most important up to 2050. The survey revealed 195 trends structured around 13 aspects, ranging from demographics to the marine environment. These trends were then ranked according to both importance and probability. This phase involved not only classifying the trends but also assessing the consensus or, on the contrary, lack of consensus about the projections presented by various individuals. The detailed results of this consultation were published in the 2022 report on the foresight base. We will therefore limit ourselves here to presenting the main conclusions.
- In a second phase, this qualitative survey was supplemented by much more precise quantified data, based in particular on the factsheets drawn up by the members of the extended foresight group, one section of which dealt with trends. Some qualitative trends were also added at this point. Detailed monographs on certain themes, such as demographics, the work of MedECC and analysis of other foresight exercises, complemented this work on trends. All this work on trends is summarised very briefly in this sub-section, with a distinction drawn between qualitative and quantitative results.

1. A broad agreement on the key trends for the future of the Mediterranean by 2050 - with climate and demographics at the top of the list

The qualitative survey revealed a very broad consensus on around thirty trends that can be grouped into five main categories:

- Firstly, those linked to climate change and its consequences, which are by far the most decisive for the next three decades: warming and sea level rise, an increase in extreme events, structural transformation of the marine ecosystem, increased droughts and water stress, degraded living conditions, economic impacts, etc.;
- Then there are demographic trends, with considerable divergence between North and South, and their impact on resources (water, soil, biodiversity, food and housing needs, etc.), but also on territories (including cities) and migration;
- Thirdly, the massive acceleration in pressure of all kinds on the coast, linked to tourism, the rural exodus, urbanisation, and economic activities that are increasingly concentrated in the major cities bordering the sea, or poorly controlled regional planning - again with major consequences for the sea, the reduction in space available for agriculture or dedicated to protecting nature, exposure to climate risks and retreating coastlines;
- The fourth category essentially concerns the economic, social and geopolitical dimensions: globalisation based on digital technology, accompanied by a shift in power towards Asia and the Big Five tech giants, a significant risk of economic and technological marginalisation of the region - including in the North, and a growing North/South divide in the Mediterranean. Other issues raised include chronic youth unemployment in the southern Mediterranean countries, with the risk of a brain drain and the consequent loss of long-term development potential; the explosion of inequalities within and between countries; and the difficulties of decoupling growth from the environment;
- And finally, and less expectedly, problems related to a lack of governance, both across the region and within countries: the failure to enforce the law - including international law and the Barcelona Convention and its Protocols, the compartmentalisation of policies into silos, lack of public policy evaluation and planning, vulnerability or lack of democracy in institutions.

[20] *Ibid.*

Box 8.

A CONSENSUS ON AROUND THIRTY TRENDS

- Increasing fragmentation of the region and a widening North/South divide.
- The global acceleration of climate change: 2.3°C increase in the Mediterranean by 2050.
- Accelerated warming of the sea, causing a change in deep-sea dynamics and a tropicalisation of species.
- Sea level rise of around 40 cm by 2050 with increasing impacts on coastal areas, natural environments, populations and activities.
- Increase in the differences in demographic dynamics between the North (- 10% by 2050) and the South (+ 45%) and East (+ 30%). 125 million more inhabitants in 2050 in the southern Mediterranean, 10 million less in the North - 3/4 of the region's population living in the South and East by 2050.
- Demographic growth in certain countries leading to crucial unsustainable development problems (scarcity of resources, food, jobs, living conditions and quality of the environment, access to health, housing, etc.).
- General ageing - with over 30% of the population aged over 60 in the North and a threefold increase in the proportion of people over 60 in the South.
- Doubling of Africa's population and its increasing integration into the global and Mediterranean economy.
- A sharp acceleration of North-South and South-South migration (linked to climate, poor development, including in sub-Saharan Africa, and conflicts).
- The completion of the urban transition in the South (over 70% of the population living in urban areas) with rampant urbanisation and urban expansion. Tensions over land use and housing that are increasingly difficult to manage. Marginalisation of rural societies (geographical dualisation of societies).
- The concentration of populations and activities in coastal areas and deltas leading to an increase in built-up areas, a loss of agricultural or natural land, and risks of vulnerability to sea level rise.
- A continued general globalisation trend, with a shift in power towards Asia, but also consolidation of regional sub-blocs.
- Relative slowdown in growth and trade compared with previous decades, particularly in the Mediterranean, with a partial substitution of movements of goods or people by virtual exchanges.
- Economic and technological marginalisation of the Mediterranean region - with widespread debt.
- Concentration of capital in the digital economy. The major role of the Big Five tech giants and their Chinese equivalents. The development of artificial intelligence in all areas and the transition to generative AI.
- The development of societies built around control and surveillance linked to the general spread of digital technologies.
- The increase in economic and political conflicts linked to access to scarce resources (strategic metals, arable land, cross-border waters, marine energy).
- Serious divides that prevent the inclusion of young people in society (employment, education, responsibilities, etc.) as a result of inadequate economic, social or educational strategies.
- Continuing North/South inequalities in the Mediterranean and an increasing concentration of wealth among a small minority of regions and individuals.
- Growing yet not always suitable investment from the finance sector and international financial or development aid organisations in the ecological and energy transition.
- Slow spread of the circular economy model, and sustainable production and consumption patterns - first in the North and then in the South, linked to both ecological and socio-economic issues (reduced spending, resource saving).
- Growing food dependency in the South, especially for cereals.
- Energy demand to double by 2050 in the South, but to stabilise in the North. Strong growth in solar energy.
- Continued overfishing of endangered species despite the massive shift from sea fishing to aquaculture. A general decline in marine biodiversity in the western Mediterranean.
- The critical scarcity of water resources. The majority of southern and eastern countries experience extreme water stress, and the doubling of drought periods in the North. Massive use of desalination.

2. Disagreement on the economy, geopolitics, and climate change are ushering in a period of great uncertainty

Alongside a large number of trends that are broadly agreed on, there are nevertheless significant disagreements on a number of possible developments up to 2050. These relate in particular to the scale of climate change, the economy and geopolitics. Foresight experts often use the acronym VUCA[21] for "volatility, uncertainty, complexity and ambiguity" to characterise the next thirty years - a turbulent world in which every possible development will have to be considered.

This is particularly true for the Mediterranean, and may explain some of the disagreement between experts.

- From an environmental point of view, the major uncertainty concerns whether or not several tipping points will be crossed between now and 2050, which could push the rise in temperatures over 2.5°C by that date.
- In economic matters, there is no clear-cut position on a large number of issues, including the decrease in mass tourism and air transport, the marginalisation of Mediterranean ports, deglobalisation and the relocation of industries, the rise of the blue economy, and the rate at which new technologies will be integrated into the management of living land and sea resources. There is also disagreement about changes to agriculture and the goal of food self-sufficiency - given the possible conflicts of interest between rural and urban people, the rate of urbanisation and environmental changes. The same applies to the probability of oil or plastic peaks in 2030 - 2040.
- In terms of geopolitics in the broadest sense, different positions are also being expressed on the continuing American presence in the Mediterranean and the evolution of European policies, the impact of the Silk Roads and the Ukrainian conflict, whether or not peace will be restored in the region, the evolution of the Balkans (in relation to demography), public or private appropriation of the sea (division of the Mediterranean Sea), and finally on the growing regional fragmentation and widening North/South divide. There is also little consensus on some global and domestic social and cultural changes – the risks of social disintegration, the change in religious sentiment, and environmental awareness. It is clear that on many issues of great importance for the future, the experts are either in strong disagreement with each other or do not have a clear-cut opinion.

[21] VUCA: Volatility Uncertainty, Complexity and Ambiguity

Box 9.

TRENDS ON WHICH THERE IS DISAGREEMENT

- A major impact if several climate "tipping points" are exceeded before 2050.
- Relative deglobalisation of economies with intensified intra-Mediterranean trade and emphasis on local trade. A new geography for value chains, with a redeployment of industries in the region.
- Greater integration of the Mediterranean economy into the global market with multiple extra-regional free trade agreements.
- Isolationism of the United States and its divestment in the Mediterranean.
- The return of peace throughout the region.
- Migration policies in the North, determined more than is currently the case by economic and demographic interests.
- Regional autonomy movements and the proliferation of new national structures around the Mediterranean. Increasing rejection of central authorities.
- Significant population decline in the Balkans.
- Very high geopolitical tensions linked to the increasing division of the Mediterranean Sea into exclusive economic zones.
- Marginalisation of Mediterranean ports on a European or global scale, despite growing intra-Mediterranean transit traffic.
- New shipping routes through northern Siberia.
- Resumption of growth in air transport at pre-COVID levels despite ecological constraints.
- Increasing barriers to mass tourism. Growing opposition to "over-tourism", including from local businesses (impact on accommodation, cost of living, etc.: "too much tourism kills tourism").
- Tourism peak in 2030.
- Continued growth in recreational boating and cruise tourism.
- The possibility of an irreversible collapse of certain economies linked to the decline in tourism.
- Major conflicts of interest between farmers and urban classes related to food autonomy and the prices of agricultural products.
- Gradually closing gaps between cities and the countryside (access to housing, education, services, etc.)
- A general decline in the proportion of agriculture in the GDPs of the countries in the region.
- Continued obstacles to the modernisation of agrarian structures.
- A slowdown or backlash with regard to interest for the environment linked to economic difficulties in a context nevertheless marked by increased emergencies.
- Rapid change in the world of finance to encourage green growth and renewable energies and a radical decrease in investments in fossil fuels.
- Rapid growth of a sustainable blue economy linked to innovation in new consumption and production business models.
- Sharp reduction in the rate of unsustainable fishing (80% in 2020).
- Plastic peak in 2030-2040.
- Rapid phase-out (before 2035) of fossil fuels, with major consequences for producer countries and energy consumption patterns.
- Societies increasingly fractured into archipelagos and separate communities. A general trend towards the social breakdown of countries. Conflicts and collapses.
- Increasing disputes over the role and status of religion in many countries. The fading of radicalism and a shift towards "cultural modernisation".
- The rise of sectarian groups and disinformation linked to digital media.
- Better perception by policymakers of the consequences of their decisions, thanks in particular to artificial intelligence.
- Increased demand for participation in decision-making in all institutions (families, businesses, governments, etc.).

3. Some major driving trends: quantifying factors

The scale of these uncertainties should not obscure the fact that **the driving forces are already foreseeable and partly quantifiable in key areas: demographics and the location of inhabitants or activities, climate change and its impacts on water, terrestrial and marine biodiversity, and certain aspects of the economy**. For MED 2050, a significant focus was placed on demographics[22], and climate[23] thanks to MedECC. The following analyses are essentially based on this work.

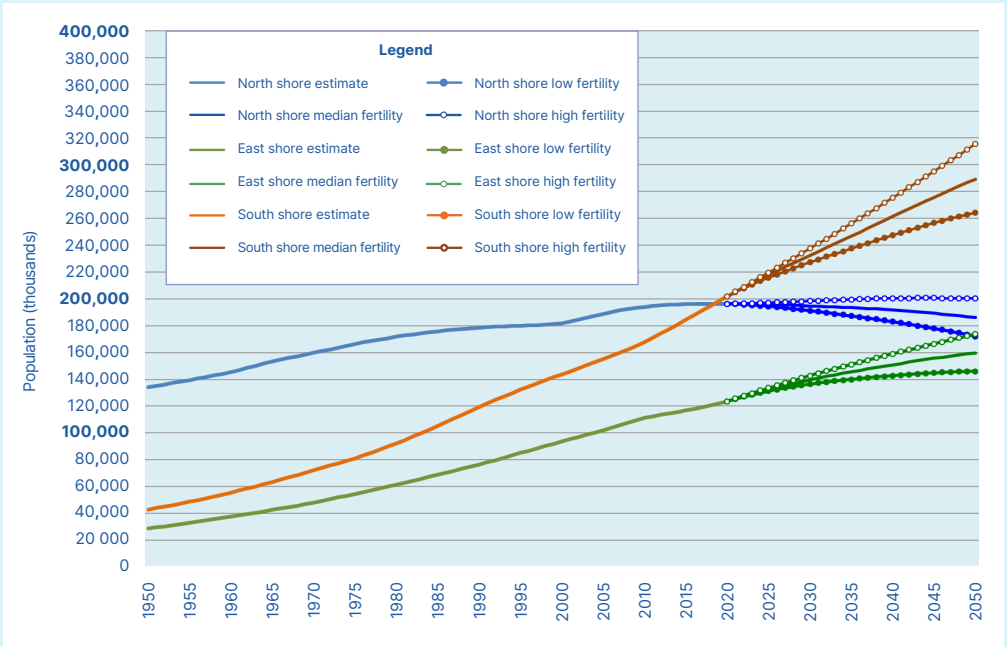
A) DEMOGRAPHIC AND TERRITORIAL TRENDS FOR 2050

Over the six decades from 1960 to 2020, the population of the Mediterranean Basin more than doubled, from 239 million to 522 million, with more than 80% of this increase attributed to the countries on its eastern and southern shores. In an area where the overall population has increased by a factor of 2.2, there has been a sharp contrast between the North, where the population has grown by just 35% in 60 years (from 146 million to 196 million), and the East and South, where growth has been 2.4 to 2.7 times higher (from 37 million to 122 million and from 56 million to 202 million respectively).

Despite this strong growth in the South, the Mediterranean's share of the world's population has fallen overall, from over 8% to less than 7%. This relative decline in demographic weight on a global scale is entirely attributable to low population growth in the Euro-Mediterranean countries. In the South and East, on the other hand, the demographic transition is not yet complete, and United Nations projections do not anticipate any significant slowdown in previous growth rates before 2050.

By 2050, the riparian countries will be home to more than 580 million people in a low scenario (up 12% on 2020); 635 million in a medium scenario with a smaller drop in fertility (up 22%); and almost 690 million in a high scenario (up 32%).
As in the past, this growth will be very uneven across the region. In fact, the gap is set to widen further between the European shore, where the population will decline in almost all countries, and the Asian and African shores, where it

Figure 5.
THREE SCENARIOS FOR DEMOGRAPHIC CHANGE IN THE REGION BETWEEN NOW AND 2050
(Source: United Nations, World Population Prospects: The 2019 Revision)



[22] Plan Bleu. *Demographic trends and outlook in the Mediterranean*. Paper 21, Plan Bleu, 2020. ; Léger, Jean-François, and Alain Parant. «Basculement démographique en Méditerranée : le Sud devenu la première puissance.» *Population & avenir*, vol. 753, 2021. ; Plan Bleu. *Présence, origine et destination des migrants en Méditerranée - Bilan 1990-2020 et perspectives à l'horizon 2050*. Plan Bleu, 2022.
[23] MedECC. *Climate and Environmental Change in the Mediterranean Basin – Current Situation and Risks for the Future. First Mediterranean Assessment Report.* MedECC. 2020.; and Boxes 10 and 11 of this report.

will increase everywhere - with, in the medium scenario, a population increase of almost 90 million in the South and 35 million in the East. While the northern Mediterranean was home to over 60% of the regional population in 1960, it will account for just 25% by 2050.

On the other hand, all countries will be affected by significant ageing of their populations. In the northern Mediterranean countries, where the percentage of elderly populations is already close to 30%, the general rise in average life expectancy will only be accompanied by a relatively moderate increase in the number of people over the age of 60. However, this rate will explode (threefold increase) in the eastern and southern Mediterranean countries, from figures that are still very low today. In the long term, this trend will pose a problem for the working generations in terms of caring for these elderly populations.

Mechanically, most demographic growth will take place in urban areas. Between 1960 and 2015, the urban population increased by a factor of 2.8 (from 116 million to 333 million). It could further increase by a factor of 1.5 between now and 2050, rising to 484 million (compared with a 1.3-fold increase in the total population).

By this date, all countries (with one or two exceptions) will have an urbanisation rate of over 70%, and will be on the way to completing their urban transition. On a country level, this growth will again occur where the increase in the total population is expected to be greatest: in the eastern and southern Mediterranean. The most dynamic cities in these two areas will benefit the most, i.e. the capitals or largest cities, and all those located along the coasts - a metropolis like Cairo will have a population of around 50 million. This is where economic, commercial and many tourist activities are concentrated.
The trend towards concentration in coastal towns and cities, which by 2050 should be home to significantly more than 50% of the population[24], is likely to be accentuated by global warming, which will also have a major impact inland. This will increase the temptation or need to head for the coast.
Despite the scarcity of land and urban housing, it's hard to imagine people returning to the countryside, which is often arid or emptied of rural activities and services. As a result, the long-standing trend towards concrete construction along the coast will increase, to an average of over 50%.

This dynamic is bound to increase living condition problems in cities, and the impact on the environment and the sea. The first question that will arise is that of urban population overcrowding and the capacity of large cities to accommodate all their inhabitants in decent conditions. In countries bordering the southern and eastern Mediterranean, the arrival of new populations often precedes the construction of housing. As a result, urbanisation will initially lead to conflicts over increasingly scarce land (including through tourism) and to a massive increase in informal housing.
Against a backdrop of global warming (heatwaves, extreme events, sea level rise), this rapid increase in coastal urbanisation is likely to create more problems than benefits. It will be accompanied by an increase in pollution and waste, chronic exposure of populations and activities to extreme or health risks, and in general, a sharp deterioration in the state of the environment and local biodiversity, whether marine or terrestrial.
Will big cities be able to accommodate this surplus of inhabitants in good conditions (protection from risks, access to nature, running drinking water, wastewater treatment, rubbish collection, educational, social and medical infrastructure, etc.)? Will they also be able to manage their impact on the environment properly and organise their resilience in the face of climate change or uncertainties?
The demographic growth expected in the coming decades will mean that the issue of the environment's carrying capacity and the spatial limits to planning and development will have to be taken more seriously, particularly with the addition of extreme vulnerability to climate change and rising sea levels (+40 cm).

In the southern and eastern Mediterranean, the sustainability of these major cities will therefore be a highly sensitive issue at an ecological, social and economic level. In a context of favourable economic development, they will undoubtedly be able to offer their residents living conditions similar to those in the North, but this will have a significant impact on the local environment, which will have to be taken into account. The most likely hypothesis is that living conditions will worsen, especially with the effects of climate-related crises, water shortages and food insecurity. It is likely that in such conditions, attention to the quality of the marine or coastal environment will still not be considered a priority.

Will urban density that has become unbearable lead to massive emigration? If so, to which destinations? Although it is likely that population movements will increase, it is not certain that this will occur mainly between the northern and southern Mediterranean. Demographically (as well as culturally, economically, etc.), the Mediterranean Basin is not a closed area in which migration occurs exclusively between the countries around it. It is this age-old openness to other areas that makes it so difficult to understand the region's demographic prospects.
For example, there are major demographic movements between the countries bordering the Mediterranean, in both the North and the South, and sub-Saharan Africa. The major demographic surge in the 21st century will take place in this region, where the number of inhabitants is set to almost double by 2050 - from 1.3 billion in 2020 to 2.1 billion in 30 years' time. The

[24] Please note, the statistics available take into account the countries bordering the Mediterranean and not the Mediterranean region in the strict geographical sense.

dynamics of Mediterranean demographics cannot be understood without also considering demographic trends in sub-Saharan Africa, especially as many of the countries in this region have long-standing and/or still very strong migratory (and economic) ties with certain Mediterranean countries.

B) CLIMATE CHANGE AND ITS IMPACT ON MARINE BIODIVERSITY

Along with demographics, the most predictable trends are clearly those linked to climate - in interaction with other, more local dynamics that are transforming sea and land areas. Multiple factors of change will combine to produce a Mediterranean in 2050 that is very different from what it is today.

First of all, the climate, and all its effects: rising temperatures, rainfall variability, extreme events, sea level rise, salinity and acidification of sea water, etc.; but also, demographic growth, infrastructure and pollution, unsustainable land and sea use practices, non-native species, and so on.

In most regional sub-basins, almost all natural ecosystems and the livelihoods of the poorest populations will be heavily affected. Given the near-certainty of the region exceeding the 2°C warming threshold before 2050, early efforts will be absolutely essential to adapt to the inevitable changes, mitigate vulnerabilities and increase resilience.

At the level of the Mediterranean basin, average annual temperatures are already 1.54°C above the 1860-1890 level, i.e. 0.4°C higher than the global average change. In all likelihood, they will exceed 2°C after 2040 and 2.2°C in 2050. In other words, what was forecast 20 years ago for the end of the century in terms of global warming could happen as early as the middle of this century.

The work carried out by MedECC provides a precise assessment of the consequences of this interaction between climate change and other factors specific to the Mediterranean (see Boxes 10 and 11).

In particular, it points to: a 4 to 5°C rise in land temperatures compared to normal during heatwaves, frequent marine heatwaves, very high variability in rainfall (with long periods of drought and low or zero river flow, but also more frequent flooding), a much greater likelihood of “major fires”,

Box 10.

CLIMATE CHANGE IN THE MEDITERRANEAN BASIN BY 2050

While the global atmosphere warmed by 1°C compared to the pre-industrial level, the Mediterranean Basin (land + sea) warmed by 1.5°C, even exceeding 2°C in summer. The warming of the sea (+1.2°C) is twice that of the global ocean (+0.6°C). Warming is currently set to additionally increase up to +2.2°C until 2050. Consequently, land and sea heat waves are already and will continue to be more intense, longer, and more frequent.

In this region, annual precipitation decreases by 4% for each degree of warming. Summer precipitation becomes rarer, especially in the southern basin, while more heavy rains and therefore increased flood risks are projected during other seasons. The decrease in precipitation, the reduction in runoff and the reduced aquifer recharge, together with a higher pressure of use, will increase the water scarcity to critical levels in some regions and for some users. Freshwater availability is projected to diminish by 10% in 2050 compared to the present state. The consequences will be particularly severe in the South and East of the Mediterranean Basin, where agriculture is the largest consumer of water.

Land and seafood production activities are strongly impacted by climate change, more frequent and intense extreme events, together with higher soil salinization, ocean acidification and land degradation. The reduction of up to 17% of crop yields and up to 20% of exploited marine species is projected by 2050. This will potentially be worsened by emerging pests and pathogens. There is a strong extension of dry areas and an increase in burnt areas during episodes of mega-fires. With the warming of 3°C, burnt area is projected to double by 2100.

Sea level in the Mediterranean increased by 6 cm during the last 20 years. It will continue reaching up to 37 cm by 2050 and up to 100 cm or even more by 2100 depending on the mitigation scenario. The Mediterranean coastal zone is more vulnerable to sea level rise than other coastal areas because the low tidal range has led to building and settling very close to the coastline. Half of wetland area has already been lost or degraded, and this trend is expected to continue. The absorption of carbon dioxide (CO2) by the sea results in the sea water acidification, adding pressure on most marine biota.

The impacts of climate change are amplified by non-climatic factors including rapid urbanisation, pressure from tourism, pollution, land degradation, overfishing and intensification of agriculture.

The combined impacts of environmental changes (notably air pollution and climate) increase risks to human health from heat waves, food and water shortages, vector-borne, respiratory, and cardio-vascular diseases.

Source : MedECC. *Climate and Environmental Change in the Mediterranean Basin – Current Situation and Risks for the Future. First Mediterranean Assessment Report.* MedECC. 2020.

a 40-centimetre rise in sea levels by the middle of the century, and widespread impacts for biodiversity and people.

Although all terrestrial ecosystems will also be affected, this combination of climate-related structural effects and other factors will have the most profound transformational impacts on the sea, with numerous consequences for biodiversity, but also for the general structure of the Mediterranean ecosystem as a whole.

The combination of warming, acidification, changes in the thermohaline circulation of water masses, and their overloading with pollutants will lead to a profound upheaval of this global ecosystem[25]. As a result, scientists[26] refer to a general process of "tropicalisation" and "southernisation" of the sea.

Biodiversity will not necessarily decrease overall, but it will change. Global warming will lead to major reorganisations in the distribution of biota, species and marine productivity, with an increase in non-native species and potential extinctions.
Although the rise in sea temperature will be less than on land (+1.2°C), it will have multiple effects, especially as it will be accompanied by periodic and devastating "marine heatwaves", including a decline in cold-water species, disruption of plankton ecology, increased proliferation of jellyfish, sharp reduction or even disappearance of coral and seagrass beds along the coast, and changes in the physiology, growth, reproduction and behaviour of marine organisms.
Projections for high-emission scenarios show a change in endemic assemblages between now and 2040 - 2060. Of the 75 endemic Mediterranean fish species, 31 are likely to extend their geographical range and 44 are likely to reduce it.
Alterations to the natural habitats of commercially valuable species will occur, with repercussions for marine ecosystem services such as tourism, professional fishing, climate regulation, coastal protection and, in the long term, human health.

In addition to the essentially global changes linked to the climate, there will be changes linked to the anticipated development of human activities around the Mediterranean. The first decisive trend in this area will be the massive replacement of fishing by aquaculture - which should make it possible to stabilise the quantities fished at around one million tonnes a year - with the difficulties of making it more socially and ecologically sustainable at a local level.

As far as future pollution is concerned, scientists are focusing first and foremost on algal blooms, which can have a negative impact on ecosystems (red tide, mucilage production, anoxia), cause serious health problems and represent a serious threat to the fishing, aquaculture and tourism industries.
Another major concern relates to emerging contaminants (recently discovered chemicals or materials), which are very prevalent in the Mediterranean Basin, and which will continue to increase as a result of the still very high input of untreated wastewater. These substances can cause disorders of the nervous, hormonal and reproductive systems.

Above all, the Mediterranean will remain one of the most polluted large bodies of water in the world, at least in terms of plastic. According to the few estimates available for the region - in particular those produced by the OECD [27] - discharges into the sea could increase by a factor of 1.5 or 2 by 2040-2050. Even with rigorous reduction in use of plastic, associated debris and its dissolved derivatives will remain a problem, since it can take between 10 and 20 years for a bag to degrade, 450 years for a PET bottle and 600 years for a fishing line.

[25] MedECC. *Climate and Environmental Change in the Mediterranean Basin – Current Situation and Risks for the Future. First Mediterranean Assessment Report*. MedECC. 2020., op.cit. and Boxes 10 and 11 of this report.
[26] Briere Spiteri, Claudette. *The Mediterranean Large Marine Ecosystem - Prioritization of the Transboundary Problems, Analysis of Impact and Causes*. Plan Bleu, 2022.
[27] OECD. *Global Plastics Outlook: Policy Scenarios to 2060*. OECD Publishing, 2023.

Box 11.

IMPACTS OF CLIMATE CHANGE ON MARINE ECOSYSTEMS IN THE MEDITERRANEAN BY 2050

The Mediterranean Sea, covering 0.82% of the global ocean's surface, remarkably hosts up to 18% of all known marine species, with 21% of vulnerable and 11% of endangered marine habitats. Severe threats for these unique biodiversity result from climate change, including sea warming, marine heatwaves, ocean acidification, and rising sea levels.

Due to the increasing temperature, the distribution of warm-water fish species shifts northwards, causing the decline of cold-water species. Non-indigenous thermal-tolerant species proliferate with increasing shipping activity and climate impacts leading to "tropicalization" of the Mediterranean. Projections indicate that by 2050, fish species richness will likely rise in the eastern Mediterranean and decline in the western Mediterranean. For high emission scenarios significant modifications to endemic assemblages are projected by 2041-2060 and among 75 Mediterranean endemic fish species, 31 will likely extend their geographical range, while 44 will likely reduce it. Within those species, 25 would be threatened with extinction and six species would become extinct. Small pelagic species and thermophilic species of lower trophic levels may benefit from changes, but large-sized commercially valuable species may struggle to survive. The Mediterranean Sea has lost 41% of marine species at the top of the food chain since 1950 due to climate change and overfishing.

Deep-water corals, residing close to their upper thermal tolerance, face potential threats due to the warming. Heat waves lead to a rising occurrence of mass mortality events among benthic species, primarily affecting invertebrates like corals, sponges, bivalves, ascidians, and bryozoans. The oxygen level in water is depleted: each degree of warming induces a 10% increase in the hypoxic water zone.

The Mediterranean hosts 5 to 17% of the worldwide seagrass habitat. These emblematic seagrass beds are at risk, with 1.2 to 5% of seagrass meadows lost annually. Among them, almost half of the surveyed Posidonia oceanica sites have suffered net density losses of over 20% in 10 years.

Acidification impacts bivalves (including aquaculture species), corals, sponges, crustaceans, coralline red algae, but also primary producers such as coccolithophores and foraminifera.

Alterations to coastal ecosystems due to climate change and human activities, affects the magnitude, timing, and composition of harmful plankton blooms and lead to an increase in jellyfish outbreaks.

Sea level rise affects coastal wetlands and estuaries. It also increases erosion leading to the retreat of coastlines with the least mobile species being most severely impacted.

Ongoing changes adversely affect ecosystem services such as tourism, fisheries, climate regulation, coastal protection, as well as human health. To enhance the resilience of marine ecosystems, there is an urgent need for more sustainable fishing practices, an ecosystem-based approach, reduced pollution, sustainable tourism, the establishment of more marine protected areas, and more effective waste management.

Source : MedECC. *Climate and Environmental Change in the Mediterranean Basin – Current Situation and Risks for the Future. First Mediterranean Assessment Report*. MedECC. 2020.

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C) WATER AND ENERGY: TWO CONCERNS THAT HAVE ALWAYS BEEN CRUCIAL IN THE MEDITERRANEAN, BUT THAT CLIMATE CHANGE AND DEMOGRAPHICS WILL MAKE MORE OF A PRIORITY THAN EVER

There are, of course, strong relationships between the trends forecast for population and climate, and those for water and energy. Water and energy have been historically crucial in the Mediterranean, and have many points in common, with on the one hand, major inequalities in situations between countries (particularly North/South) and, on the other, a common situation of shortage or vulnerability. There is also, with a few exceptions, a dependence on new resources (desalination, renewables, etc.) or imports (cross-border or virtual water, fossil fuel imports, etc.), and an overall problem with controlling demand and reducing waste.

For water, the resource situation is almost symmetrical to the existing or expected demographic situation - with 70% of potential in the North, 25% in the East and 5% in the South. **Today, 60% of the world's water-poor population (less than 1,000 m3/capita/year) live in the Mediterranean, with 180 million people suffering severe water stress and 80 million suffering extreme water stress (less than 500m3/capita/year).**

With the exception of Turkey, almost all the countries of the southern and eastern Mediterranean already have water consumption rates of over or close to 100%, 80% of which is used for agriculture. The average drop in precipitation (4% for each additional degree of warming), and therefore in runoff and aquifer recharge, will reduce the resource by a further 10% overall by 2050.

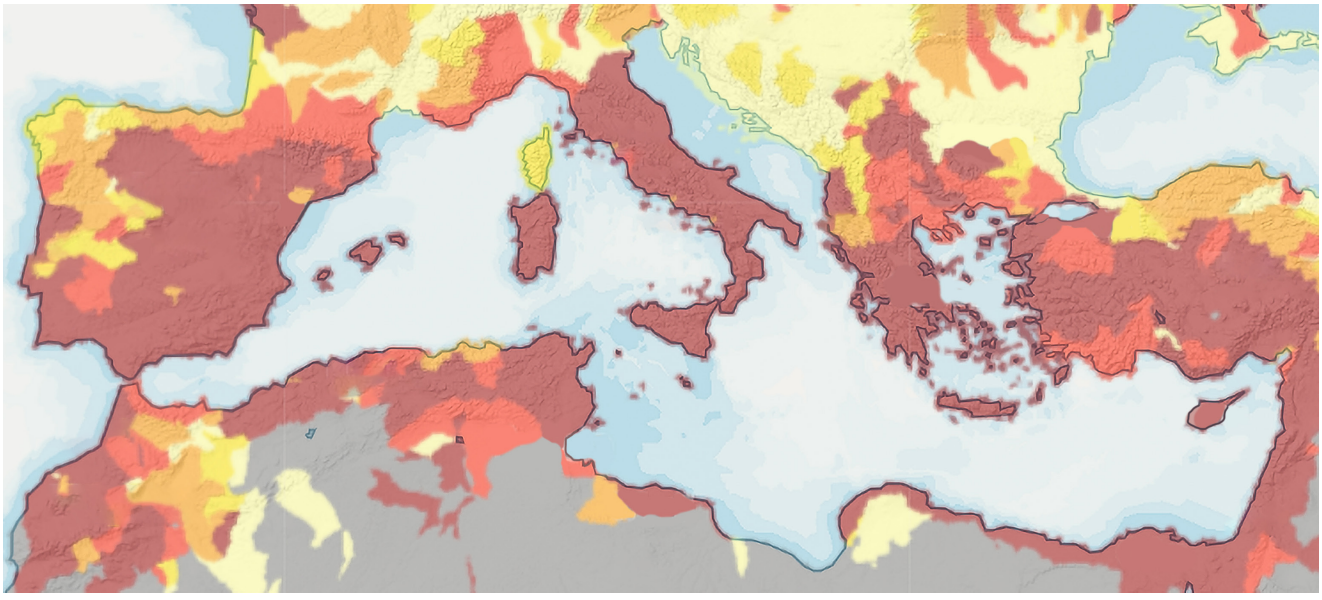
By this date, it is estimated that at least 290 million people will be experiencing severe water stress[28]. However, this drop in precipitation is only an annual average. Increasingly long, severe and frequent periods of drought will be followed by extreme rainfall, leading to flooding, and these phenomena will alternate in impacting almost the whole region. In coastal areas, particularly in the South and East, salt water intrusion into coastal aquifers due to both increased water extraction and rising sea levels, combined with increased pollution, will create critical problems in terms of groundwater quality and availability.

In fact, with temperatures rising by more than 2°C by 2050, the whole region will gradually be faced with a serious problem of water shortages and sometimes chronic or cyclical aridity - with major impacts on agricultural productivity and food dependency, which could rise from 50% to 70% within 30 years.

Figure 6.

PROJECTED WATER STRESS IN 2050 ASSUMING A BUSINESS-AS-USUAL SCENARIO

(Source WRI, Using cutting-edge data to identify and evaluate water risks around the world - wri.org/aqueduct)



[28] See Figure 6. Projected water stress in 2050 assuming a business-as-usual scenario.

The desalination solution - which has seen a spectacular increase of over 450% in the last ten years - looks set to become inevitable for many countries in the medium and long term. However, in addition to its cost (ten times that of conventional water), desalination has very high energy and environmental impacts - particularly on the sea (massive discharges of brine, etc.). In principle, therefore, this alternative can only be used to deal with extreme drought situations or in specific geographical situations (e.g. islands)[29]. Without effective policies for managing water (and its demand), we can expect to see an increase in local and international conflicts over this vital resource in the next 30 years.

This will undoubtedly also be the case for **energy** - with multiple future challenges linked to the very sharp rise in demand in the South and East, the impact of global warming on supply (for hydroelectric or nuclear power), logistical problems due to the geopolitical situation and the needs and constraints arising from the climate and energy transition.

The foresight exercise for 2050 published by the Mediterranean Energy Observatory (OME)[30] provides some figures for this timeframe. Overall, energy demand in a business-as-usual scenario is set to rise for the region as a whole from around 1,022 Mtoe (million tonnes of oil equivalent) in 2018 to 1,404 Mtoe in 2050.
However, these figures conceal major divergences in the energy trajectories for the different shores of the Mediterranean, with a virtual inversion of the respective shares of primary energy demand from the different sub-regions over three decades: the share of the southern and eastern countries is set to rise from 40% in 2018 to 61% in 2050 (i.e. a forecast increase in energy demand between 2018 and 2050 of +111%).
While demand in the northern countries is set to fall slightly in a business-as-usual scenario (-11.5%), from 614 Mtoe in 2018 to 544 Mtoe in 2050, it could more than double in the southern and eastern Mediterranean countries, for reasons associated with both demographics and economic catch-up.

However, in an active transition scenario (Proactive Scenario), the OME forecasts that energy consumption could drop significantly, falling by 30% in the North and rising by only 51% in the South and East, with the share of renewables rising from 9% to 35% in the North and from 3% to 23% in the southern and eastern Mediterranean countries.

These overall figures do not take sufficiently into account the diversity of national situations, uncertainties surrounding climate policies or the geopolitical situation,

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and possible innovations in energy (the role of hydrogen, marine energies or nuclear fusion, the future of electric or alternative transport, etc.). They underestimate the considerable potential for the development of solar and wind power in the region, and do not make sufficient reference to grid problems and the specific situation of fossil-fuel producing countries, which will have to undertake a difficult transition within the next three decades.
However, they do give us an idea of the overall challenge represented by the adaptation of Mediterranean energy systems, particularly in southern Mediterranean countries.
It should be noted that **in 2050, the Mediterranean will continue to account for only a modest share of global energy consumption and CO2 emissions** (counting only direct emissions, without taking into account imports and international travel). Furthermore, energy consumption and greenhouse gas emissions on a per capita basis will remain much higher in the North than in the South.

[29] Plan Bleu. "Opportunities and risks of desalination activities in the Mediterranean in the face of climate change and growing water needs." *Plan Bleu Notes*, no. 45, February 2024.
[30] OME. *Mediterranean energy perspectives to 2050: Executive summary*. Observatoire Méditerranéen de l'Énergie (OME), 2021.

4. A final table with figures and a conclusion on trends

Table 4 shows some of the key figures collected in MED 2050.

These forecasts and data serve as a reminder of four realities for the Mediterranean that are already cause for concern:

- After the Arctic, the Mediterranean is the fastest-warming region in the world;
- It is also one of the world's most threatened marine and land biodiversity hotspots, with an 80% overfishing rate for fished species and a drop in fishing catches between 1992 and 2020 from 1.2 million tonnes to 800,000 tonnes;
- At the same time, it is the most plastic-polluted sea in the world;
- And finally, 60% of the world's water-poor live in this region, with more than 55% of people in the southern Mediterranean already suffering major water shortages (less than 1000m3 per capita).

The Mediterranean region is a global hotspot for biodiversity, culture and tourism, but also for marine pollution and climate change, and by 2050 it will be simultaneously facing the effects of much greater climate upheaval than other regions, and the population increasing by a half in the South and by a third in the East, with a massive concentration of the population in cities and along the coast. Turning to aquaculture and desalination will not prevent the need to deal with increasingly strong socio-economic and political pressures to over-exploit marine and land resources, a structural transformation of the marine ecosystem and a critical drought situation gradually spreading to many countries in the North. All the region's vital activities and territories will be affected, from agriculture to maritime transport and tourism, cities and countryside alike, with food dependency set to increase significantly.

Significant long-term uncertainties remain on issues as important as the outlook for economic growth across the region as a whole, or in sectors such as the blue economy, tourism, transport and energy. These uncertainties also affect the future ability of Mediterranean countries to find their place in the digital and industrial revolution that began at the turn of the century.
There is also considerable debate about the evolution of societies and value systems, as well as geopolitical changes, including the future role of Europe in the Mediterranean, the prospects for intra-Mediterranean cooperation and whether or not the process of fragmentation and fracturing of the region will continue. These uncertainties justify the many scenarios proposed in Part 4 of this report.

However, at least one thing is certain: given the relatively gloomy trends forecast for 2050, some have described the Mediterranean as a "field of ruins" by that date[31], a wait-and-see attitude and "business-as-usual" approaches will not be an option.

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[31] Daguzan, Jean-François. *Méditerranée 2050, réflexion sur un champ de ruines*. MMSH, 2021.

Table 4.
SOME STATISTICAL TRENDS FOR 2050[32]

Variables	2020	2050
Climate	Second fastest warming region in the world after the Arctic. In 2020, **+1.5°C** compared with the pre-industrial period	According to MedECC scenarios: **+2.2°C** (between +2°C / +2.5°C)
Population	North: 196M / South: 202M / East: 124 M / **Total: 522M**	High scenario: North: 200M / South: 315M / East: 174M / **Total: 689M** Medium scenario: North: 179M / South: 293M /East: 157M / **Total: 630M** Low scenario: North: 172M / South: 264M / East: 146M / **Total: 582M**
	% > 65 years-old: North: 21.4% / South: 6.4% / East: 8.06%	High scenario: North: 35.5% / South: 14% / East: 20% Low scenario: North: 30.5% / South: 11.7% / East: 16.8%
Urban transition (Urbanisation rate)	Several countries in the **South and in the Balkans** (10) still have a **large rural population** (between 35% and 57%) Average urbanisation rate for the Mediterranean: **72%**	**All Mediterranean countries** have **an urban population close to or above 70%, with the exception of Egypt (55%)** Average urbanisation rate in the Mediterranean: **82%**
Fishing, aqua-culture and marine biodiversity	**Overfishing rate: 73% in 2020 and 58% in 2021** **Fishing:** 1994: 1.08 million t / 2015: 0.75 million t / 2020: 0.8 million t / **2021: 0.66 million t** **Aquaculture: 3.2 million t** (2021)	**Overfishing rate < 50%** **Fishing:** between **0.6 and 1 million t** **Aquaculture:** between **4 and 5 million t**
	The Mediterranean: **a global biodiversity hotspot** (18% of the world's species, 28% of which are endemic) - but highly threatened **(8% of species are in danger of extinction)**	**Major qualitative transformation of marine ecosystems:** tropicalisation of species with the **disappearance of certain endogenous species (around 20%)**
Plastic pollution	The Mediterranean is **the most plastic-polluted marine area in the world**: 8 times more than the global average. 260,000 t (2015)	Plastic discharges into the sea are expected to **increase by a factor of 1.5 to 2** (source: OECD)
Water shortage risk	**180 million people in the South and East are facing a water shortage** (less than 1000 m3/year.cap). **80 million people face extreme shortage** (less than 500m3/year.cap). 75% of resources are in the North	By 2050, **almost the entire population of the Mediterranean Basin will be suffering from water shortages** due to drought **290 million people in the southern and eastern** Mediterranean
Primary energy	For 2018: **Energy demand: 1 022 Mtoe** - North: 614 Mtoe / South and East: 408 Mtoe - of which: **Fossil fuels** (oil, gas and coal) for the region: **777 Mtoe** (76% of total demand) / North: 399 Mtoe, i.e. 65% of the EM/ SEMCs: 379 Mtoe or 93% of the EM **Renewable energies: 120 Mtoe** (12% of total demand) - North: 91 Mtoe, i.e. 15% of the EM/SEMCs: 29 Mtoe or 7% of the EM **Nuclear energy: 124 Mtoe** (12% of global demand) - North: 124 Mtoe or 20% of the EM / South: 0	Business-as-usual scenario: **Energy demand: 1,404 Mtoe (+37%)** - North: 543 Mtoe (-11.5%) / SEMCs: 861 Mtoe (+111%) of which: **Fossil fuels** (oil, gas and coal) for the region: **1,026 Mtoe** (73% of total demand) - North: 60% of EM / SEMCs: 82% of EM **Renewable energies: 268 Mtoe** (19% of total demand) - North: 29% of the EM / SEMCs: 13% of the EM **Nuclear energy: 110 Mtoe** (8% of global demand) - North: 58 Mtoe or 14% of the EM / South: 52 Mtoe or 6% of the EM

[32] Sources: 1. Climate: MedECC ; 2. Population : Plan Bleu ; 3. Urban transition (urbanisation rate): United Nations Statistics Office; 4. Fisheries, aquaculture and marine biodiversity: FAO. *The state of Mediterranean and black sea fisheries.* FAO, 2022. ; Coll, Marta, and al. "The biodiversity of the Mediterranean Sea: estimates, patterns, and threats." PLOS ONE, vol. 5, no. 8, August 2010. ; 5. Plastic pollution: Plan Bleu and OECD; 6. Water shortage risk: Plan Bleu; 7. Primary energy: OME.

IV. DISRUPTIONS AND WEAK SIGNALS OF CHANGE

As mentioned above, one of the trends that will mark the coming decades is the rise of uncertainty. We are entering a world of turbulence and decisive choices in which major disruptions are likely to occur, or in which new directions will have to be taken. Some weak signals of change are already pointing to significant shifts in past trends. The foresight group worked on both these disruptions and weak signals, as with the trends, through a consultation using a questionnaire, thematic analyses (factsheets) and a group seminar.

1. A world of turbulence: possible disruptions at all levels and in almost every field

The list of disruptions mentioned by the experts is almost as long as the list of trends, and addresses all areas (economy, technologies, environment, geopolitics, societies, governance). The general conviction is that the next thirty years will be marked by multiple and fundamental uncertainties and shifts.

The disruptions on which there is a broad consensus, which are considered highly likely, once again concern climate change:

- Climate change will accelerate much faster than predicted ("tipping points" are passed), with multiple consequences;
- Much more rapid expansion of deserts and periods of drought;
- The possibility of periods of "migratory chaos" and social or economic disruptions linked to the mass influx of displaced persons due to climate change;
- Sudden acceleration of the rural exodus to cities and the coast;
- The first impacts, before 2050, of sea level rise and the disruption of major ocean currents;
- The major transformation of the Mediterranean marine ecosystem linked to the climate, especially with disruptions in the regulation of the upper and lower layers and currents of the Mediterranean.

In addition to this list of disruptions linked to climate change, there are also a number of possible, but not necessarily probable shifts, particularly in the economic and social spheres:

- Establishment of a common space for sharing patents and technologies between the northern and southern Mediterranean;
- A sudden and regionalised deglobalisation of maritime flows (end of hubs, disruption of supply chains, re-regionalisation of traffic, cabotage etc.) and strong development of intra-Mediterranean trade;
- New waves of political destabilisation or mass migration due to revolt and a sense of despair among young people;
- Faster development of civil societies, including in the South, giving them an important role in public decision-making;
- Reconstruction plans for disaster-stricken countries or a "Marshall Plan" for Africa and the southern and eastern Mediterranean.

Beyond this consensus, taking into account not only the experts in the foresight group, but also consultations held with a number of key figures in the Mediterranean region, and detailed analyses of the different variables in the Mediterranean system[33], there is a much longer list of potential disruptions, including political and geopolitical shifts. Box 12 provides a summary.

[33] See Annex 2. List of variables: part of the foresight base.

Box 12.
SOME POSSIBLE MAJOR DISRUPTIONS UP TO 2050

- A Mediterranean common market.
- A Union of Maghreb countries.
- An Arab revival (Union of Arab States).
- Weakening of radicalism and religious conflicts.
- An axis of vertical integration between Europe - the Mediterranean– Africa.
- An axis between China - the Middle East - southern and eastern Mediterranean.
- A democratically elected Mediterranean parliamentary assembly with a President.
- Opening of the North-East corridor for freight.
- Tropicalisation of the Mediterranean Sea. Transformation of ecosystems.
- Cadastral mapping of the entire Mediterranean Sea.
- Ban on deep-sea mining.
- The Mediterranean Sea becomes a global commons.
- Creation of an IPBES equivalent for the Mediterranean Sea.
- Strict legal enforcement of the Barcelona Convention and its Protocols.
- Dramatically accelerating climate change (tipping points).
- Mass relocation of workplaces and living spaces due to digital technology (remote working).
- Radical change in values and behaviour, linked to climate change and the growing concern of young people: the arrival of a new generation of leaders.
- A Mediterranean solar union.
- A worldwide extension of the European ban on the sale of new internal combustion engine vehicles from 2035.
- A “Marshall Plan” for adaptation and water for southern Mediterranean countries, financed by taxes, especially on financial transactions (€400 billion per year).
- A sharp rise in mobility costs (carbon tax, air travel peak, new energies, etc.).
- Disruptive technology that is decisive for desalination (ecological and economic).

2. Weak signals of change: some examples from the environmental sector

Consensus on trends or disruptions does not give us precise information on their probability. It is therefore useful to supplement them with so-called “weak signals”. These are observations of embryonic changes that are expected to have a major influence on future development trajectories.
The foresight group worked together to highlight around one hundred of these weak signals spread across six major areas: geopolitics, the environment and climate, demographics and the distribution of activities across regions, the knowledge society, the economy, and social and political change.
Box 13 presents the weak signals mentioned for the environment, in particular the marine environment. Some are linked to recent events (from 2020-2023). Others reflect more subjective perceptions.

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Box 13.

WEAK SIGNALS MENTIONED BY EXPERTS FOR THE ENVIRONMENT, CLIMATE AND SEA

- Strong development of offshore projects (gas, aquaculture, pipelines, real estate, artificial ports, wind farms, etc.).
- Initiation of strategies for deep sea mining and increase in the number of mining permits, within a context of international trade.
- Installation of first offshore wind farms.
- Local opposition to over-tourism and large cruise ships.
- Repeated and increased severity of drought episodes and major fires.
- Major solar projects in some Arab countries (Morocco, Gulf States, etc.).
- Increase in soil salinity, particularly in all the deltas (Ebro, Rhone, Po, Nile, etc.).
- Change in the primary composition of the sea: phytoplankton, microalgae, etc.
- Development of invasive species, jellyfish and algae.
- Introduction of first programmes to reduce plastics in the Mediterranean and worldwide by 2030.
- Acceleration of sea water desalination projects.
- First serious measures to reduce air pollution from ships (sulphur, CO2, 40% reduction in carbon intensity between 2008 and 2030 (IMO)).
- Attempts to regulate the use of pesticides, antibiotics, endocrine disruptors, fertilisers, etc. and difficulty in reducing them.
- “Case of the century” (l’Affaire du siècle) and legal actions against States failing to follow through on their international climate commitments. Pressure for the recognition of the concept of ecocide.
- Recognition of the rights of some natural areas (rivers, etc.).
- Implementation of the European Green Deal, greening of the CAP and impacts on the Mediterranean region. Ban on the sale of new fossil-fuelled cars from 2035.
- Development of sustainable finance (international organisations and private finance).
- Increasing treatment of water as a commodity (creation of a market for water in the event of crises and serious shortages).
- Development of electric or non-motorised land and sea transport solutions.
- From 2021, global investments in renewable energies exceeding investments in fossil fuels.
- Experimentation with alternative solutions in agriculture (agroecology, agroforestry, permaculture, etc.).
- Development of “conservation” agriculture and agroforestry.
- Ecology associated with privileged urban social categories in the North: short supply chains, organic products, sobriety, alternative mobility, veganism, low-tech, etc.
- Successful experiments and innovations in the blue economy (cleaner ships, sustainable fishing, aquaculture, etc.).
- Focus on environment-health and environment-biodiversity relationships (post Covid). “One Health” approach.
- Very slow emergence of the circular economy and review of waste exports.
- Widespread municipal waste management crisis in large cities around the Mediterranean.
- Slow progress in raising environmental awareness in the South. Role of civil society (particularly on climate).
- With the risk of sea level rise and increased severity of extreme weather events, some decision-makers shift to coastal protection (dykes) or progressive withdrawal strategies.
- Beginning of recognition of the responsibility of northern countries for climate change and of international funding for adaptation to benefit southern countries.
- Acceptance of the idea of a transition away from fossil fuels at COP 28. A technological breakthrough decisive for desalination (ecological and economic).

V. ASSUMPTIONS FOR MAJOR THEMATIC TRENDS: THE MORPHOLOGICAL CHART

As well as highlighting trends and disruptions, the experts in the group and the authors of the factsheets were asked to put forward assumptions for thematic changes up to 2050. In general, three to five assumptions were suggested by the authors, sometimes supplemented by the steering committee. They were then summarised in a table combining variables and assumptions: the morphological chart.

This table is presented in full in the Annex[34]. Given its size, a reduced version limited to just ten variables is presented for illustration in Table 5. This is an essential part of the process of building scenarios (see Part 4: The scenarios).

Table 5.
EXTRACT FROM THE FIRST MORPHOLOGICAL CHART SHOWING ASSUMPTIONS BY VARIABLE

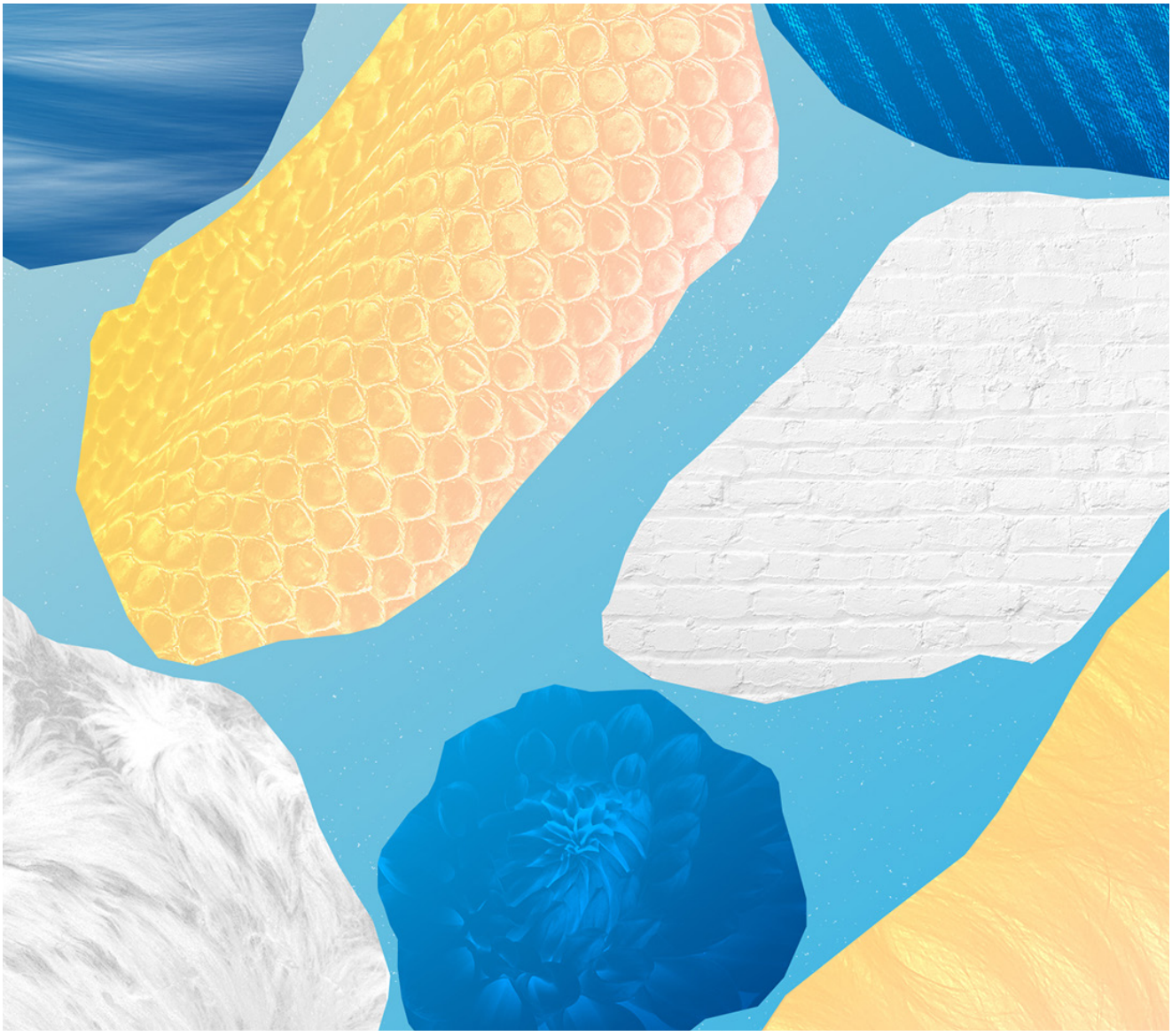
Variables	Assumption 1	Assumption 2	Assumption 3	Assumption 4	Assumption 5
Major global trends for 2050	Sino-American dyarchy and partition of the world in 2.	"Open World 4.0".	A world of fortresses.	A multi-polar world.	Global mobilisation for sustainable development.
The Mediterranean in the global context	*Status quo and "Battlefield": National isolationism and stagnation.*	Crises, profound destabilisation and resilience.	Recomposition of the Mediterranean space into large "centrifugal" sub-regions.	Successful adaptation to globalisation (technological and ecological).	Co-construction of a (sustainable) development model specific to the diversity of the Mediterranean.
Global (IPCC) and Mediterranean (MedECC) climate scenarios	Target rise of 1.5 °C by 2100 (2 °C by 2050 in the Mediterranean).	Carbon neutrality target for 2050 (+2 °C by 2100) (2 °C by 2050 in the Mediterranean).	Business-as-usual: +3 °C to 3.5 °C by 2100 (2.3 °C by 2050 in the Mediterranean).	Climate chaos: tipping points exceeded (2.8 °C by 2050 in the Mediterranean).	Successful climate engineering and maximum efficiency of carbon sinks.
Population growth	Business-as-usual. +130M in the South & East, -10M in the North and general ageing.	High scenario: higher-than-expected fertility in the South & East (+165M) and faster decline in the North (-25M).	Low scenario: faster-than-expected demographic transition in the South (+85M).		
Concentration of human activity in coastal areas and at sea	Effective spatial planning, protection and land-use planning at national and local levels.	Coordinated withdrawal to the hinterland and coastal protection.	Uncontrolled coastal development with protected enclaves for the elites. Increasing reclaimed land from the sea.	Uninhabitable and deterrent coastline (urbanisation, climate, etc.).	Coastline at the service of the sustainable blue economy.

[34] See Annex 3. List of assumptions by variable: first morphological chart.

Variables	Assumption 1	Assumption 2	Assumption 3	Assumption 4	Assumption 5
Adaptation issues and policies, between vulnerability and resilience	Public awareness-raising and development of a risk culture.	Economic regulation through insurance and international aid (from North to South). Public compensation for damage.	Decentralised management of adaptation by territories and land-use planning and resilience policies.	Investment policies (dykes, etc.) targeting the most vulnerable areas, populations and infrastructure.	Anticipating the impacts of climate change on activities and ecosystems, and active transition strategies.
Transformations of the Mediterranean ecosystem and its impacts on marine and coastal biodiversity	Marine ecosystems under structural transformation (massive disruptions linked to climate change, tropicalisation, pollution, etc.).	Biodiversity and marine ecosystems under pressure. Protection limited to Marine Protected Areas and emblematic species.	Species replacement and new ecosystems (very contrasting trends: depending on the species and sub-regions).	Successful ecological transition, strong protection of marine biodiversity and control of catchment areas.	Diversification and enrichment of ecosystems, resulting in increased overall productivity.
Public and private financing for development in the Mediterranean. What role for Green Finance?	Financing limited to profitable projects or offsetting markets, and greenwashing.	Financial and budgetary crises, and refocus on short-term emergencies. Community solidarity.	Strong green conditions tied to public and private aid and funding. Removal of subsidies for unsustainable activities.	Abundance and diversity of green financing, with priority given to vulnerable countries and populations and small-scale projects. Acceptance by northern countries to pay for the South.	Strong greening of finance and aid, but focus on attractive countries and projects.
Maritime transport, port facilities in the Mediterranean, international trade and pollution linked to these activities	Exemplary Mediterranean: carbon-free transport, resizing of cruise ships.	Congested motorway: transport expands despite growing security and pollution problems.	A marginalised sea: fall in transport, especially linked to competition, new routes through the Arctic, and a decline in cruises and oil transport.	The sea as an instrument: strong North-South differences. Foreign-controlled mega-ports in the South with no local benefits. Minimalist legislation.	A local sea: priority given to local transport and cabotage. Maritime transport offsets a lack of land-based infrastructure and develops for reasons of regional cooperation.
Changes to production and consumption patterns	The economy at the expense of sustainability. Inertia in behaviour and reuse of waste.	Regulation by the market, costs and technical innovation.	Public constraints and incentives hindered by inequalities in social and geographical situations.	Sobriety rather than growth (coordinated transitions at national and international levels).	Changes in values and local, community or individual initiatives. Territorial transitions.

PART 3

VISIONS AND ISSUES FOR THE MEDITERRANEAN IN 2050



The situation in the Mediterranean in 2050 will not only be the result of the trends and potential disruptions mentioned above. It will also naturally depend on the actions implemented by stakeholders and therefore indirectly on their long-term visions and their perceptions of diverse priority issues.
The MED 2050 is unique in that it seeks, as far as possible, to incorporate these visions of the future and these issues as expressed by certain stakeholders in the region.

The original aim was to use a foresight approach specific to each sub-region to reflect the heterogeneity of Mediterranean countries and the diversity of different political, scientific, business, artistic and civil society stakeholders. Given the health context in which the MED 2050 exercise took place, alternative, more modest solutions ultimately had to be adopted to allow for participation. Two consultations were carried out. Firstly, interviews with around fifty key figures and stakeholders representing[35] the entire Mediterranean region, and secondly, a workshop bringing together around forty Mediterranean young people of different backgrounds, entitled the Youth Commission for the Future of the Mediterranean[36].

A wide range of ideas were expressed, particularly in the interviews with key figures and stakeholders, which cannot be fully conveyed here. This paper will begin with an overview of the two consultations, before illustrating this wealth of ideas in a second sub-section devoted to priority issues for the Mediterranean in 2050, as expressed in both the interviews and the work of the foresight group.

[35] See Annex 4. List of key figures interviewed and respondents to the online questionnaire.
[36] See Annex 5. Geographical origins and profile of young participants in the Youth Commission for the Future of the Mediterranean.

I. VISION OF THE MEDITERRANEAN BY 2050 FROM A SAMPLE OF PERSONALITIES AND YOUNG PEOPLE FROM THE REGION

Before discussing the issues, the results of consultations on stakeholders' visions for the future of the Mediterranean will be summarised in three successive points:

- Interviews with key figures in the Mediterranean;
- The Youth Commission for the Future of the Mediterranean;
- Similarities between the two consultations.

1. Survey of key figures and stakeholders in the Mediterranean

Analysis of the interviews conducted with around fifty key figures in the Mediterranean revealed the same general observation: Mediterranean societies are in crisis, with generally converging views on environmental degradation, social and political tensions, and growing inequalities, in particular between the northern and southern shores of the Mediterranean.
These are therefore predominantly pessimistic visions, based on the prospect of major ecological upheavals in the region: the impact of climate change, with the risk often mentioned of exceeding "tipping points", sometimes leading to apocalyptic visions such as the disappearance of cities or islands as the sea rises; the unsustainable use of most resources, with particular emphasis on the erosion of biodiversity and the depletion of water resources; and issues linked to marine ecosystems given the intensity of maritime traffic, overfishing, illegal fishing and mass tourism.

In addition to this gloomy picture for the environment, there are many social and political concerns linked to intense demographic growth, placing additional pressure on coastal areas and leading to the uncontrolled development of many Mediterranean cities; migration as a major issue resulting from other challenges (geopolitical, environmental, etc.); the place of the Mediterranean in the global political landscape and the risks linked to competition, or even conflict, between the major political and military blocs, with the fear expressed that the ambitions of some states would increase fragmentation of the region.

Faced with this observation, many respondents unanimously express their rejection of the status quo and inertia set out in the business-as-usual scenario. To achieve this, it would first be essential to shift away from silo thinking to adopt a more holistic approach to the issues in the Mediterranean, and to bring about a genuine revolution of mindsets and work to build a new collective mindset in order to design actions aligned with the issues and the challenges that need to be overcome.

While the notion of crises is omnipresent in almost all the interviews, for some, they are synonymous with hope, and their cathartic effects are sources of opportunities to invent new models. The Mediterranean is not only perceived as a region with an accumulation of difficulties and obstacles, but as a laboratory of solutions, and for some, even an innovative development model capable of inspiring other regions of the world.
These changes should come from the younger generations, on the fringes of institutions. Some highlighted the lack of efficiency or even failure of these institutions. However, this means responding urgently to the brain drain, which is identified as a fundamental problem by many interviewees from the southern and eastern Mediterranean, along with priority investment in human capital, starting with education and training.

Although the Mediterranean is a space of "otherness" with multiple identities, it has an essential advantage through its common heritage and incomparable cultural melting pot. Many of the people interviewed called for greater regional integration based on cooperation and solidarity, investing more in this foundation of shared fundamental values and complementarity between the different shores of the Mediterranean, rather than in rivalries and differences.
A political framework capable of organising this has not yet been invented, as existing models have shown their limitations. Some mentioned very concrete examples such as a (democratically elected) Mediterranean Assembly with a President, and greater integration of citizens in decision-making processes, particularly in local governance.

A community with a shared destiny, with the Mediterranean as a commons - "One Mediterranean" - as others note that in an increasingly interdependent Mediterranean and even world, crises teach us that only a collective framework makes sense.
This would mean reforming legal systems, and therefore rewriting some laws to set a precedent, in order to take account of common assets, including the Mediterranean Sea.

Despite unanimous acknowledgement of the crises in the Mediterranean, there are nonetheless points of divergence on the solutions to respond:

- The democratic model based on a liberal economy raises questions about its suitability for some countries, particularly in the South and East;
- The driving and positive role of the European Union, particularly within the framework of a strong, balanced and continuous Euro-Mediterranean partnership (with a vertical axis integrating Africa according to several respondents), is subject to debate, with reservations from individuals from the southern and eastern shores, especially linked to the Palestinian issue and the notion of meddling;
- The market economy, which does not benefit some Mediterranean countries with fragile economic situations and large debts;
- Mass (or popular) tourism, which some see as a threat, while others see it as a source of opportunities, if properly managed and regulated;
- The role of technology in solving a number of problems (e.g. seawater desalination or decarbonisation techniques);
- The type of energy, with the use or non-use of certain forms of energy such as nuclear or offshore wind power;
- Lifestyles and the depth of the changes required, and above all, who should bear this responsibility: consumers versus producers.

Finally, in these interviews with Mediterranean figures, the rural world or rurality was mentioned only once, apart from in comments related to agriculture and food security, but not as a subject in itself. This "oversight" could reflect a decisive trend for 2050, with an urban transition taking place in all Mediterranean countries.

2. Youth Commission for the Future of the Mediterranean

A) THE APPROACH

The aim of the Youth Commission for the Future of the Mediterranean was to bring together young people aged between 17 and 27 living in one of the 23 Mediterranean countries to find out more about their vision of the future of the region, in terms of sustainable development, and to identify any consensus or disagreement on these visions. Around fifty participants took part in working groups and collective discussions during a 4-hour workshop. A total of 21 countries were represented.

To organise the discussion and debates, **three fictions on the future of the Mediterranean** were prepared in advance by the facilitation team, using "PechaKucha"[37], drawing on the work of the foresight group. These fictions were:

- 2.2°C - Connected Mediterranean: The Technological Shoreline;
- 3.3°C - Islands of Resistance in the Face of the Crisis;
- 1.5°C - The Resilient Mediterranean: Sobriety in Osmosis.

These fictions cover the diverse climate situations and potential political solutions for the Mediterranean of the future.

Box 14 sets out the main characteristics.

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[37] See Annex 6. Three Pecha-Kucha fictions for the Youth Commission for the Future of the Mediterranean.

Box 14.

THE 3 FICTIONS PRESENTED AT THE YOUTH COMMISSION FOR THE FUTURE OF THE MEDITERRANEAN

• Fiction 1

+2.2°C - A Connected Mediterranean: The Technological Shoreline

This scenario depicts a future in which humanity manages to limit global warming to 2.2°C by 2050, thanks to technology. However, the international community reacted too late and is suffering heavy consequences.

In the Mediterranean, the sea has lost 35% of its fish and 30% of its plant species. The sea level has risen considerably and coastal farmland is becoming progressively arid due to soil and groundwater salinisation. Summer heatwaves last two months, causing droughts, forest fires and a loss of agricultural production. On the other hand, in winter, floods and landslides are more numerous and more violent, leading to the destruction of villages.

However, thanks to various technical innovations and renewable energies, societies have managed to limit their greenhouse gas emissions and adapt. Technology is at the heart of every aspect of people's day-to-day lives. The Internet of Things is pervasive, measuring and regulating everything from energy consumption and food to temperature-regulating clothing.

The Mediterranean is still one of the world's most popular tourist destinations, but due to the extreme heat, tourists are now only sunbathing on artificial and air-conditioned beaches "under glass". Those who can't afford to travel discover landscapes in the metaverse where tourist sites are reproduced.

These inequalities are reflected in our eating habits. While the wealthiest people have access to local products with a high nutritional value, the less well-off consume ultra-processed globalised products, or even fake products made with the help of cellular techniques. Nutritional deficiencies and health problems associated with the consumption of recycled wastewater are a health risk for the Mediterranean's inhabitants.

• Fiction 2

+3.3°C - Islands of Resistance in the Face of the Crisis

This pessimistic scenario depicts a world where the worst-case climate predictions have become reality. Temperatures have risen by an average of 3.3°C, and many ecosystems have collapsed. The Mediterranean has acidified and lost 70% of its biodiversity.

All Mediterranean societies have been destabilised; political leaders are constantly caught off guard, struggle with imposed changes and are only able to implement short-term policies in response to one catastrophic event after another. Unsustainable infrastructure continues to be developed, and social movements are multiplying, demanding the preservation of the environment and the respect of public health. Countries with fossil fuels continue to produce them. The coastline has become uninhabitable in places, with thousands of people dying prematurely each summer due to over-pollution of the air and previously tropical diseases. The countries of the South are particularly affected. In response to these premature deaths, governments force their citizens to live at night, when temperatures are a little more bearable.

Due to drought and the collapse of fisheries and agriculture, coastal residents face systemic food and water shortages. The tourism sector has deteriorated considerably, and the Mediterranean is no longer a major tourist destination; only the wealthy holiday there in winter. The decline of tourism is symptomatic of a more general economic recession. Unemployment rates average 30% across the Mediterranean. Finally, aggravating an already precarious situation, the Mediterranean experiences major waves of migration.

In the face of this widespread crisis, some areas of resistance emerge. On a municipal or even provincial level, determined and united citizens pool their efforts to try and collectively build a life protected from the general slump. These micro-societies adopt lifestyles based on autonomy and resilience. Governance is based on direct democracy, but with a high level of social control.

• Fiction 3

+1.5°C - The Resilient Mediterranean: Sobriety in Osmosis

Contrary to the previous scenario, this one is the most utopian. It depicts a world where, following an unprecedented natural disaster, California has suddenly disappeared under water. Not only do tens of millions of people die, but many Internet servers crucial to the global digital economy also disappear.

In the wake of this digital blackout, and the shockwave felt around the world, first by constraint and then by choice, governments unanimously agree to establish a new era based on respect for the planet and sobriety. Coastal populations are relocated to medium-sized towns a few dozen kilometres inland. This urban exodus starts off as forced before becoming the defining phenomenon of the 21st century. Seduced by their new less stressful lifestyle that is more in tune with nature, Mediterranean citizens are much more fulfilled.

A new social ideal is created around the commons and solidarity. Housing has shared spaces. Energy and food is produced collectively, on the scale of buildings, neighbourhoods or villages. A user-friendly technology model emerges, based on low-tech and nature-based solutions.

The mass tourism model, which has become incompatible with these new lifestyles, collapses. However, travel has not disappeared, and is now longer, focused on nature, cultural enrichment and sharing local know-how.

Young people are moving towards careers in production and service activities that benefit the whole community: quality food, care for others, particularly in inter-generational systems, care for ecosystems, etc.

However, the decline in the use of digital technology, the reduced need for tertiary professions and the emphasis on dropping out of school to look after the community have led to a resurgence in inequalities in access to education. Resistance to this paradigm shift, advocating a return to 20th-century consumption patterns, emerge and occasionally disrupt the newly established relative "peace" between humankind and nature.

At the start of the workshop, participants were shown these three contrasting scenarios for the Mediterranean Basin in 2050 and asked to give their views on the information presented in these fictions by filling out individual online questionnaires.

The young people were then brought together in five sub-groups to discuss the fictions, focusing on:

- Lifestyles (what they find desirable or less desirable in the lifestyles of Mediterranean people in these fictions);
- And the role they would like to see played by governments, public institutions, businesses, NGOs, non-profits, the media and citizens in each of them.

Discussions were then analysed both qualitatively and statistically.

B) THE MAIN FINDINGS OF THE CONSULTATION

The discussions and group work were structured around the reactions to the three fictions, demonstrating consensus or disagreement on the following seven themes:

- Technology,
- Nature,
- Changes to lifestyles,
- Perception of sobriety,
- Social justice,
- Expected role of the main categories of stakeholders,
- Cultural differences.

Ten major points emerged:

1) A rather dystopian vision of the future
Overall, participants found dystopias more likely than utopias. For them, these dystopias seem to be in continuity with our current lifestyles (Fiction 2) or with the directions taken by governments today (Fiction 1). For many, the advent of a major crisis is also considered likely (Fiction 3).

2) Consensus on nature-based solutionsL'alimentation Organic, seasonal and less meat-based food, urban greening, the use of nature-based solutions to achieve carbon neutrality, and even walking and cycling, are all promoted by a large majority of respondents.

3) Technologies under question
Technologies are widely accepted and expected in the fields of health, education and work, or in response to major crises, such as water desalination in the event of drinking water shortages. However, their use to control household carbon consumption, create artificial rainfall or climates (climate engineering), or for carbon sequestration in industrial installations appeals to some respondents but not others. Most of these young people believe that it is essential to favour natural solutions where they exist, and to develop technologies if, and only if, they have little or no negative impact on ecosystems.

4) Disagreement surrounding the creation of metropolises
While land artificialisation is criticised, participants pointed out that access to employment is essential, and that it is often only possible in cities. The creation of metropolises is therefore both desired and criticised. Particular attention was given to preservation and access to coastal areas, as participants expressed both significant concern and attachment.

5) Sobriety: opponents and aficionados
Sobriety, in the sense of reducing consumption, generates both positive and negative perceptions. For most participants, sobriety could only become a dominant practice in Mediterranean societies if it is forced through regulations or crises.

6) Extremely high expectations for social justice
All the inequalities portrayed in the fictions were criticised by the participants, who also identified other risks to people, such as the abuse of night work, modern slavery for climate refugees, and unequal access to health care during pandemics. Participants expect governments to be especially attentive to the issue of equality and to put forward appropriate solutions to ensure that the poorest can meet their basic needs. However, not everyone is prepared to work individually to help others - e.g. in communities or through work centred on collective needs.

7) Environmental awareness at the heart of stakeholders' actions
Governments are expected to start by raising public awareness about the environment and force businesses to make the transition. Meanwhile, citizens have a major role to play in applying pressure on governments and getting actively involved alongside NGOs. The media, non-profits and local authorities are generally identified as being required to help individuals change their lifestyles (towards greater sobriety). Regional institutions are more specifically seen as guarantors of the interests and common good of local communities. They are also expected to create and support projects run by residents and citizens, particularly initiatives by or for women and young people.

8) International cooperation under certain conditions
While international cooperation between Mediterranean countries is praised (Fiction 1), it is seen as unlikely, especially by participants in southern countries. A number of conditions need to be met if it is to be effective and move towards genuine sustainable development, including wealth redistribution and taking into account the diversity and specific features of Mediterranean lifestyles.

9) Contrasts between the South, East and North
In this area, there are significant contrasts between the South, East and North. People living in southern Mediterranean countries seem to be seeking emancipation: action without waiting for help from developed countries. Those living in the eastern Mediterranean seem to expect more protection for individuals exposed to the most restrictive situations. Those who live in the North expressed a greater sense of urgency to take shared action to tackle climate change and

the loss of biodiversity. A larger sample would be needed to verify these varied assumptions.

10) High and shared demand for more discussion between young people in the region.
Participants in the Youth Commission for the Future of the Mediterranean want to see increased opportunity for these discussions and any occasion to debate substantive issues and work together to build a common future for the Mediterranean region. In their view, there are too few places where this is possible.

3. Similarities between the visions of key figures and young people

The visions expressed in the individual interviews and the Youth Commission for the Future of the Mediterranean are generally pessimistic about the likelihood of Mediterranean countries making the political and economic changes needed to reverse current trends. Several participants referred to the idea that humans only change once they are up against the wall, and that only a major crisis can force systemic change.

Even though the "business-as-usual" scenario is considered the most likely, the status quo is unanimously regarded as unacceptable. **Across generations and across all the Mediterranean countries represented in these surveys, there is consensus about a desire for profound change, and a refusal to accept inaction, as this is considered irresponsible.**

Points of agreement and consensus can be found on subjects such as stopping the use of fossil fuels, inequalities within countries and between the different sides of the Mediterranean, and mass land artificialisation, particularly in coastal areas. The majority of the people consulted call for more sustained international cooperation, which many see as a sine qua non condition for a successful transition to a desirable future.

However, this unanimity is somewhat tempered: **young people in the southern Mediterranean** are sceptical about getting help from northern Mediterranean countries, and **tend to favour endogenous solutions** without waiting for outside help. While all those interviewed said they would like to see closer cooperation, during the workshop young people from the southern Mediterranean expressed a strong desire for autonomy, and a certain distrust of the North. This scepticism echoes a concern shared by key figures from the southern Mediterranean, almost all of whom said that the prerequisite for North/South cooperation was the need to resolve the political disputes currently aggravating relations between the two shores (in particular, colonial legacies and the Israeli-Palestinian conflict).

Overall, the people consulted were in favour of greater public sector control over the private sector, greater pressure on governments from NGOs and the media, respect for nature, the promotion of nature-based solutions, the preservation of coastal areas, greater power for local authorities and the development of medium-sized cities and towns.
Several of the key figures interviewed expressed both their desire to make way for new generations, and their confidence in young people's ability to bring about the necessary changes in values and lifestyles. Rather than blind faith in the new generations, these responses are probably also a sign of awareness of the failure of their predecessors to provide innovative solutions for a more viable future in the Mediterranean.

The Youth Commission for the Future of the Mediterranean shows, however, that the way in which these generations view the future of the Mediterranean varies enormously, particularly depending on their country of origin.
While there is a shared desire for change, there are very different concerns and contrasting, even diverging, ideas about what needs to be done to move towards other trajectories.

A strong divide was seen concerning the use of technology and a change to lifestyles. There were two opposing positions: “technophiles” who want to maintain current lifestyles, and “downshifters” or those in favour of alternative development who want to shift towards greater sobriety by radically transforming the way society is organised, and consumption and production patterns for greater fairness.

While the use of technology to reduce greenhouse gas emissions or respond to crises is universally accepted, geo-engineering (such as techniques to induce artificial rainfall) and enclosed tourism solutions under glass are widely debated. It seems that these two typical positions are geographically divided, with young people from eastern Mediterranean countries tending to be more technology-oriented and liberal, while those from northern countries tend to desire a return to more sustainable, environmentally-friendly lifestyles.
Like the views expressed on cooperation, it should be noted that this geographical divide on technological solutionism was also found in the individual interviews.
Beyond consensus on the desire for profound change and improved international cooperation, dissensus was seen not so much based on the age of the people consulted, but mainly based on their geographical location.
Beyond any divisions or differences of opinion or choice, there is a sincere desire on all sides to maintain dialogue, and better still, to carefully cultivate it, as each side expressed their deep rejection of selfishness, whether personal, communitarian or national, which was considered as a source of certain disaster.

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II. ACTION ISSUES

In the interviews, people from different countries in the Mediterranean expressed not only their visions but also their perceptions of future challenges for the sea and the region in 2050. Including those proposed by the members of the foresight group in the various factsheets, there is a substantial list of proposals, concerns and objectives evoked by the various participants[38]. They are summarised in this section, which ultimately identifies eight major priorities for the next three decades.

1. Trends and challenges for 2050 and associated action issues

Even though they do not measure the scale of these challenges in the same way or with the same precision, the people interviewed, the Mediterranean young people and the experts in the foresight group have a fairly shared vision of the overall challenges facing the Mediterranean in 2050.

For the environment, the shared perspective is that there will be a structural upheaval of marine or terrestrial ecosystems and an accelerated degradation of the urban environment and resources (water, soil, natural areas, resources extracted from the sea, etc.), linked to the combination of climate change, increased economic pressure (e.g. deep-sea mining), and an even greater concentration of populations and activities on the coast (with an almost 50% overall population increase on the southern shore).

In the light of these concerns, the margins for action are perceived as shrinking even more than in previous decades, for economic, social and political reasons.

This includes:

- The economic context: chronic energy and food insecurity, exacerbated by the geopolitical situation, the risk of the region becoming marginalised in the digital globalisation process, the lack of alternative growth drivers to tourism and the exploitation of natural resources, the persistence of North-South inequalities, and a general constraint linked to debt levels;
- The political context: transition to a context that is less favourable to regional cooperation, with the Mediterranean increasingly divided in two, the persistence of open or diplomatic conflicts (especially linked to the issue of migration) and Europe's diminished involvement. But also, within countries, there are seemingly insurmountable difficulties to reduce institutional obstacles preventing the mobilisation of local authorities or civil societies regarding the environment, policy integration in a context of increasing silo organisation, transparent or anticipated decision-making, and above all, law enforcement in all areas;
- The social context: inequalities and the spread of poverty or insecurity that will continue to relegate the environment to a secondary priority, a persistent lack of education about the sea and ecology, and the inclusion of women and young people that is far from being achieved, including in the North.

Some visible challenges are little mentioned or anticipated, such as the effects on the region of the whole African population doubling, rapid population increase in some very large coastal cities in the South/East, the region's dependence and too limited influence on global warming by 2050, or the uncertainties weighing on major activities like fossil fuel extraction and consumption, tourism, sea fishing and maritime traffic.

Some mention the possibility of peaks in oil, plastics or international tourism in 2030 - 2040, while others believe that growth will range from 50% to doubling by 2050. It is impossible to judge the validity of these assumptions because of the decisive impact of future political choices or situations. Managing this type of uncertainty will be a key issue over the next thirty years, which is why the scenarios are so useful.

Beyond these shortcomings and uncertainties, there are **two attitudes when faced with the scale of the challenges ahead**. For some, the complexity of the challenges means that we need to "refocus on a few clear objectives, communicating about them better and setting out a strategy and resources to obtain and monitor the results, such as climate risk management, overfishing and plastics, etc.". For others, one of whom evokes the image of the Titanic, "correcting the system at the fringes would be pointless; we need to change the whole system"[39].

[38] See the annex for detailed lists of these issues as proposed by the experts in the factsheets and by the people interviewed: Annex 7. Action issues for the Mediterranean as seen by experts and Annex 8. Type of action issues cited by the key figures and stakeholders interviewed.
[39] Quotes from interviews with key figures.

Between these two extremes, **summarising the issues expressed in the interviews and by the foresight group makes it possible to rank eight major issues for 2050** (see Figure 8. Eight major action issues in the Mediterranean between now and 2050):

- Prioritise adaptation;
- Avoid irreversible consequences, particularly for the sea;
- Successfully manage the "water/agriculture - food/energy/environment" nexus;
- Anticipate demographic and territorial changes;
- Better promote the shared Mediterranean area;
- Adapt regional and national governance;
- Drive forward the fair transition of business models by promoting specific local and Mediterranean features;
- Drive the Mediterranean into a digital and "knowledge society" that integrates the environment and the sea.

2. Eight major action issues for 2050

Each of these eight major issues can be broken down into a number of objectives, which cannot be presented in detail here, but are annexed to the report[40]. They were chosen on the basis of the trends and disruptions mentioned in Part 2, as these issues provide some responses. This summary will simply substantiate each priority with a few examples illustrating the types of action to which they refer.

PRIORITISE ADAPTATION

The first issue is to fully prioritise adaptation. The Mediterranean is the second global region most affected by climate change, warming 20% faster than the global average. Phenomena forecast for 2100 may occur as early as 2050, and in all likelihood, temperatures will increase in the very near future by around 2.3°C. This situation will make the climate the key driver of ecological change over the next thirty years.
As a relatively low emitter of greenhouse gases, the region will have little room for manoeuvre and little leverage to change this trend. But because of its high vulnerability, it will suffer the consequences more than others, in all areas: heatwaves, floods, major fires, water shortages, desertification, changes to marine and land ecosystems, the effects of sea level rise (+40 cm by 2050).
In the deltas, this rise in water levels could threaten some cities as early as 2050, and all homes located directly on the coastline will be affected.

A "cultural revolution" is essential to anticipate and deal with the consequences of these changes in all areas and fields of activity: increasing national and local resilience capacities, reducing vulnerabilities, adapting natural systems and setting up regional cooperation and assistance organisations in the event of disasters.

It is also important to capitalise on the experience of southern countries for adapting to these climate conditions, both in terms of water and housing. As the most affected region in the world, the community of Mediterranean countries, like the Pacific islands, should also have shared positions and very proactive diplomacy on reducing global emissions and increasing the green fund dedicated to supporting adaptation policies in the South.

SUCCESSFULLY MANAGE THE WATER - AGRICULTURE/FOOD - ENERGY - ENVIRONMENT NEXUS

The issue of water is naturally closely linked to climate change, with a predicted 10% fall in available water by 2050, and around 300 million people in the region suffering major water shortages in the South and East, i.e. 60% more than today.
Solving this issue will be a major condition for the survival of Mediterranean agriculture, which will be overstretched by another priority in the coming decades: ensuring food security in the various countries.
With the prospect of a decline in productivity (-17% by 2050), resolving this contradiction will not only require allocating a larger share of available water resources to agriculture (compared with industry, city residents or tourists), but also managing it better, using new techniques and therefore new energies, and securing access to agricultural land, while at the same time reducing the environmental impacts of the agri-industrial sector (on the greenhouse effect, biodiversity and pollution) and ensuring healthy, environmentally-friendly food.

The second major issue for 2050 will be to successfully connect and reconcile all these dimensions, known as the water-agriculture/food-energy-environment nexus.
This issue will relate to all levels of action: from the management of water and land as a common good at the local or regional levels (based on the model of river basin agencies), to the management of international conflicts over cross-border rivers or intra-regional agreements on trade in agricultural products, not forgetting energy or mainstreaming the Mediterranean diet.

As pollution from agriculture and the agri-food industry is a major contributor to pollution of the sea and coastlines, the success of this nexus will also have major consequences on this particular type of pollution.

[40] See Annex 8. Type of action issues cited by the key figures and stakeholders interviewed.

Box 15.

WATER - ENERGY - FOOD - ECOSYSTEMS (WEFE) NEXUS IN THE MEDITERRANEAN BASIN IN THE CONTEXT OF CLIMATE CHANGE

The Water-Energy-Food-Ecosystems (WEFE) nexus approach is a comprehensive framework for analysing interactions among these elements, identifying synergies, trade-offs, and recognizing co-benefits. The challenges within the WEFE nexus are interconnected, and cascading effects occur when changes in one element trigger changes in others. For instance, water scarcity reduces agricultural yields, while soil degradation (through deforestation, soil erosion, and improper land use practices) decreases water-holding capacity of soils, leading to flash floods and reduced water quality.
Efforts to enhance water availability may result in salinization and increased energy consumption. Energy production elevates water usage, affecting water availability for food production. Climate change influences water availability, ecosystem productivity and diversity, impacting ecosystem services like water quality and carbon sequestration. Biodiversity loss affects soil fertility, pollination, and pest control, thus reducing food availability.

The climate and environmental changes have mostly a detrimental impact on the nexus. Currently, 180 million people suffer from water scarcity in the Mediterranean, prompting competition between sectors like agriculture, industry, energy production (notably hydropower), drinking water supply, and tourism, potentially escalating conflicts. In the Middle-East North-Africa (MENA) region, 80 % of water withdrawals are for irrigation, and under a 2°C warming scenario, agricultural droughts could become 150 to 200% more frequent in southern rim countries.
Food insecurity arises from various factors, including reduced water availability, heat stress, and agricultural land loss due to coastal flooding, soil salinization, and desertification. Staple crops like olives, grapes, fruits, cereals, and vegetables in the Mediterranean are projected to see decreased yields (- 17 % by 2050), with changes varying by country and crop. Shifts away from traditional Mediterranean diet contribute to increased malnutrition trends, ecosystem degradation, and greenhouse gas emissions, exacerbated by rising food demands and international trade.

Quantification of global warming impacts on future energy demand is still highly uncertain, but non-climatic drivers (e.g. demography, urbanisation, modernization) suggest a decrease by 10 to 23 % by 2040 compared with 2015 in the North of the basin and an increase by 55 to 118 % by 2040 compared with 2015 in the MENA countries, related to larger economic development needs. Transitioning to renewables is hindered by climate change impacts on energy production, as hydropower and thermo-electric production, including nuclear, are expected to decline, due to decreased streamflow and increased water temperature.

The unsustainability in the WEFE elements is not only characterised by insecurity but also by the large disparities across countries and across territories (rural and urban areas), and by the multiple interlinkages (nexus). Integrated and cross-sectoral approaches and cooperation at various scales (local, regional, national and transnational) are crucial for addressing interdependencies within the WEFE nexus, advancing its security, and minimising trade-offs.
Main pathways for action implemented to foster synergies among water, energy, food, and ecosystem elements are: 1) innovative technological solutions, often leveraging renewable energy and efficiency enhancements; 2) Nature-based Solutions (NbS) such as agroecology, urban greening, wetlands preservation and 3) social approaches to alter consumption patterns, such and the adoption of the Mediterranean diet; 4) environmentally friendly subsidies policies. Despite these efforts, the current situation concerning these four elements falls short of expectations set by the WEFE nexus approach, revealing a gap between concept and operation, partly due to a lack of data for the Mediterranean Basin.

Source : MedECC. Interlinking Climate Change with the Water-Energy-Food-Ecosystems (WEFE) Nexus in the Mediterranean Basin. MedECC, 2024.

AVOID IRREVERSIBLE CONSEQUENCES, PARTICULARLY FOR THE SEA

The consequences of climate change and increasing water scarcity are the issues most often discussed related to the future of the region, but they do not cover all the environmental issues for 2050, particularly those relating to the Barcelona Convention and its protocols.
There are many problems, and once again, it is not possible to make an exhaustive list. But over a longer period like for MED 2050, priority must be given to preventing irreversible changes, particularly those affecting the sea. This is the third issue, with the possibility of a 20% decline in exploitable marine species within thirty years, and structural transformations affecting the entire marine ecosystem.
Unfortunately, the main source of irreversibility, which is the risk of global warming approaching or exceeding 3.5°C by 2100, cannot be reduced at the regional level, resulting in the disruption and tropicalisation of the entire Mediterranean marine ecosystem, changes to water body dynamics and increased acidification, not to mention many other consequences for terrestrial biodiversity.

This is why everything must be done both to contribute to mitigation (make net-zero emissions by 2050 a common objective for both the North and South), and to reduce other pressures on the sea or coastline, in order to strengthen their ability to adapt to future changes:

- Reduce overfishing by at least half (80% in 2020) and stabilise fishing catches at fewer than one million tonnes by 2050 through mass uptake of sustainable aquaculture and responsible fishing;
- Avoid the massive increase in invasive species;
- Strictly protect Posidonia seagrass meadows, coral reefs and endangered species, and organise protected areas into a system, by extending protection to 30% of the marine area (including 10% under strict protection);
- Move towards zero plastic by 2050 and stop oil and gas projects in the East, with a moratorium on deep-sea mining;
- Guarantee compliance with commitments on sea pollution and ensure sea and catchment area management continuity;
- Monitor the ecological impacts of desalination and wind power.

However, this concern to prevent irreversible consequences must also extend to the protection of land biodiversity and take into account long-term impacts and climate change in investments and land-use planning.
Investors should avoid financing projects, activities, housing or infrastructure that will be threatened by sea level rise or that will lose value as a result of choices linked to future transitions (stranded assets).

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[41] The Protocol on Integrated Coastal Zone Management (ICZM Protocol) is one of the seven protocols of the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention). It focuses on strengthening the integrity of coastal ecosystems and their resilience, by integrating marine and coastal areas into spatial planning.

Land-use planning should control urban sprawl and coastal occupation to reduce pressures on the sea and ensure the protection of existing outstanding natural areas, and the coastal buffer zone to protect from sea level rise. In particular, this requires strict application of the Protocol on Integrated Coastal Zone Management (ICZM)[41].

ANTICIPATE DEMOGRAPHIC AND LOCAL CHANGES

This reference to protected areas brings us to a fourth and final major issue, linked to the environment, society and living conditions. It is about anticipating and controlling the considerable demographic and local changes in the region by 2050, first in the South but also in the North.

By 2050, the population in the North will stagnate, and even fall sharply in some countries, while in the South and East it will increase by almost half, alongside widespread population ageing. Alongside this population increase is an ongoing rural exodus and the persistent economic and social attractiveness of large cities and coastal areas, internal or external migration, whether or not linked to the climate, and the continuation or possible acceleration of tourism (30% of global tourist flows, i.e. 360 million international tourists, but forecasts for 2050 are uncertain). These aspects combine to exacerbate, considerably in southern countries, the already long-standing trend towards the concentration of populations and activities in large cities and coastal areas. Pressures on the sea will therefore increase, as will conflicts over land use and access to housing, nature and the sea.

To avoid the foreseeable blockage, spatial planning will therefore become absolutely central, with the need to avoid the collapse of rural areas and small inland towns, maintain the habitability of cities in a context of global warming, and organise the transition to "post-carbon" cities through urban planning policies that integrate land and sea, while ensuring effective enforcement. At the regional level, the issue will be to better manage the complementarity of migration policies, which could be a possible solution to the growing demographic imbalances.

PROMOTE THE SHARED MEDITERRANEAN AREA

For the people interviewed, the future of the Mediterranean as a sea and coastal area is less linked to knowledge and consideration of a specific future risk, than to awareness of the interest in working together to tackle coming upheavals and the growing trends for fragmentation and fractures in the region. According to one of those interviewed, "it's about rediscovering the spirit of cooperation that led to the adoption of the Barcelona Convention in the mid-1970s". The major issue in the years to come is therefore to restore the value of the shared Mediterranean area.

According to the people consulted, this could be achieved in three different ways:

- Firstly, by reaffirming the region's unique identity and exemplary economy, culture and ecology, both as a global commons and a hotspot for climate change and biodiversity, a crossroads of cultures and an example of integrated management at eco-region level. This specific feature is not sufficiently recognised, for example through the regionalisation of economic or demographic statistics at a global level.
- Secondly, by increasing awareness of all kinds of complementarities between the three shores, either in certain economic areas (e.g. ensuring shared energy or food sovereignty), or through sharing experience, where southern countries could be a role model for northern countries for climate change adaptation, and the region could become a "laboratory for sustainable solutions for maritime or land areas with the same specific characteristics".
- Finally, according to the people interviewed, through new political initiatives ranging from strong symbolic or practical actions, such as raising the profile of the Mediterranean Parliament and the Mediterranean Olympic Games, or strengthening (existing) cooperation in the event of disasters, to more hypothetical changes, such as a security pact guaranteeing the neutrality of the region, or the potential creation of a common economic zone. Other possibilities include agreements on economic migration, debt cancellation for the poorest countries, the extension of the New Deal to the Mediterranean with the Union for the Mediterranean (UfM), and the establishment of vertical Africa - the Mediterranean - Europe partnership. Civil societies and local authorities will have an important role to play in paving the way for one or other of these future directions.

ALTERNATIVE MEDITERRANEAN GOVERNANCE AT NATIONAL AND REGIONAL LEVEL

One of the essential areas where there is room for manoeuvre in bringing about the above changes, beyond the economic and technical aspects discussed below, is with institutions and the adaptation of governance at a regional, national or local level.

By sharing the same enclosed sea, the vast Mediterranean eco-region has been fortunate enough to have a structure for management of the sea as a common good, and a cooperation mechanism with few equivalents in the world. But to meet the challenges of the next thirty years, this governance will need to be both significantly strengthened and transformed. The situation in 2050 will largely depend on these changes.

At the national levels, budgetary and institutional situations and room for manoeuvre are very different, and it is difficult to define precise issues. But the people interviewed insist on one priority and a small number of general issues common to all countries. Priority must be given to compliance with the law and regulations, and therefore to informing the public, collecting data and control.

Five other governance issues are also emphasised:

- Moving away from silo-based policies by favouring systemic approaches (such as the water-agriculture/food-energy-environment nexus).
- Making better use of the co-benefits of environmental policies by taking them out of their "technical ghetto" and showing their impacts on health, living conditions, housing, employment, etc.
- Moving towards more transparent, socially inclusive and effective policies by sharing responsibilities with businesses, local authorities and civil society.
- Organising actions around more selective transition and long-term sustainability strategies that take into account time constraints and irreversible consequences.
- Finally, depending on the specific characteristics of each country, gradually incorporating these strategies into the SDGs and the dual social and ecological boundaries inherent in sustainable development, as proposed in Figure 7.

Figure 7.

DUAL BOUNDARIES (PLANETARY AND SOCIAL): THE DOUGHNUT BY KATE RAWORTH[42]

Oxfam 2018

[42] Raworth, Kate. *Doughnut economics: Seven ways to think like a 21st-century economist*. Random House Business Books, 2017.

At the Mediterranean level, the emphasis is also on law enforcement and clarification, with specific concerns about people's limited awareness of international law, means of inspection, the precise boundaries of economic zones and strict enforcement of the Barcelona Convention and the additional protocols corresponding to new long-term challenges, such as marine energy, including wind power, and deep-sea mining.

Two different visions of the future are proposed. One emphasises the creation of joint projects and institutions, with bodies to regulate conflicts over cross-border waters or to intervene in the event of disasters, coordinated strategies for phasing out fossil fuels or promoting the blue economy with an investment bank, using some income from tourism to finance protection of the sea, etc.
The other vision emphasises experience sharing and the implementation of cooperation outside institutions between civil societies, local regions, cultural players, researchers and young people. This could consist of alliances or networks around a specific theme or profession: sister cities, port alliances, joint work on energy recovery on islands, waste and plastics processing, climate change adaptation for forests, and education about the sea and the environment. In particular, southern countries could share their experience of climate change adaptation with northern countries.

CHANGE BUSINESS MODELS TO TAKE INTO ACCOUNT SPECIFIC REGIONAL AND LOCAL FEATURES

Whether or not to opt for regional cooperation and innovative governance at all levels will, in the medium and long term, depend solely on the willingness of Mediterranean countries and societies. The same cannot be said for the region's economies, which, in both the North and South, will have to change their business models and embark on long-term transitions.
These changes in models are not just based on the need to meet new constraints or standards. They are also necessary in order to adapt to the acceleration of digital technologies, climate or geopolitical upheavals, changes in society and consumer standards, not forgetting the scheduled phase-out of fossil fuels and the increasing scarcity of some resources and raw materials.

Either this economic, social and environmental transition will be forced through and involve crises, or it will be anticipated and partly chosen, allowing those committed to it to best capitalise on their specific assets.
Despite the weaknesses and even fragility of Mediterranean countries, they still have many assets, including those tied to the sea. By focusing on greater cooperation and sustainable practices, they will be able to reap the benefits over the next 30 years.

A significant part of this new stance will naturally relate to the environment, including necessary, even inevitable, considerations:

- Firstly, better identify emerging sectors in the blue economy and ensure their compatibility with ecological objectives, for activities linked to aquaculture, desalination, offshore wind power, and maritime transport, etc.;
- The need to accelerate the transition to hydrogen and renewable energies, in particular by capitalising on the enormous solar potential throughout the region;
- Then to anticipate potential peaks in the short or medium term (2020 - 2040), for sea fishing, oil, internal combustion cars or mass tourism;
- Find alternatives and provide social support for the necessary transitions;
- Finally, drive transformations in agriculture and the agri-food industry, or in polluting industries, and any industries that support the adaptation of cities, transport and infrastructure to new energies and climate risks;

Almost all existing activities in this list of measures will have to move towards more sustainable models.

These transformations will only be possible thanks to a combination of factors: mobilising consumers and restoring their purchasing power; new accounting rules coupled with corporate accountability; financial incentive and subsidy policies favouring sustainable solutions; the harmonisation of standards and potentially common trade and customs protection policies across the Mediterranean.

However, without a growth driver other than the environment, for example in the digital sector, and without budgetary resources to ensure a minimum safety net, this will not be enough to release the rapidly growing population in the South from poverty and the informal economy, and to guarantee a long-term sustainable development pathway. At the very least, there will need to be new banking or financing organisations to fund small projects at local level, the introduction of a minimum income for the poorest funded through tax measures (including taxes on tourism), or much stronger cooperation with Europe or between countries in the South.

Some also mentioned extending the Green Deal to the South, a Euro-Mediterranean common market, a "Marshall Plan" for the poorest countries or those devastated by war, or more modestly, major joint infrastructure and utilities projects (energy, digital technologies, water, local maritime transport, etc.).

CLOSE THE GAP - MOVE TOWARDS A MEDITERRANEAN KNOWLEDGE-BASED SOCIETY INTEGRATING THE SEA AND THE ENVIRONMENT

Whichever transition pathway is chosen, it will require knowledge and skills to be strengthened, including practical, traditional and local knowledge.

In all areas, the issue will be to close the growing gap in capacities and investment, particularly in digital technologies, research, innovation and education.
Internationally, the gap between Mediterranean countries and the rest of the world, particularly Asia, tends to be widening in terms of scientific publications, patents and new technologies.
Added to this is the risk of an irreversible divide between North and South, with fewer than 5% of exports from the South with a high technological content, and the prospect of an accelerating brain drain.

A number of proposals were made by the people interviewed and by members of the foresight group: a Union for digital technologies and artificial intelligence in the Mediterranean, the creation of technology incubators in the South, particularly focused on the blue economy or decarbonisation, free transfers of patents or technologies, the mobilisation of funding from rich Arab countries to finance new technologies for the sea, water or climate.
In the shorter term, it could be very useful to establish a network of Mediterranean universities, research centres and think-tanks and better capitalise on local experiences. The sea and climate change adaptation could be a key area for scientific and technological cooperation in the region, with major joint projects on extreme risk prevention, the Water/Agriculture-Food/Energy/Environment-Ecosystems nexus in arid zones, or the mapping and modelling of marine biodiversity throughout the Mediterranean.
Ultimately, the aim is to make the region “a laboratory for sustainable solutions” or “a region of global excellence in sustainable marine science and technology”.

Another equally important issue is education, training, the production and dissemination of information and knowledge, and the link between science and public decision-making.
In all these areas, such as training for professions in the blue economy and the energy or ecological transition, stronger public statistics, knowledge of the sea (“ocean literacy”) and environmental awareness, there are still major gaps, not only in the South, and these are hindering future progress in taking into account the issues mentioned above.
Scientists, civil society, digital media and specialised media will undoubtedly be able to fill some of these gaps if they work together. However, progress cannot be made without all Mediterranean populations having a minimum level of shared culture and knowledge of the sea and its future issues.
It is also clear that without institutional initiatives at all levels, from local authorities to international organisations, and therefore without expanding the scope for action, it will not be possible to make the essential changes to face the next thirty years effectively. On this point, adopting a wait-and-see attitude is also not a solution.

These action issues and considerations for the future of the Mediterranean, mentioned by many of the people interviewed, pave the way for the scenarios discussed in the next section.

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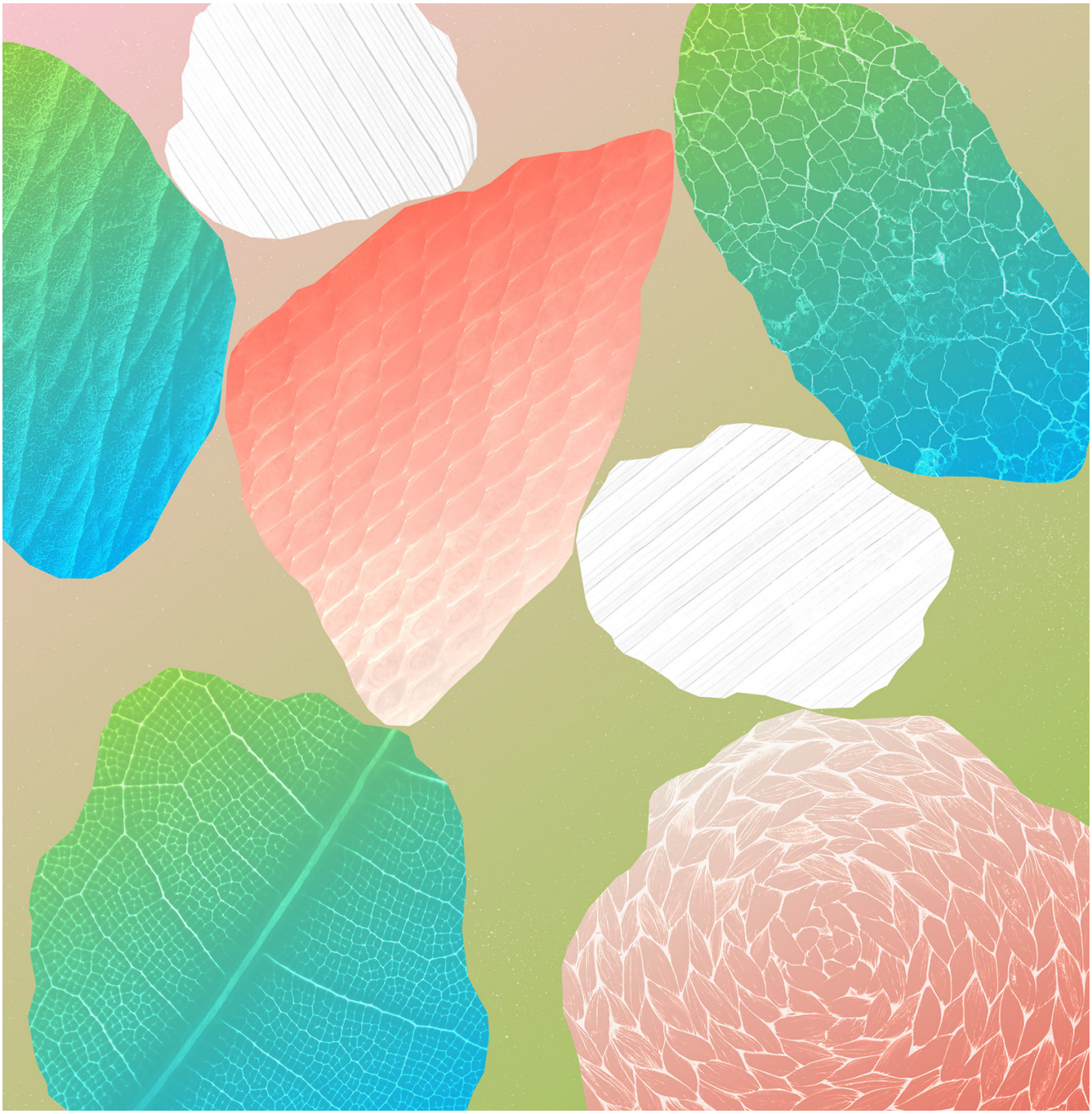
Figure 8.
EIGHT MAJOR ACTION ISSUES IN THE MEDITERRANEAN BETWEEN NOW AND 2050

PART 4

THE SCENARIOS



Starting with the twofold observation that there is a great deal of uncertainty between now and 2050, and that major changes are needed in future Mediterranean policies, MED 2050 proposes several scenarios for the next 30 years.
These scenarios were developed using the foresight base, and visions collected during the Youth Commission for the Future of the Mediterranean and from interviews with key figures in the Mediterranean. The morphological chart summarises the assumptions for possible changes between now and 2050. It plays an essential but non-exclusive role, as the many visions and issues are also broadly taken into account. Both served as a basis for the work carried out during a workshop organised to develop the preliminary versions or scenario outlines.

The Plan Bleu team used these preliminary versions to flesh out the scenarios. This work was a long process, which included many presentations to different audiences, in order to test them and make them stronger and more credible.

I. BUILDING THE SCENARIOS

1. General presentation of the approach

The choice of potential scenarios was discussed at a workshop with around twenty participants, including members of the MED 2050 steering committee and members of the foresight group. Two methods[43] were used to develop the outlines, drawing on the same frame of reference, which consisted of 37 variables and their development assumptions presented in a morphological chart. An extract of this chart is available at the end of Part 2[44].

The first approach uses the nested morphological analysis method to develop scenarios. This is based on the DEGEST framework, while the second approach is based mainly on ranking the main driving variables.

Each method mobilised a specific working group for one-and-a-half days, in two parallel workshops. The first group developed five scenario outlines and the second group produced six. A plenary session then brought together all the experts to share the results and merge the scenarios produced in the two groups.

2. First approach: building scenarios using nested morphological analysis

Following this approach, building robust, plausible and contrasting scenarios for the futures of the Mediterranean Basin is part of an approach that uses the classic scenario method[45] at its core, with a system analysis framework derived from the DEGEST approach[46].

The working group completed this morphological analysis in two stages: a first stage of aggregating assumptions related to the variables for each component of the DEGEST framework, and a second stage of integrating the micro-scenarios obtained for each component at the overall level. The group worked on the components in order of importance: Governance, Context, Societies, Demographics, Economy, Environment and Technology. Each variable was also ranked in order of importance, i.e. in the order in which the group considered that any changes would have the greatest impact on the component in question. Another methodological precaution was taken. The moderator for building scenarios was changed for each new scenario, in order to avoid a potential bias due to the same person leading the exercise.

[43] These two approaches are part of the overall "scenarios" method in the classification proposed by Bishop and al in 2007 (Bishop, Peter, Andy Hines, and Terry Collins. "The current state of scenario development: an overview of techniques." *Foresight: The journal of futures studies, strategic thinking and policy*, vol. 9, no. 1, 2007.).
[44] See Annex 3. List of assumptions by variable: first morphological chart.
[45] Godet, Michel, and Philippe Durance. *Strategic foresight for corporate and regional development*. DUNOD, UNESCO, Fondation Prospective et Innovation, 2011.
[46] Cornish, Edward. *Futuring: The exploration of the future*. World Future Society, 2004.

Box 16.

THE SEVEN COMPONENTS OF THE DEGEST FRAMEWORK

Component 1, the **Context**, has four variables: major trends on a global scale, the place of the Mediterranean in the world and in European policies, and finally the IPCC climate scenarios. As presented in the system analysis, the importance given to the global and European context outside the Mediterranean is a specific feature of MED 2050 compared with previous foresight studies.

Component 2, **Demographics**, has two classic variables: demographic trends and migration dynamics, both of which are central to the region's development.

Component 3, the **Environment**, has six variables that distinguish between the sources of change, such as the concentration of human activity on the coast, and the ecosystems, environments and resources affected by these changes. This component is important because IPCC projections show that the Mediterranean region is ahead of the global average for climate change.

Component 4, **Governance**, has eleven variables. This high number is explained by the multiple influencing factors in this field: geopolitics; security; relations between EU and non-EU countries; energy, carbon emissions management and risk prevention policies; the level of involvement of civil society, coastal zone planning, etc. Within this set, it is important to distinguish between regional governance and geopolitics (which concerns the region as a whole and is closely linked to the global or European context) and governance within countries.

Component 5, the **Economy**, has nine variables. It encompasses all levels, from financing of investments and the necessary transformations, to consumption patterns and changes to inequalities between social classes and between sub-regions. Several variables focus on major sectors in this region, such as tourism, transport, fisheries and aquaculture, and more generally, the potential of the blue economy.

Component 6, **Societies**, has six variables and deals with various aspects such as the place of young people and women in community life, the burden of senior citizens, the influence of secular and religious value systems on human relationships and social choices. The specific role of the media, including the Internet and technological developments, is also taken into account.

Component 7, **Technology** and **Science** (two variables), focuses on research innovation policies in the Mediterranean and on observation systems in all areas, which are essential knowledge tools for understanding dynamics.

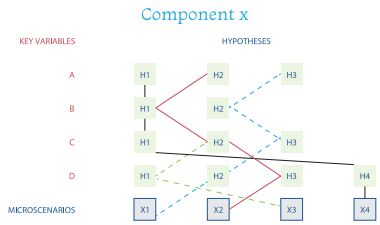
Box 17.

NESTED MORPHOLOGICAL ANALYSIS

Extract from: Lamblin, Véronique. *Prospective and strategic foresight toolbox*, « L'analyse morphologique. Une méthode pour construire des scénarios prospectifs ». Futuribles, March 2018.

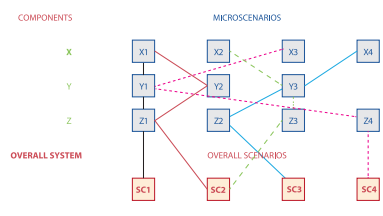
Once the number of variables in the foresight system exceeds ten or so, it is very difficult to build a sequence of assumptions (with one assumption per variable) all at once. A system of 20 to 30 variables, or even more, is very common in foresight exercises (...); and combining 30 assumptions all at once is too difficult. In this case, it is advisable to assemble the different variables into groups, called components of the foresight system. For example, the aim should be to develop four or five components from a system of 30 variables (...). A morphological chart is built for each component (Table 3) using the same principles as in a traditional morphological analysis. By combining these assumptions, it is possible to build component-based scenarios known as micro-scenarios.

MORPHOLOGICAL CHART OF A COMPONANT (HERE NAMED X)



Micro-scenarios are partial scenarios for a component in the system of variables, i.e. for a group of variables. The aim is to work on a component-by-component basis, with the dynamics of each component dependent on changes to the key variables. For each component, three to seven micro-scenarios are developed, often including a business-as-usual scenario and other contrasting scenarios.
Once the component-based micro-scenarios have been developed, possible combinations need to be examined in an overall morphological chart in order to build the overall scenarios (Table 4). This technique of nesting variables into components avoids being limited to a small number of variables, thereby increasing the depth and accuracy of the scenarios (...).

OVERALL MORPHOLOGICAL CHART: FROM MICROSCENARIOS TO OVERALL SCENARIOS



Once the micro-scenarios have been developed for the various components, these combinations can be tested in an overall morphological chart to build the final scenarios.

In the end, five scenarios were obtained using this two-stage method:

- Scenario 1 - BAU - Metastable and Asthenic
- Scenario 2 - Perfect storm
- Scenario 3 - Pragmatism still trumps engagement
- Scenario 4 - State-community alliance to restore common goods
- Scenario 5 - A responsible, learning society

3. Second approach: exploration of possible scenarios based on a ranking of driving variables

Whereas the first approach starts with all the variables, and the corresponding change assumptions, and integrates them in two successive steps, the second approach starts the other way around. It begins by ranking the variables and decisive shifts that will determine the future of the Mediterranean, and then, through successive adjustments, seeks to re-articulate these essential components (which form the basis of the scenario ideas) with the assumptions relating to all other variables.
To use an architectural metaphor, this second approach begins by defining specifications, then choosing the architectural design and building pillars, before ensuring that it can be built using the available materials (the assumptions for all variables).

The process followed in this second workshop involved six stages:

– Firstly, a reminder of the specifications of the MED 2050 project: to build robust scenarios that are useful for decision-making, covering the diversity of possible developments between now and 2050; to give an important place to the sea and the climate; to address the interfaces between the environment and development; to analyse the conditions for cooperation between countries and territories in the region, taking into account developments inside and outside the region; and finally, to consider the major risks of disruption or crisis over the next three decades;

– After this, the participants were provided with and collectively read a detailed morphological chart differentiating between context variables (2), cross-cutting variables (15) and sector variables (20);

– The third essential stage included the ranking of context and cross-cutting variables that are key for structuring the scenarios. At this stage, an initial distinction was made between variables that will be key in determining the future development of the Mediterranean, but which are characterised by a high degree of inertia, and those that are much more unstable and uncertain. Demographic trends, the urban transition, the influence of digital technology, and climate change fall into this first category, despite possible variants. Their impacts must be reflected in all the scenarios. On the other hand, other cross-cutting or context variables are more unstable or uncertain, and may therefore be used to substantiate different scenarios: changes in the external context, growth and development choices, regional or internal governance within countries, cultural and societal changes, and the priority given to the environment. After discussion, it emerged that the international and European context, modes of governance and intra-regional cooperation or cooperation within countries and territories, and development choices were essential for differentiating the scenarios.

In the fourth stage, debate shifted from the driving variables to the disruptions and shifts likely to have a decisive impact on the future of the Mediterranean.

Around ten of these were mentioned by group participants:

- A common market for the Mediterranean,
- Strict enforcement of the Barcelona Convention and its protocols,
- A Union of Maghreb countries,
- A vertical axis (Europe - Mediterranean - Africa),
- The Mediterranean Sea as a global commons,
- Shocks, especially climate shocks, that cause a change in values and behaviour, particularly among young people,
- An Arab “revival”,
- Changes in the location of work,
- A space for information and governance,
- A Mediterranean alliance for solar energy and hydrogen,
- Weakened religious radicalism,
- A “Marshall Plan” for Africa and southern and eastern Mediterranean countries.

Following this debate on the essential shifts, the decision was made to adopt a scenario based on the Mediterranean Sea as a global commons. The list of disruptions cited also showed the importance of the political dimension at all levels (from global to local), socio-cultural changes and the risk of faster-than-expected climate change.

On the basis of these first four stages, it was possible to tackle the fifth crucial stage of choosing the scenario ideas. Initially, it became clear that two issues were essential: one about the Mediterranean as a global commons (see

previous paragraph), and the other on the prospect of a serious crisis in the region. For the rest, it seemed that the choice of other possible scenarios should consider a small number of essential criteria: the speed and intensity of future changes (inertia, slow transformation, radical disruption); the integration of the Mediterranean into globalisation (marginalisation, autonomy, integration); the forms of cooperation between countries (conflicts, fragmentation, North-South cooperation, South-South cooperation); development choices and the role of the environment (growth at any cost, weak or strong sustainability); and lastly, modes of governance in relation to socio-cultural changes (effectiveness of governance, role of States and civil or local societies, political room for manoeuvre).

After discussion, the group reached a consensus on six scenarios:

- Scenario 1 - Mediterranean: battlefield and marginalised
- Scenario 2 - Colliding crises and shifts
- Scenario 3 - Structural changes in a plural Mediterranean
- Scenario 4 - Euro-Mediterranean Deal for an ecological transition
- Scenario 5 - A specifically Mediterranean model of sustainable development
- Scenario 6 - The Mediterranean Sea: global commons

A final very time-consuming stage involved taking each scenario and reconstructing the list of corresponding assumptions for each of the 37 variables considered, and ensuring the consistency of this list. This backcasting approach starts with an objective and then specifies the conditions for achieving it. It showed that the group's proposals adequately covered the entire morphological chart originally proposed.

4. The results: six scenarios for the Mediterranean by 2050

In order to establish definitive scenarios common to both groups, a third and final stage was required. The two working groups pooled their results, placing the eleven scenarios in a single table. Then, working in successive stages, the plenary group looked for relatively similar scenarios in order to merge them.

Merging the scenarios from the two groups led to the following six proposed scenarios:

- Scenario 1 - Degradation, inertia and pragmatism
- Scenario 2 - Colliding crises and forced adaptations
- Scenario 3 - Growth at all costs in a fragmented Mediterranean
- Scenario 4 - Euro-Mediterranean partnership and a blue-green transition
- Scenario 5 - The Mediterranean, a plural model of sustainable development
- Scenario 6 - Global partnership for the Mediterranean Sea as a commons

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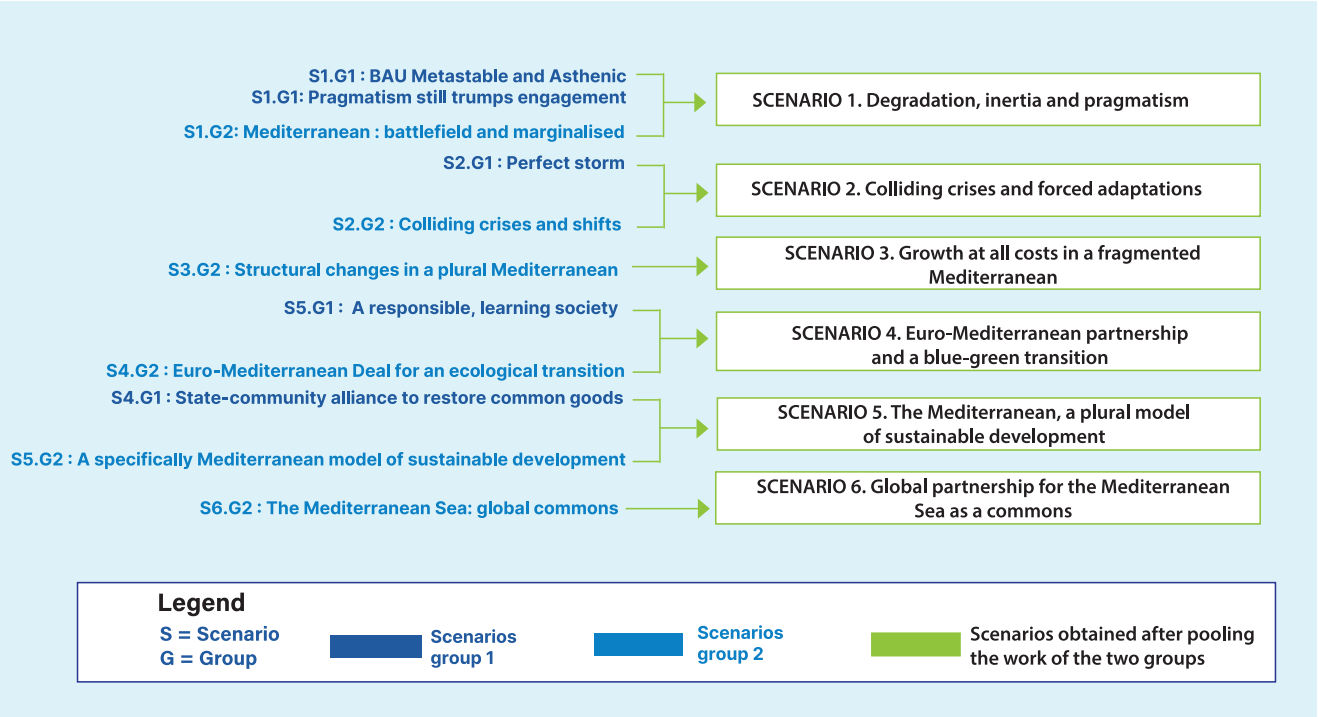
Figure 9.
SCENARIOS OBTAINED AFTER POOLING THE WORK OF THE TWO GROUPS[47]



These proposals were stabilised by members of the Steering Committee to produce the final titles of the six scenarios presented in Table 6, in 2 distinct categories: scenarios with more or less rapid environmental degradation and scenarios for transition pathways towards sustainable development, which also happen to be scenarios of cooperation at different scales.

Table 6.
THE SIX MED 2050 SCENARIOS

S.1 INERTIA, MARGINALISATION OF THE MEDITERRANEAN, AND PRAGMATISM	**S.2 COLLIDING CRISES AND FORCED ADAPTATIONS**	**S.3 GROWTH AT ALL COSTS IN A FRAGMENTED MEDITERRANEAN**
S.4 EURO-MEDITERRANEAN PARTNERSHIP FOR A BLUE-GREEN TRANSITION	**S.5 ANOTHER SUSTAINABLE DEVELOPMENT MODEL SPECIFIC TO THE MEDITERRANEAN**	**S.6 THE MEDITERRANEAN SEA: GLOBAL COMMONS**

5. The assumptions for each scenario

All six scenarios were then characterised in terms of all 37 MED 2050 variables, using the assumptions in the morphological chart presented at the end of Part 2[48]. Table 7 shows a reduced version for some variables[49].

[47] Group 1 followed the nested analysis approach based on the DEGEST framework, while Group 2 followed the approach of exploring possible scenarios by ranking the variables.
[48] See Table 5. Extract from the morphological chart and Annex 3. List of assumptions by variable: first morphological chart.
[49] See Annex 9. Assumptions relating to the main variables, used for the six scenarios: second morphological chart.

Table 7.

SOME ASSUMPTIONS FOR EACH SCENARIO: EXTRACT FROM THE MORPHOLOGICAL CHART ON ALL VARIABLES

Variables	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6
Major global trends for 2050	American dyarchy and partition of the world in 2.	A fortress world.	A multi-polar world.	Open World 4.0 + Global mobilisation for SD.	A multi-polar world + Global mobilisation for SD.	Global mobilisation for SD.
The Mediterranean in the global context	Status-quo and "Battlefield": National isolationism and stagnation.	Crises, profound destabilisation and resilience.	Recomposition of the Mediterranean space into large "centrifugal" sub-regions.	Successful adaptation to globalisation (technological and ecological).	Co-construction of a sustainable development model specific to the diversity of the Mediterranean.	Co-construction of a sustainable development model specific to the diversity of the Mediterranean.
Global climate scenarios (IPCC)	Business-as-usual: +3°C to +3.5°C by 2100 (+2.3°C to +2.5°C by 2050 in the Mediterranean).	Climate chaos: tipping points exceeded (+2.8°C by 2050 in the Mediterranean).	Business-as-usual: +3°C to +3.5°C by 2100 (+2.3°C to +2.5°C by 2050 in the Mediterranean).	Carbon neutrality objective in 2050 (+2°C by 2100) (2°C by 2050 in the Mediterranean) + Successful climate engineering and maximum efficiency of carbon sinks.	Target rise of 1.5°C by 2100 (2°C by 2050 in the Mediterranean).	Carbon neutrality objective in 2050 (+2°C by 2100) (2°C by 2050 in the Mediterranean).
Population growth	Business-as-usual. +130M in the South & East, -10M in the North and general ageing.	High scenario corrected for excess mortality at the end of the period.	High scenario: higher-than-expected fertility in the South & East (+165M) and faster decline in the North (-25M).	Business-as-usual. +130M in the South & East, -10M in the North and general ageing.	Low scenario: faster-than-expected demographic transition in the South (+85M).	Business-as-usual. +130M in the South & East, -10M in the North and general ageing.
Concentration of human activity in coastal areas and at sea	Uncontrolled coastal development with protected enclaves for the elites. Increasing reclaimed land from the sea.	Uninhabitable and deterrent coastline (urbanisation, climate, etc.).	Uncontrolled coastal development with protected enclaves for the elites. Increasing reclaimed land from the sea.	Coastline at the service of the sustainable blue economy.	Effective spatial planning, protection and land-use planning at all levels.	Coordinated withdrawal to the hinterland and coastal protection.
Transformations of the Mediterranean ecosystem and its impacts on marine and coastal biodiversity	Biodiversity and marine ecosystems under pressure. Protection limited to Marine Protected Areas and emblematic species.	Marine ecosystems undergo structural transformation (massive disruptions linked to climate change, tropicalisation, pollution).	Marine ecosystems under structural transformation (massive disruptions linked to climate change, tropicalisation, pollution).	Species replacement and new ecosystems (very contrasting trends: depending on the species and sub-regions).	Successful ecological transition, strong protection of marine biodiversity and control of catchment areas.	Successful ecological transition, strong protection of marine biodiversity and control of catchment areas + Diversification and enrichment of ecosystems, resulting in increased overall productivity.
Public and private financing for development in the Mediterranean. What role for Green Finance?	Financing limited to profitable projects or offsetting markets, and greenwashing + Greening of finance and aid, but focus on attractive countries and projects.	Financial and budgetary crises, and refocus on short-term emergencies. Community solidarity.	Greening of finance and aid, but focus on attractive countries and projects.	Strong green conditions tied to public and private aid and funding. Removal of subsidies for unsustainable activities.	Abundance and diversity of green financing, with priority given to vulnerable countries and populations and small-scale projects. Acceptance by northern countries to pay for the South.	Strong green conditions tied to public and private aid and funding. Removal of subsidies for unsustainable activities.
Changes to production and consumption patterns	The economy at the expense of sustainability. Inertia in behaviour and reuse of waste + Regulation by the market, costs and technical innovation.	Changes in values and local, community or individual initiatives. Territorial transitions.	The economy at the expense of sustainability. Inertia in behaviour and reuse of waste.	Regulation by the market, costs and technical innovation + Public constraints and incentives hindered by inequalities in social and geographical situations.	Sobriety rather than growth (coordinated transitions at national and international levels) + Changes in values and local, community or individual initiatives. Territorial transitions.	Changes in values and local, community or individual initiatives. Territorial transitions.

II. THE SIX MED 2050 SCENARIOS

01 INERTIA, MARGINALISATION OF THE MEDITERRANEAN, AND PRAGMATISM

COLLIDING CRISES AND FORCED ADAPTATIONS 02

03 GROWTH AT ALL COSTS IN A FRAGMENTED MEDITERRANEAN

04 EURO-MEDITERRANEAN PARTNERSHIP FOR A BLUE-GREEN TRANSITION

ANOTHER SUSTAINABLE DEVELOPMENT MODEL SPECIFIC TO THE MEDITERRANEAN 05

06 THE MEDITERRANEAN SEA: GLOBAL COMMONS

The six scenarios are presented on the following pages. They were drafted by members of the Steering Committee using the same template, which is broken down into four sections:

- ABSTRACT
- DYNAMICS AND ACTORS
- DESCRIPTION OF THE SCENARIO
- ASSESSMENT OF THE PLAUSIBILITY OF THE SCENARIO

SCENARIO

1

INERTIA, MARGINALISATION OF THE MEDITERRANEAN, AND PRAGMATISM

1. Abstract

By 2050, the average temperature in the Mediterranean will have risen by 2.3°C, due to the significant inertia of global climate policies.

Mediterranean ecosystems are undergoing major degradation that alters their stability and how they function. Socio-environmental risks (droughts, floods) and socio-political destabilisation (such as an increase in illegal migration) are recurrent, and national economies are undergoing repeated periods of recession.

Some countries in economic crisis are becoming more isolationist, managing internal conflicts by establishing non-democratic regimes. The Mediterranean is therefore gradually sidelined from globalisation. Growing internal tensions prevent the emergence of ambitious and sustainable environmental policies. In response to civil societies whose actions are becoming more radical in the face of climate inaction, **governments turn to pragmatic and short-term policies that do not address the root causes of problems, and therefore cannot curb underlying trends, which are nevertheless structural causes of the crisis**. Regions hardest hit by climate and environmental changes are becoming uninhabitable, which increases inequalities at the territorial, social and economic levels.

The Mediterranean of 2050 is a deeply contrasting space, on the verge of fracturing, divided between a socio-economic elite barely affected by the effects of climate change, and vulnerable populations whose living conditions and future prospects are deteriorating as a result of increasing risks and extreme events such as heat waves, mega-fires and coastal storms and floods.

2. Dynamics and actors

INITIAL CONDITIONS FOR THE SCENARIO

2020-2030 was seen as the decade for change: this did not occur for two key reasons. First, Mediterranean countries and governments remain divided as to the need to begin a transition and profound change right now, at the expense of economic development. Some countries, especially in the South and East, continue to massively produce oil and gas in an attempt to finance the post-fossil fuel era.
Secondly, certain ambitious decisions from the 2020-2030 decade, such as the ban on the sale of new vehicles with thermal combustion engines from 2035 in the European Union, have not seen widespread implementation globally.

The lack of action by some countries is explained both by smaller room for manoeuvre due especially to debt, and by the political influence of a conservative socio-economic elite that perpetuates itself through the exploitation of resources and unsustainable activities. A context of economic recession or stagnation forces governments to make short-term decisions to ensure the safety and protection, and even the survival, of their population. In the North, there has been no trade-off between the “end of the world” and the “end of the month”. Instead, this tension has been heightened. In the South and East, the environment is still not a priority, except in certain vital areas such as water supply.
Governments act pragmatically but without ambition because they know that ambitious measures will be unpopular with part of their electorate. The decarbonisation of the economy is still too expensive in the short term for uncertain long-term gains. A “wait-and-see” and laissez-faire attitude therefore prevails. The legal instruments available to countries prove their ineffectiveness, because they are not applied.

However, some concrete measures are being taken, but mainly in the name of food and energy security. Some sectors (such as the use of biotechnologies in agriculture or the use of shale gas) are being deregulated without planning for the long-term impacts. Here, inertia is not the absence of action but the result of the sum of opposing forces which, by cancelling each other out, prolong the status quo.

Mediterranean young people rise up against the inaction of the ruling classes, but are repressed in the name of collective security. The European Union turns away from the Mediterranean, in favour of extension to the East. The Mediterranean cooperation system is therefore gradually losing momentum, due to the loss of confidence in a shared future of progress. This also results in the degradation of resources and ecosystems, sometimes to the point of no return.

ACTORS AND ASSOCIATED STAKEHOLDERS

Through a lack of knowledge, electoralism, ideology or collusion with the socio-economic powers, governments adopt rhetoric and superficial policies that constantly postpone ambitious decisions, which are the only way to have a positive effect on local and global climate change.

The involvement of the various actors is strongly determined by their specific situations, which are very unequal. Some socio-economic groups, who are often privileged, fuel this status quo, as they suffer little from the effects of climate and global change. Others benefit from the deteriorated state of the Mediterranean system, either because they invest in transitioning sectors, or because they benefit from offsetting measures, thus acquiring part of the public money invested by Mediterranean states.
Mediterranean civil societies, especially young people, try to influence governments, sometimes at the cost of violent action, but without much success. A feeling of resignation is widespread among these young people, with privileged social classes in the North tending to flee the region to settle in economically healthy countries (e.g. certain American states, Northern Europe, New Zealand or Canada).

The non-profit sector and informal solidarity networks are increasingly taking the place of governments, particularly in the fields of education, housing and assistance to vulnerable populations.

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DIFFERENT PHASES

In the decade from 2020 to 2030, there is still hope of profound changes to environmental policies to achieve carbon neutrality by 2050 and curb the increase in greenhouse gases. However, without proactive mitigation and adaptation policies, the Mediterranean gradually faces a series of turbulent economic situations, reinforcing its marginalisation from the global economy. Social and economic inequalities are increasing, firstly in the South and East under the more intense effects of climate change, contributing to an explosion in illegal migration that cannot be contained.
Economic stagnation further reduces the scope for redistributive policies, and the wealth produced continues to be captured by a minority of the population, preventing a rebalancing of social inequalities.

The Mediterranean Basin therefore experiences gradual degradation that affects almost all economic sectors and the living conditions of its people. The reason for widespread inaction, or rather superficial policies without real implementation, is that governments put forward unambitious and cosmetic solutions. In the North, governments are buying the appeasement of different sections of the population - those who are little or unaffected by the future effects of climate change (and who at the same time still vote the most) or those who are likely to be most negatively affected by the necessary transitions.

It is this policy of small steps under constraint ("too little, too late") that leads the vast majority of Mediterranean countries towards a gradual but irreversible decline after two decades.

3. Scenario description

EXTERNAL CONTEXT

While GHG emissions have led to a global warming of +2°C, the Mediterranean Basin is facing more intense warming at +2.3°C. Despite increasing warnings from various international institutions like the UN, IPCC, IPBES, IUCN and World Bank, and annual climate negotiations, countries have not managed to agree on a global and coordinated strategy to drastically reduce greenhouse gas emissions.

Some measures, such as the contribution of northern countries to finance adaptation in southern countries, have not been ratified. There is a mistrust of the international institutions inherited from the Second World War, accused by some governments of using the climate issue to serve political agendas. When it comes to climate, like other large-scale problems, superficial and "small steps" policies take precedence over ambitious actions and reality. Following the war in Ukraine, the European Union speeds up its policy of integrating the countries of eastern Europe (Ukraine, Moldova) for geopolitical and economic reasons.

This eastward expansion occurs at the expense of the Mediterranean (and even potentially the Balkans), with the European Union slowing down its neighbourhood and investment policy on the southern shore. This extension ultimately reinforces inaction on environmental issues, as the European Union seeks an impossible consensus, all the more so as it is being challenged from within by a growing number of populist governments.

GEOPOLITICS AND GOVERNANCE OF THE MEDITERRANEANE

At the Mediterranean level, there is also a mistrust of supranational institutions. While some economic cooperation between Mediterranean countries has been initiated around strategic sectors, such as energy, others are facing growing and recurring conflicts of use. The Mediterranean maritime space and coastline is the subject of disputes between increasingly competing uses (fishing, offshore wind power, transport, biodiversity protection, tourism etc.). These uses should be regulated by maritime law and the Barcelona Convention, but enforcement remains lax and inconsistent.

The fragmentation of legal tools and the fact that maritime planning is not applied by all Mediterranean countries, particularly with regard to the environmental assessment of maritime activities, result in a state of status quo that fuels conflicts. For example, the mass development of offshore wind power is a source of spatial competition with other activities such as fishing, military activities and maritime transport, and causes problems for biodiversity.

Globally, **the priority given to national interests over supranational cooperation has caused the Mediterranean to lose its influence in the world's geopolitical and economic balances**. The Mediterranean, once the centre of world trade, is being marginalised by its inability to engage in long-term policies. Difficulties maintaining the security of maritime trade routes for container ships leads to a drop in commercial traffic through the Suez Canal, and therefore a drop in global traffic passing through the Mediterranean.
Paralysed by chronic problems of insecurity, incapable of overcoming internal economic difficulties and levels of debt, and sidelined from global dynamics concentrated in Asia and North America, the region sees its place on the world stage shrink unrelentingly.

In this lacklustre context, which is also affecting the northern shore with its declining population, Mediterranean countries fall back on pragmatic short-term policies in response to the economic and social shocks of varying intensity experienced, without succeeding in reducing their vulnerabilities. Hopes for a reduction in inequalities between the two shores are fading.
The world's major powers, such as China, Russia and the United States, are clashing indirectly in other geographical areas, such as Sub-Saharan Africa and Southeast Asia, and maintain a large military presence in the region.

Without an ambitious policy of cooperation to ensure the co-development of each side of the Mediterranean, the migration issue remains without a permanent solution and greatly destabilises the region. In addition to the intra-Mediterranean migration flows, there are those from Sub-Saharan Africa and countries in Asia significantly affected by climate change (Bangladesh, Pakistan, Myanmar).
The migration issue is a subject of strong diplomatic discord between the different Mediterranean countries. It may even be instrumentalised by some governments seeking to influence geopolitical balances ("blackmail over migrants"). For geopolitical and energy reasons (e.g. gas fields) and to meet the challenge of illegal migration, borders and maritime areas are militarised. This arms race heightens tensions between neighbouring countries.

DEMOGRAPHICS AND LAND-USE PLANNING

In 2050, the Mediterranean Basin will have a population of 634 million (compared to 521 million in 2020, +22 %), with the southern and eastern countries on course to complete their demographic transition. The population of the North will have slightly decreased (-5 %), while eastern countries (+30 %) and southern countries (+44 %) will have seen their population increase significantly. There is a general ageing of the population, which is more acute in the northern Mediterranean than in the southern and eastern countries. In some countries, the collapse of the population or, on the contrary, its very rapid growth (like in Egypt), are becoming major sustainability issues, but with no possibility of changing course.

In terms of regional migration dynamics, the Balkans witness a large proportion of their "life blood" (educated young people) flee the region for countries offering better employment prospects, such as Western and Northern Europe.
This phenomenon of the "brain drain" is also at work in the southern Mediterranean, but is offset by a highly educated diaspora "returning home" after the implementation of policies to encourage their return (higher salaries, creation of economic opportunities, better social status). They invest in adaptation sectors (green energy, desalination, aquaculture, etc.).

Although some relocation of activities and populations to the hinterland and rural areas can be observed, due to the rise of remote work for executives and employees in the tertiary sector and the territorial dynamic of "returning to the countryside" for privileged social classes, the major underlying trends (urban and coastal development) continue to shape Mediterranean landscapes. These fairly rapid changes contribute to destabilising the region's socio-environmental balance.
The vast majority of the population lives in large coastal urban areas, which has negative impacts on environmental and human health ("One Health"). In many impoverished urban areas where extremely precarious populations survive, there is a re-emergence of diseases that had been "eradicated" in developed industrial societies, such as tuberculosis, scabies and syphilis, alongside an increase in diseases associated with poverty and urban sedentary lifestyles, including obesity and diabetes.
Climate change, particularly rising temperatures, encourages the emergence of vector-borne diseases, such as dengue fever, zika and chikungunya, carried by tiger mosquitoes (Aedes albopictus and Aedes aegypti), whose range is constantly expanding.

These large urban areas are also facing increased inequalities. "Slums" sit next to new, highly internationalised neighbourhoods financed by foreign pension funds. Most of the upper classes work in these business districts, in service jobs, IT, and finance, etc. The residential districts of these social classes are often gated and secure.

Migration policies remain ambiguous and uncoordinated at the regional level, with no reduction at source or prospects for co-development. They fail to curb ever-increasing migration flows. This growing migration is driven by an increase in conflicts often linked to the effects of climate change (e.g. droughts, famine). They destabilise diplomatic relations between the countries on all three sides of the Mediterranean and weaken their governments, which are forced to face mounting protests.

The rise of populism and the exacerbation of anti-migrant hostility lead to the rise of private militias to monitor and contain illegal migration. Migrant populations become scapegoats for a worsening economic situation, with the migration issue capturing most media attention, forcing all political parties to take a stance on this issue.

ECONOMY AND DEVELOPMENT POLICY

The general state of the Mediterranean economy is gradually deteriorating, even though some sectors involved in the ecological transition are booming, such as solar power. With a lack of research and innovation capacity, the Mediterranean is marginalised in the digital revolution and is struggling to make a position for itself within a globalised world.
Despite efforts to diversify, a large proportion of countries continue to base their development on the exploitation of natural resources (sea, sun, fossil fuels, Mediterranean products, etc.), which are threatened by climate change and declining yields.

Some southern and eastern Mediterranean countries nevertheless take advantage of the transition to low-carbon energies by welcoming large infrastructure projects (solar power plants in the desert, offshore wind power near the coast, underground carbon storage, deep geothermal energy) to generate huge financial returns and create jobs. However, this revenue is not fairly redistributed among the population, leading to an increase in social and economic inequalities. Some areas with high economic potential but limited investment capacity, whether for renewable energy production, tourism or aquaculture,

compete with difficulty for aid, partially from large foreign pension funds, which then take a share of the income. Redistribution policies therefore clash with the interests of those who own the capital and production facilities. Inequalities are widening both within and between countries, some of which are unable to emerge from the deep slump that has hit them since the 2010s.

The Mediterranean of 2050 will be a dichotomy with contrasting economic and social outcomes. Although the energy transition is well under way in the Mediterranean, it is mainly implemented through technologies and for economic profit, without social justice or redistribution policies. The transition therefore happens in fits and starts, without any profound systemic change, according to the whims of sectors facing crisis, and sometimes includes an overturn of the standards in force.

Large corporations pursue policies of maximum short-term profitability, without taking into account the negative external impacts on resources or the environment. They protect themselves from the criticism of social media and NGOs with elaborate communication policies, enlisting highly paid scientists and influencers with little concern for ethics.

They build a "green sheen" (through green and blue washing), based on carefully crafted advertising and the obstruction of legal proceedings against them.
Economies are "greening" primarily for economic reasons. A "green market" therefore develops. It is attractive to capital and based on carbon offsetting mechanisms and the promotion of ecotechnology "solutions", such as "green" hydrogen (or labelled as such), or CO2 storage in underground caverns, etc.

In this scenario, "green" investment must be above all profitable, which is also true of the "blue economy". Through intense lobbying campaigns with various bodies such as the European Commission, large transnational firms in the energy, agri-food and digital sectors influence the green certification and labelling processes. Therefore, in terms of environmental transition, a "small steps" policy still prevails, and the responsibility falls primarily on consumers who are asked to "green" their behaviour. There is no break with the quest for economic growth or consumption, and citizens are asked to behave as "responsible consumers".

Property and "new" products are still socially valued. At a local level, short supply chains, recycling centres and second-hand businesses develop (e.g. second-hand clothing stores, repair shops), thanks to support from the public authorities or due to poverty.

Sectors related to the maritime economy have not made any substantial transition towards greater sustainability. Those such as maritime transport, shipyards and tourism continue to be major polluters.

In the tourism sector, there is a dichotomy between the development of mass tourism with a heavy ecological footprint (coastal resorts) and eco-tourism in preserved landscapes and socio-ecosystems, which is expensive and reserved for the elite. Some places highly dependent on tourism (such as certain Mediterranean islands) are suffering the full force of climate change.

To continue to welcome tourists and preserve the huge financial gains that come from it, these territories must adapt defensively to climate change. They are therefore forced to turn to foreign capital to finance major defence and development infrastructure, such as dikes, pilings, irrigation and reforestation, etc. Those who do not make this choice are downgraded and become impoverished. Despite several attempts to regulate the exploitation of marine resources more strictly, no consensus on a Mediterranean-wide scale has emerged due to the persistence of conflicts over the boundaries of exclusive economic zones.

SCIENCE AND TECHNOLOGY

Despite the declared intentions of Mediterranean leaders for the region to serve as a hub for new green technologies (alliance for green hydrogen, offshore wind farms) and develop a long-lasting partnership between northern and southern countries on digital technologies, the Mediterranean has not managed to catch up with the American and Chinese giants of digital and other new technologies.

The European Union is developing a plan for digital sovereignty that gives it a degree of independence, while in the South, the digital divide persists, limiting prospects for economic development. However, Europe itself does not have the resources to match its ambitions, and the share of patents and scientific publications from eastern and southern countries remains marginal. Critical and vital digital infrastructure in these Mediterranean countries is owned by major global groups (Asian or American). Some global tensions (for example between China and the United States) therefore have repercussions on the interoperability of digital infrastructure and systems, and lead to recurrent outages.

To meet the Sustainable Development Goals (SDGs), Mediterranean countries are strengthening their surveillance and monitoring capacities based on new information and communication technologies (NICTs), including smart sensor networks, remote sensing via satellite and drones equipped with Lidar systems, etc. However, due to a lack of public resources, research and observation are increasingly financed by private funds (particularly the Big Five tech giants or their Asian equivalents).

These high-performance monitoring systems are therefore designed to meet economic rather than ecological objectives. As scientific interests give way to economic interests, data sharing is hindered by tolls or fees, and observation systems continue to have poor interoperability. Security-sensitive data is still controlled by governments.

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In the end, the increase in Mediterranean socio-ecosystem monitoring capacities has limited influence on the decisions taken by governments when it comes to sustainable development.

Radical decisions are constantly postponed, despite increasingly urgent warnings from civil societies around the Mediterranean and the world. In some countries, climate scepticism is even on the rise.

SOCIETIES

Deteriorating living conditions and increasing inequality have created a breeding ground for anti-globalisation and conservative political movements and radical religious currents opposed to the emancipation of some populations, such as women.
These movements, some of which are cult-like (such as the new age movement), are gaining an increasing audience. Internet smear campaigns and even physical violence are used against environmental activists or journalists who document and expose conflicts of interest and collusion between corporations, governments and regulatory institutions.

Mediterranean young people, whose future prospects are dimming, are increasingly isolated from the rest of society. Intergenerational conflicts are on the rise. The youth blame the previous generations and past governments for successive climate disasters, and a “wait-and-see” approach in the light of their acceleration. Movements for the rights of future generations are growing.

In the North, young people mobilise in large numbers to oppose unsustainable or unsuitable projects (such as water reservoirs in the plains). Faced with policymakers failing to take into account their demands, these protests are becoming more radical and increasingly violent.
At the same time, in order to buy a form of social peace, decision-makers increase the number of consultation and participation bodies (e.g. youth conferences on adaptation), without it having any influence on decision-making. This situation reinforces the frustration of young people, who lose confidence in the electoral process and usually abstain from voting except in local elections. Young people gradually leave public life and marginalise themselves by distancing themselves from decision-making spheres.

In the South and East, youth protests increase, as they bear the full brunt of climate and environmental changes, making their living conditions precarious (basic needs such as food and housing, etc.). Educated youth from affluent circles in the East migrate to countries that offer them satisfactory living and working conditions (Northern Europe, the United States, Canada, etc.), while the vulnerable youth of the South emigrate to France, Spain and Italy to take up jobs considered unpleasant and unwanted by the local population.

The status of women in the Mediterranean is subject to contrasting developments, with a local decline in certain fundamental rights (difficulty accessing employment, wage inequalities, etc.), due to the consolidation of power by certain political movements, sometimes bordering between politics and religion.

GOVERNANCE

The role of civil society remains mixed and controversial. On the one hand, some associations try to promote measures to protect nature, human rights, or justice, but they are opposed by many organisations which are hostile to any change in the system resulting in losses of income or power, and that would therefore be unfavourable to them. These tensions or conflicts are exploited by pressure groups whose political agenda goes beyond environmental issues.
On the other hand, there are more and more consultation and negotiation mechanisms, but they do not produce social acceptability, because, for reasons of financial and political power, decisions almost always go the way of the project owners, which reinforces the feeling of mistrust towards politicians and policymakers.

Governance of marine space remains in a state of status quo, with no real progress. This space is subject to state and economic interests that hinder any action towards sustainable management. Especially due to the growing divide between North and South, the Mediterranean is subject to increasing geopolitical and diplomatic tensions (e.g. over the regulation of illegal migratory flows), which prevent the development of cross-cutting, inter-state policies for sustainable development and the definition of coordinated strategies able to tackle vital emergencies. **In the end, the Euro-Mediterranean partnership for sustainable development, which was reaffirmed ambitiously between 2020 and 2030, does not lead to** long-term co-development and is limited to economic cooperation. Nevertheless, the initiatives taken to strengthen protective measures, extend the law, implement sustainable development goals, and coordinate disaster responses, etc., are still too disparate to have a decisive impact and remain too little enforced for lack of an effective monitoring system.
Despite this, some cooperative projects become a reality, but these are mainly in strategic or crisis sectors, such as energy, agri-food or fisheries. For example, this is true of European Union imports of gas extracted from the Mediterranean to replace Russian gas since the war in Ukraine.

Countries adapt as they go along, in particular through pragmatic actions or regulations in response to emergencies, usually without addressing structural problems. Policies are increasingly determined by events and communication needs. Some controversial sectors are progressively deregulated (biotechnology, genetic manipulation, etc.).

Sectoral conflicts emerge due to decisions of short-term interest that take precedence over planning for future crises and disasters. For example, in order to develop tourism, golf courses and swimming pools continue to be built in regions affected by increasing water stress, and waterfront residences are built without taking into account the increase in coastal storms or ICZM (Integrated Coastal Zone Management).

Some measures undertaken do nevertheless improve the living conditions of Mediterranean populations, such as the greening of public spaces or the development of short supply chains in the food industry.

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LAND AND MARINE ENVIRONMENT

In 2050, carbon neutrality has not been achieved. However, mitigation policies are generally more advanced in the North than in the South, although medium-term economic profitability there still takes precedence over sustainability. State investment remains low due to limited room for manoeuvre in budgets, and large infrastructure or land redevelopment initiatives are mainly left up to private actors (due to a poorly regulated carbon market and tax relief measures that do not sufficiently take into account the environment).

Adaptation policies, in the South as well as in the North, are implemented in a reactive manner, prioritising areas of high vulnerability. Governments solicit action from individuals or associations, and prepare vulnerable populations for the culture of risk (floods, forest fires).

Local adaptation prevails over strategic structuring. The South develops gravity-fed and localised drip irrigation and crops that consume less water. Nevertheless, some countries gamble on technological solutions with true progress slow to materialise, leading to chronic food shortages.

As efforts to improve the sustainability of production or consumption systems can temporarily lead to a decline in competitiveness or living standards, and living conditions, environmental taxation and taxation of the carbon footprint are stabilising or even declining.
While southern Mediterranean countries are forced to fall back on this "forced" resilience to adapt to climate change, northern Mediterranean countries still focus on changing individual behaviour and developing a culture of risk. In some cases, this prevents catastrophic damage, for example in the prevention of mega-fires, but fails to address root causes.

Marine ecosystems are strongly affected by climate change, which leads to profound changes in functionality and productivity.
Biodiversity protection measures (such as Marine Protected Areas) are developed, but in the absence of effective monitoring of their implementation, **real ecosystem protection is not guaranteed. This focuses on emblematic species, such as turtles, red coral and Posidonia seagrass.**
Transplantation projects for Posidonia are financed by major Mediterranean shipping companies through the establishment of an environmental offset mechanism.
"Alien species" that are not necessarily "invasive" (with a proven negative impact) continue to spread throughout the Mediterranean with accelerated changes to certain ecosystems and new production channels, such as the blue crab.

In the end, after initial backlash from public opinion unhappy that the Mediterranean Sea is changing, this uncontrollable evolution of ecosystems is gradually being accepted.

Land ecosystems are also undergoing increasing degradation due to climate change, and urban, coastal and metropolitan development. Droughts and heat waves disrupt food production and supply, and increase imports of basic necessities.

Some countries specialise in the production of agricultural raw materials because they still enjoy a favourable climate. High-tech companies that produce synthetic food (both meat and vegetables) profit from this and acquire dominant positions in crucial food security markets. Subsistence agriculture in the southern Mediterranean is in decline, contributing to the rural exodus, metropolitanisation and the rise in numbers of migrants between the South and the North.

To meet the challenges of food sovereignty, available resources of land, water and species are further stretched, especially by the expansion of intensive agriculture and unsustainable livestock farming systems. Water crises and conflicts of use related to this resource are on the rise. The technological solutions proposed often remain controversial (e.g. water storage ponds for use in the summer or desalination).

4. Assessment

This is a disunited Mediterranean, plagued by social and territorial inequalities, that must face major climate turmoil. The various actors and stakeholders (governments, industries, businesses, etc.) pass the buck.
This lasting status quo leads the Mediterranean towards a trajectory of degradation on many levels. With the exception of young people, this failure to bear responsibility for climate change and biodiversity is shared by most Mediterranean social categories. This is the true explanation for this downward slide of the Mediterranean system.

While the Mediterranean Basin is still habitable for a large part of the Mediterranean population in 2050 and a few symbolic or cosmetic actions can still be taken, its climate and environmental trajectory will considerably modify and disrupt the socio-ecological and living conditions of populations in the second half of the 21st century. Is this trend irreversible after 2050? The survival of this great region depends on the ability to respond collectively in time. However, this dark scenario may be necessary over two or three decades to spur the impetus for radical change in all vital areas of the Mediterranean region.

SCENARIO

2

COLLIDING CRISES AND FORCED ADAPTATIONS

1. Abstract

During the three decades following the year 2020, the Mediterranean has progressively plunged into a spiral of multiple crises that are racing beyond most forecasts, particularly with repeated crises and climate events. Their causes are both internal and external to the region.
Mediterranean countries as a whole, although particularly vulnerable, have not taken the necessary actions to prevent risks that have been known for a long time. The inadequacy of prevention and adaptation policies is generating new crises that radically change all the characteristics of the region. In a context of chronic instability, there is a deep disintegration of the Mediterranean's political institutions, economic and environmental collapse, an increase in inequalities in access to resources, as well as the multiplication of violence and food riots with a heavy human cost. Fractures are becoming established or deepening at all levels: between the shores of the Mediterranean, within the states of the region, as well as between the populations of the Mediterranean Basin.

However, the early 2040s will see the gradual arrival of a turning point that marks a break with traditional lifestyles and consumption patterns. To survive, Mediterranean countries are forced to embrace various adaptation strategies. In some countries, there are authoritarian modes of governance centred on security policies and resource rationing, while others promote energy sobriety and frugal consumption patterns.
In some areas, communities organise themselves locally to compensate for the lack of public action and meet their own needs. Food and water security are becoming the absolute priority all around the Mediterranean. They require a profound paradigm shift, which is the only viable solution for escaping the chaos and chronic dependence on international aid, when it is still available.

2. Dynamics and actors

INITIAL CONDITIONS FOR THE SCENARIO

The prerequisite for this scenario is that the worst contextual hypotheses are confirmed or even exceeded, at both the international and Mediterranean levels.
The Mediterranean system is unstable, with major environmental risks (droughts, heatwaves, floods, tsunamis, earthquakes, erosion/landslides, etc.), the overexploitation of resources and an explosive geopolitical, economic, demographic and financial situation. What's more, there are significant social inequalities, and vulnerability linked to food and energy dependency, as well as tourism. All forecasts are exceeded, leading to open-ended crises and potentially wars.

A second condition is the inertia of regional governance, and the inability of the main political actors to implement the profound changes necessary for sustainable development, which could have led to the emergence of systems for preventing crises and their impacts.

ACTORS AND ASSOCIATED STAKEHOLDERS

Governments are failing to provide basic public services (employment assistance, education, security, public health, transportation, energy). The governance of the region, as we knew it in the early 2020s, is collapsing, and giving way to isolated authoritarian regimes and self-managing local communities.

External actors are losing interest in the Mediterranean. It is no longer attractive and is considered too unstable to envisage large investments in technology, research and training. A few specific actors, especially the Big Five tech giants, maintain activities in the Mediterranean thanks to the anarchic privatisation of essential resources.

The political landscape is becoming more radical, with a significant rise in populist and nationalist parties. Opposition is violent. Political life is fractured, with inter-generational and inter-cultural divides. There are hunger riots and increasingly violent demonstrations as poverty increases.

International institutions are becoming much weaker and exist now only on paper. There is no longer any real international cooperation in the region. Only a few humanitarian programmes continue to support the Mediterranean. Some international foundations and diaspora funds artificially support the economy, but in an unstable climate.

Faced with the collapse of institutions, political life is organised at community level. A new social dynamic emerges, leaving more room for civil society or for groups organised autonomously. Their role shifts from a minor to a more major role.

DIFFERENT PHASES

Three phases shape this scenario:

- **2020-2030: Series of crises.**
  The Mediterranean is subject to a series of disasters, starting with a succession of droughts and heat waves and increasing instability in the international economic and geopolitical context. This situation leads to serious internal crises in the region, in the ecological, economic, social and political spheres, forming a system.
  These crises diversify and increase in frequency, including extreme natural events, economic and financial crises, food and resource crises, pandemics, mass migration, fuel shortages and intermittent access to electricity, governance crises, and armed conflicts between countries and within countries.
  During this period, northern countries obsessively try to regain their pre-crisis levels of performance, particularly economic performance and "comfort", while also increasing their number of disaster management systems. On the other hand, SEMCs strive to catch up with the level of economic development of northern countries, whose model is fundamentally based on unsustainable economic development.
  Both sides exhaust themselves trying yet failing to plug the gaps and handle emergencies. By failing to recognise that the dominant system is dysfunctional and unsustainable in the long term, these approaches only accelerate the recurrence of new crises during this first phase.
- **2030-2040: Exhaustion, general breakdown and chaos.**
  The entire system is running out of steam, with a marked divide between the northern and southern Mediterranean, and within individual countries.
  The system has reached the end of its tether and can no longer absorb shortages (food, energy, water, etc.) and disasters (natural and health disasters, armed conflicts) in the region, after removing strategic infrastructure (telecommunications, transport, energy and water generation and supply infrastructure) and stopping public services in most places. This general chaos causes a high mortality rate, which deeply marks the trajectory of the Mediterranean region.
- **2040-2050: Emergence of local resilience and sobriety, by necessity.**
  A paradigm shift is forced upon Mediterranean people through pain and urgency, as they adapt to the situation in order to ensure their survival and gradual exit from chaos. Political alternatives are put in place to compensate for the collapse of the most fragile states that are unable to provide basic public services.
  Depending on the country or community, this adaptation is achieved either by authoritarian regimes or by self-organised local societies, with differing levels of democracy. The search for resilience in the face of these crises becomes a necessity. This involves the search for autonomy, particularly for water, food and energy, or the domination of communities that have access to these resources. **The Mediterranean is dislocated, but reinvents ways of adapting to these brutal changes.**

3. Scenario description

EXTERNAL CONTEXT

Since the 2020s, the world has been confronted with a succession of crises in the financial and economic, health, ecological, social and political spheres. International regulations have proved ineffective or powerless in these circumstances.

These repeated crises are caused by the acceleration of structural imbalances and maldevelopment, and also by the speed of climate change. Overall, globalisation is running out of steam and is beginning to show more negative than positive results. For a long time, this globalisation was presented as "fortunate" as it took over from national developments, such as the "Trente Glorieuses" in France, the emergence of the Four Asian Dragons, or the expansion of China. However, this evolution ultimately generates more losing countries than winning countries, and contributes to the growth of inequalities and, above all, to the inability of countries to safeguard common goods such as the climate or biodiversity.

The international context is therefore marked by strong economic instability and by a recurrence of crises caused by excessive debt levels in certain countries, inflation, rising interest rates, payment defaults, unemployment, and by adjustment programmes in the face of these economic realities. Moreover, the financial and property bubbles have burst. This situation has a strong impact on the Mediterranean region, which is particularly vulnerable to external factors, due to its dependence on food and energy imports and tourism. The Mediterranean suffers all the more because its capacity to adapt is weakened by several factors: the vulnerability of its ecosystems, the overexploitation of its natural resources, the more intense effects of climate change compared to other global regions, the high debt levels of most Mediterranean states, and the permanence of strong social and geopolitical tensions, particularly in the eastern half of the region.

Global efforts for climate change mitigation have not achieved the goals of the Paris Agreement. As they continue to push global economic competition ever further, states are doing nothing to curb globalisation and its deleterious effects on the environment. The global temperature rise curve follows the worst-case scenarios. **At the same time, concerns raised since the early 2020s about the possible interaction between exceeding several tipping points become a reality**. With global warming expected to exceed two degrees Celsius by the mid-2030s, the ice caps of the Antarctic, Greenland and Barents Sea melt much faster than predicted, drastically increasing sea level rise and putting pressure on coastlines around the world. The average temperature in the Mediterranean region is set to rise by 2.8°C by 2050. The trends of sea warming and acidification are on the rise, and the risks of water stress are intensifying and reaching most Mediterranean countries. In particular, there is an increase in the number of extreme events such as droughts, floods, heatwaves and mega-fires affecting the region. Mediterranean countries lack the resources, means, stability and, above all, coordination to implement effective preventive measures to deal with these repeated crises.

All over the world, states and certain groups that can ensure their own security and survival are retreating behind "fortresses". New borders are emerging, in the form of protected enclaves and gated residential areas. This context of increasing fragmentation is accompanied by the rise of more authoritarian regimes in the North, and a reduction in the role and influence of traditional political actors, such as parties, trade unions and associations. This fragmentation contributes to an increase in local tensions, conflicts and collapses that are gradually becoming systemic and increasingly international. Cooperation struggles to respond collectively to regional issues affecting all countries, such as freshwater management, water quality, or the restoration of land and marine biodiversity. International organisations limit their activities in the Mediterranean to humanitarian aid in order to address the most urgent needs.
This situation accentuates the dependence of the most vulnerable populations on imports of basic necessities (drinking water, foodstuffs, medicines). This growing insecurity increases tensions between vulnerable social groups and wealthy elites who hijack most international aid for their own benefit.

Box 18.
MAJOR UNCERTAINTY FOR 2050: CROSSING CLIMATE TIPPING POINTS

Scenario 2 is distinguished from the other scenarios by a much higher rise in temperatures, due especially to several climate tipping points being crossed.

A tipping point is a critical threshold which, when crossed, leads to major irreversible changes that qualitatively alter the state or evolution of a system. Potential tipping points for the climate system were identified as early as the early 2000s. However, at the time, they were considered fairly probable beyond a 4 degree rise in temperatures, i.e. not before 2100. Today's IPCC estimates have lowered this threshold for several of these tipping points to 1.5 or 2 degrees, making them possible before 2050.

The most frequently cited tipping points are the disintegration of the ice cap in the western Atlantic part of Antarctica, the disintegration of the Greenland ice sheet, the reversal of the Atlantic Meridional Overturning Circulation (AMOC) causing the Gulf Stream to cool, the decline of the Amazon rainforest and the transformation of boreal forests, the death of coral reefs, the melting of permafrost in cold regions (Siberia, etc.) leading to the massive release of methane hydrates, and the displacement of monsoons in West Africa and India.
The cascading effects of all these disruptions could considerably amplify their impacts. This concept of a climate tipping point has recently been extended to include socio-political disruptions - such as the removal of fossil fuel subsidies or the collapse of fossil fuel assets.

GEOPOLITICS AND GOVERNANCE OF THE MEDITERRANEAN

This economically fragmented and chaotic Mediterranean is just as fractured geopolitically. The systems of governance and internal politics in the region are disintegrating at several levels.

First, the international community is gradually losing interest in the Mediterranean due to the decline of its strategic value and its growing instability. Only large digital or mining companies, especially from America and Asia, are taking advantage of this instability, or even chaos in certain regions, to exploit easily accessible resources or take control of vital infrastructure (ports, airports, telecommunications networks, etc.).

At the regional level, various long-standing tensions are evolving into armed conflicts under increased pressure from the state of crisis facing the environmental, financial and political systems. In the East, open conflicts are breaking out over the sharing of water resources.
Continued aridification of the land, rising temperatures and decreasing rainfall mean that water is becoming the most precious resource, and sharing it leads to the outbreak of armed conflicts. Countries that control areas upstream of the region's major rivers try to extract as much profit as possible, leaving just a tiny share of the resource for countries downstream.

Diplomatic solutions have failed, meaning that the only solution left to threatened countries is to go to war with their neighbours. In the South, the arms race and geopolitical rivalries have led to local border skirmishes, which were small-scale but have resulted in a definitive breakdown between neighbouring states.

Finally, in the Balkans, a deterioration of ecological conditions is further accentuating the divide between rural and urban areas. This often follows ethnic divides, with the ghosts of civil war reawakening and violence breaking out within countries.

The European Union is unable to find coordinated peacekeeping solutions between its Member States, and halts its neighbourhood policy with its immediate neighbours. Several northern EU countries have made their continued membership contingent on ceasing to provide aid to southern and eastern countries and on the strict closure of borders.
This turning point, during the early 2040s, reveals the North-South Mediterranean divide, which has been latent since the late 1990s. This geopolitical divide between the two shores of the Mediterranean is causing enormous tensions within the EU, with some countries calling for a move towards greater security and autonomy, and others seeking to maintain a minimal flow of migration in order to avoid the accelerated ageing of European populations. Ultimately, the EU splits into two groups because neither diplomacy, political willingness, nor economic benefits can effectively curb the centrifugal forces at work. Added to this are the many secessionist movements within Member States, which are accelerating the disintegration of institutions.

In the South and East, profound political differences between countries and disparities in wealth make it impossible to build a common regional project, even if it is only an institutional façade. As a result, cooperation between countries or communities remains limited to a few bilateral programmes, particularly in cross-border regions, and it relies on the many diasporas.
The maritime space is also militarised, with armed groups and disputes over borders and the control of marine and

coastal infrastructure that frequently degenerate into territorial conflicts.
At the national level, the widespread retreat into sub-regional identities leads to a chaotic breakdown of the Mediterranean political system (mafia takeovers, secession of provinces, local power grabs by populist and nationalist groups). As the central states weaken, there is a "Springtime of the Mediterranean peoples" - a wave of nationalist independence. All across the Mediterranean, in the North, South and East, nationalist movements break out, people take up arms and win their independence. In the North, this independence is won with less violence than in the South and East, but they plunge the EU into a new crisis thus accelerating its collapse. In the South and East, independence leads to lasting conflicts between the new states and those to which they had previously been attached.

Many states are no longer able to provide reliable public services, abandon any desire to protect the environment, and no longer comply with most international conventions. They are refocusing on disaster management. Some of them become institutional fronts behind which new political actors operate (militias, nationalist parties or radical religious parties). Corruption is widespread, and further undermines governments' ability to take action. Others take an ultra-protectionist isolationist stance, strengthening border controls and attracting capital and people who are looking for security first and foremost. The most vulnerable areas and those hardest hit by crises are abandoned.
Unstable political movements take advantage of this climate of uncertainty and instability to declare improbable independence. In some areas, professional military and private militias attempt to hijack strategic infrastructure and resources for their own benefit, leading to recurrent escalations of violence between different groups.

Difficulties in the supply of energy, water, food and basic materials lead to increased precariousness for populations, who depend on external aid regardless of the source: predatory states; lobbies; mafias; financial, industrial, agri-food or IT oligopolies, etc.
In many countries, this situation of social precariousness and chronic instability leads populations to question the legitimacy of the public authorities, which are considered incapable of meeting their basic needs and providing essential services. Political violence takes hold.

Generally speaking, in the North, the state manages to maintain its integrity and continues to perform its governing functions of law and order, preserving a fragile yet still present rule of law. On the other hand, in the South, the relative lack of state resources and safety nets compared to northern states makes them much more vulnerable to systemic crises on this scale. Administrations collapse, and the most fragile states break down.
On the other hand, since local solidarity networks are denser and stronger in the South, societies in the region are better able to absorb the shock, and are much more resilient than in the North, where societies are much more

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fragmented and completely disorientated.
In this chaos, informal modes of self-organisation develop in response to the shocks caused by the succession of crises. Some communities stand out for their adaptability and resilience. Based on informal solidarity systems, local communities develop their food autonomy and low-tech nature-based solutions to resist the crisis.

DEMOGRAPHICS AND LAND-USE PLANNING

Demographic changes are of particular importance in this scenario, as they are both a source and a significant consequence of the crises that characterise it.

First, a source of crises: while long-term demographic trends continue to follow the trajectory of previous decades, with demographic and urban transitions continuing, by 2050 almost all Mediterranean countries will be facing sustainability problems linked to these changes, with extremely contrasting situations depending on the region.

For the first time, the North is experiencing (net of migration) an overall decline in its population of almost 10 % (18 million fewer inhabitants), and in some countries even more, with a rate of ageing that will reach an average of over 30 % by 2050, and in some cases 40 %.

Conversely, in the South and East, countries will initially have to cope with a sharp population rise, with the number of inhabitants in the South rising from 200 million to almost 300 million, and in the East from 122 million to 160 million. By 2050, these two regions could account for almost 70% of the Mediterranean population, compared with just over 60% today.

Although the ageing trend now affects the whole region, the geographical age imbalance between young and old is still significant, with over 55 % of the elderly population concentrated in the North, and an even greater proportion of the young population living in the South and East. In a Mediterranean region that is already highly vulnerable and facing major physical constraints, the combination of these demographic changes and a context of intensifying external imbalances concerning the economy, climate and ecology increases the risk throughout this period of unmanageable tensions and unsustainable situations that could turn into crises. This is all the more true given two other trends: an urban transition which, with some exceptions, is coming to an end, with more than 80 % of Mediterranean people living in cities by 2050, and a concentration of populations along the coast, where, by this time, more than half the population could be concentrated, compared with around one third in 2020 (according to some statistical estimates).
With employment crises, housing crises, water or resource crises (including food crises), conflicts over land or coastlines, etc., all these demographic trends carry with them potential risks of multiple crises on a local and/or national scale over the next 30 years.

However, due to a deterioration of the economic and ecological situation, these demographic trends are significantly curtailed and may even be reversed by the end of the period.

The succession of crises, which have hit people hard, have three types of gradual impact:

- **A spectacular increase in mortality:** due to diminished access to healthcare, especially linked to budget cuts in public health systems, antibiotic resistance causing many deaths that were previously avoidable (more deaths recorded in 2050 due to antibiotic resistance than due to cancer), pandemics, armed conflicts, extreme natural events (fires, floods, droughts, “medicane” tropical storms), multiple sources of pollution, and famine;
- **Declining fertility**: by choice, or because of increasing biological incapacity due to pollution and the impact of crises on physical and mental health;
- **Migration chaos:** an explosion in flows of all origins, without cooperation between countries. The Mediterranean is facing isolationism in countries, but also the explosion of migration linked to climate change and violent conflict. The virtual disappearance of subsistence farming in the southern Mediterranean causes a mass rural exodus (more metropolisation) and migratory flows, firstly within countries, but also between the southern and northern shores. However, due to the instability of the Mediterranean region, most economic migrants and climate refugees try to reach Northern Europe. The Mediterranean thus becomes a temporary crossroads of migration rather than a chosen destination. When possible, the elites flee the region and head for new hubs (Canada, New Zealand, Australia and Northern Europe) in search of a stability that cannot be found in the Mediterranean. Mediterranean diasporas are scattered across several continents. Uncontrolled urbanisation and the breakdown of public services make the coast uninhabitable. The risks associated with climate change and pollution, as well as its unsuitability in a context of necessary subsistence farming, become a deterrent for life on the coast. By the end of the period, the consequences of rising sea levels also begin to emerge, for example in the Nile delta. In the North and in the Balkans, communities settle instead in the hinterland and inland. In the South, as a result of the aridification of the hinterland, populations find themselves squeezed into a narrow strip of habitable land. Population density explodes throughout the region, making living conditions and adaptation even more precarious.

ECONOMY AND DEVELOPMENT POLICY

The Mediterranean weighs less and less in the world economy, with dramatic local collapses. The crisis begins with disruptions to water supplies, which heavily impact other sectors (agriculture, fishing, tourism, etc.) with serious economic, social, geopolitical and environmental consequences. The second cause aggravating systemic crisis in the Mediterranean is the energy sector.
Due to disruptions in supply chains, fossil fuels and raw materials are becoming scarcer and more expensive. This has an indirect effect on the transition to alternative energies. Gradually, through a domino effect, all economic sectors (primary, secondary and tertiary) are affected by this energy crisis.
Whole parts of the economic system collapse as it is built on permanent, cheap and virtually unlimited access to energy, and on globalisation.

Mediterranean countries that produce fossil fuels, especially gas, and countries close to energy autonomy (considering all energy sources), are more resilient to crises, which leads to new power relationships. Those with sufficiently stable allies outside the region receive conditional and interested support to keep certain strategic sectors of their economies afloat (water, food, energy, etc.), thus creating new dependencies and fragilities.

In 2020-2030, in an attempt to overcome the various crises, Mediterranean states fall deeper into debt, according to their respective capacities and up to a certain limit. It becomes increasingly difficult for states to meet their repayment deadlines. The financial markets get scared and increase their interest rates, creating a vicious cycle: the debt burden is rapidly becoming unsustainable.

The collapse of the public finances in several states leads to the collapse of a number of financial markets. Stranded assets held by banks, in particular investments in activities that required permanent and cheap access to energy, water or imported materials, are taken over at low prices by speculators or political actors interested in increasing their sphere of influence. In the North, the European Central Bank (ECB) does all it can to save the European banking system, but is failing. Institutional investors, pension and insurance funds, along with sovereign wealth funds and banks, are the first to attempt to speculate on a rebound of the Euro. But without the support of a credible renewal of the European project, and under pressure from inflation, these measures are actually leading to a loss of confidence in the Euro, which is seriously depreciated in relation to other strong currencies considered more reliable.

This phenomenon is becoming one of the causes of the dislocation of the European Union, which has already been weakened by internal divisions. This is leading to a severe destabilisation of the global banking system. Like some northern Mediterranean countries, several southern countries declare themselves bankrupt, especially those without energy autonomy. Foreign investment in the region becomes scarce, with credit conditions that are more like usury. But the economic disorganisation is such that no serious, respected and lasting regulations can be implemented.

In the agricultural sector, a significant proportion of large-scale farms have been abandoned. The increase in extreme events, the high cost of energy and inputs (seeds, fertilisers, pesticides), which are mostly imported, and the drying up or inoperability of water tables, due particularly to salinisation, are the main causes behind the bankruptcy of these large agricultural enterprises.
The western Mediterranean no longer serves as Europe's breadbasket and vegetable producer, and agricultural exports to other Mediterranean countries are declining. At the same time, as a result of land aridification, agriculture is collapsing in the South. The region is the world's largest importer of wheat, and is becoming dependent on mass imports of essential foodstuffs. Some countries, where global warming is making previously frozen land available for growing crops, are taking advantage of this to increase their influence in the region. These imports lead to a disruption (speculation, instability) in the prices of basic foodstuffs, aggravated by the increase in transport prices at the global level. Hunger riots are breaking out in various Mediterranean countries. Frequent and large-scale stock-outs lead to revolts, looting, and even political destabilisation. In these conditions, low-tech and agro-ecological solutions are proving their resilience, and are being mass-developed in local communities in search of food autonomy.

The exploitation of living marine resources continues without enhanced cooperation and governance efforts to try to achieve sustainability. Regulatory structures such as the ICES (International Council for the Exploration of the Sea), the Barcelona Convention and even the competent bodies of the United Nations such as UNEP or FAO are gradually marginalised. In the absence of effective regulation, control and sanction systems, non-Mediterranean actors are taking advantage of weakening local competitors to capture the majority of resources. A decline in fishing productivity reinforces the justification of the development of coastal or lagoon aquaculture, with the primary objective of reducing the risks of protein dependency and food crises.

The main mining companies start or intensify extraction and refining activities in the region for metals that are essential to many industries (lithium, cobalt, copper), with very little consideration of the environmental, social and health impacts.
The increase in the price of almost all materials and the disintegration of the international market have made these mining activities in the Mediterranean profitable. However, these activities have limitations related to the size and dispersed location of deposits, the lack of infrastructure, the lack of training of specialised personnel, and the need to secure the entire processing chain up to the end products.

Once an emblematic pillar of the Mediterranean economy, tourism has declined following successive crises, including the consequences of accelerated global warming and increased insecurity. The last sector to resist relatively well is the cruise industry. Only the wealthiest social categories continue to enjoy nature tourism in a few "parks" or protected enclaves. Mass tourism infrastructure is deteriorating and falling into disuse. Some generally isolated facilities, such as old hotel complexes or disused airport buildings, are taken over more or less legally by self-managed communities.

2040-2050 witnesses the emergence of a survival economy, spread across the entire Mediterranean region, which creates new economic opportunities.
For example, the Mediterranean landscape is strongly impacted by an accumulation of waste and mismanagement over several decades.
In the face of the energy and financial crisis, the waste management chain is chaotic, especially for electronics waste and abandoned vehicles. The number of open dumps is increasing, including on the coast where populations are concentrated, with an increase in microplastic pollution and toxic products penetrating the soil and flowing into rivers and then the sea.

However, micro-scale recycling and reuse activities are established on a decentralised basis. In parallel, short supply chains and circular micro-economies based on swaps, solidarity networks and new local currencies are set up, like a parallel economy based on the black market. These alternative markets, initially positioned as a complement to the large dominant markets, gradually become more widespread as very agile and adaptable solutions, which are therefore ultimately sustainable in this critical and unstable context.

Some large financial, industrial or agribusiness groups, and even some states, take advantage of this climate of instability and corruption-prone governance to gain access to certain resources considered strategic, such as arable land, water and energy resources, etc.
A few groups claiming to be revolutionaries take over entire territories, which can be captured and kept under control more easily thanks to easy access to the large arms market. Weapons are circulating on a large scale, because they are of interest to all actors, from states to the black market. The justification is always for the legitimate defence of territory, resources and short-term security in a global context of violence and threats of multiple kinds.

This economic chaos is leading to a paradigm shift for most economic actors. The quest for economic growth was formerly the driving force behind decision-making, but is being replaced by the search for survival and thus maximum resilience, whether through strategies of self-reliance, mutual aid or domination.

While fossil fuels are still used in the absence of other alternatives, they will become rarer and more expensive, and therefore less used from the 2030s. This trend towards economic slowdown, even if it takes little account of the negative impacts on the environment, nevertheless contributes to a certain reduction in the carbon footprint of human activities.
The global scarcity of all resources is leading to even greater shortages in the South and East, which had already experienced these phenomena. In the North, societies are adopting more frugal lifestyles, with sobriety imposed more out of necessity than choice.

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SCIENCE AND TECHNOLOGY

The region is increasingly lagging behind in technology, digital advances and research, due to a massive reduction in both foreign and domestic investment, poor access to electricity and difficulties in sourcing critical materials. These materials (such as rare-earth elements) are essential for many technologies, but become almost inaccessible in this context of multiple crises.
States no longer have the means to conduct public research. In this context, a few large players, often from overseas, monopolise technical, financial and information resources, without helping to reduce the crises facing the region.

Transportation-related infrastructure is gradually becoming less well maintained. The Northeast shipping route between Asia and Europe has become a reliable waterway for most of the year for three reasons: first, global warming, which leaves a large part of the Arctic Ocean as open water most of the year; and second, the status of international railroad given to this route, which is under permanent high international surveillance. This Arctic route will reduce freight costs and delays by 30-40%, while the traditional supply route to Europe via Malacca, Bab-el-Mandeb, Suez and Gibraltar will lose much of its competitiveness.

In addition, there is a sharp decline in maritime transport due to de-globalisation. However, the Mediterranean Sea still remains a possible alternative in the event of geopolitical tensions, or even a blockage, on the Arctic route. Internet cables, pipelines and land and underwater electricity cables in the Mediterranean are the subject of strong diplomatic tensions, following maintenance defects and malicious acts that lead to connectivity cuts. There are clear consequences in many sectors, such as energy, health, food security or monitoring and warning systems for natural disasters. Sectors that are highly dependent on connectivity are relocating, adapting to regular power and Internet outages with new tools, or setting up small-scale alternative energy sources (e.g. methanizers, private solar panels, mini hydroelectric power plants).

Technological sobriety is therefore the best and often the only option, in this context determined by urgency and infrastructure failure. The Mediterranean region is therefore characterised by low carbon emissions.
Throughout the region, there is an abundance of simple and artisanal technologies, alongside more sophisticated risk reduction systems used by the wealthiest social groups (automatic remote fault detection, network optimisation via artificial intelligence, etc.).

SOCIETY AND GOVERNANCE

Mediterranean lifestyles are gradually transformed. The aim is to deal with the most pressing problems in an attempt to recover from the consequences of chronic crises. This change in mindset is accompanied by a growing and widespread awareness of risks, but with little attention paid to prevention, and cooperation between

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communities and the management of common goods, such as the Mediterranean Sea.

States and local authorities refocus their efforts on disaster management and introducing increasingly stringent security or rationing measures.
However, these public bodies are increasingly overwhelmed by the growing number of crises and extreme events. Their inability to provide security is exposing them to increasing criticism, as their legitimacy is called into question and even leads to revolts and the overthrow of power.

Mediterranean people must therefore adapt in order to survive, but these forced adaptations come at a heavy social cost and a decline in human rights. In the North, and particularly in European Union countries, social insurance and regional solidarity systems initially manage to absorb the shock of crises, but repetition gradually leads to budgetary capacities drying up and assistance mechanisms becoming paralysed.
Private economic insurance systems, where they exist, refuse to insure against climate risks. More and more, in both the North and South, this has to be taken over by what remains of family, non-profits or local solidarity. The situation is therefore testing the resilience of local societies, communities and residents to shocks, which, paradoxically, are stronger in southern than in northern countries.

The vast majority of local populations are left to their own devices to adapt to the permanent state of emergency, or conversely are subjected to radical measures implemented by authoritarian powers in "fortress" areas.
The region witnesses the rise of authoritarian, xenophobic and nationalist regimes that are both a cause and a consequence of mass and disorganised migratory flows. Despite some vehement opposition from civil society, the populist authorities in power take unilateral measures to stem the flow of migrants by all means, with increased surveillance, militarisation of borders, creation of numerous internment camps and violent expulsions. Gender-based inequalities are exacerbated and sexist and sexual violence increases.

This situation is a breeding ground for the rise of sectarian groups. Social bonds are breaking down, and identity-driven categorisation is becoming an additional criterion for division.
Religious affiliation is instrumentalised, either by advocating forced secularism in order to exclude certain specific groups, or conversely as a conditional criterion for belonging to society. For example, a person's religion or ethnic group is shown on their identity papers in certain regions and becomes a pass to access certain areas and resources. As a result, there is increasingly accepted and normalised systemic discrimination, and even an upsurge in racist crime. Sporadic and violent revolts are used to express opposition, and protest movements become more radical. But divergent voices are either unheard in the face of constant crises and accumulating disasters, or they are stifled by responses that are hardening and becoming militarised.
The culture of demonstrations and protests is entering a cycle of retaliation and vengeance that is getting worse. Some energy-intensive sectors and those dependent on globalised trade disappear suddenly, leading to unemployment rates that exceed all projections.

Initially, young people, especially those living in countries with the greatest difficulty in meeting their energy demand, are the first victims of these repeated crises, which widen the geographical and generational gaps. In the 2030s, while employment statistics still exist in the Mediterranean Basin, 150 million young people find themselves unemployed, most with qualifications unsuited to this context of chronic crisis. This "no future" generation is economically and civically isolated, and self-organises with sometimes violent protests.
Human trafficking networks are growing as a means of cheap labour for unscrupulous economic actors. Employment and working conditions are deteriorating everywhere, especially for people who are vulnerable and/or in a state of insecurity. In the North, legal frameworks for employment protection unravel gradually, making the lives of populations more precarious.

The rise in migration, the impoverishment of certain neighbourhoods and climatic conditions favourable to certain vectors of disease reinforce the spread of epidemics such as dengue fever, yellow fever and cholera. Antibiotic resistance also contributes to the emergence of new diseases and makes populations vulnerable to pre-known diseases. It impacts the biological capacity of inhabitants to survive epidemics that decimate certain neighbourhoods and cities, leaving them isolated, or conversely, provoke new mass exoduses that spread diseases.
This situation does not just impact individuals' physical health. The mental health of Mediterranean populations deteriorates as they go through crises. In the mid-2030s, the backlash from intensified crises is felt when the suicide rate in the region rises, contrary to past trends.

The rise of populism hinders weak efforts at cultural exchange. The Mediterranean cultural sector bears the brunt of the crisis and struggles to find the financial and human resources required for recovery. Many traditions once central to Mediterranean identity are lost, such as Mediterranean music and art, in the face of the break-up of diasporas. This consequent cultural loss contributes to the uprooting of Mediterranean societies and confirms a widespread feeling of total loss of bearings.

Towards the late 2040s, this catastrophic scenario sees the emergence of new self-managed and more egalitarian community lifestyles, in search of food autonomy, low-tech and nature-based solutions, ancestral know-how and solidarity systems. In the face of the despair and panic generated by the crises, some places implement decentralised management, start to apply resilience policies and invent new, more local and collective decision-making methods.
Mutual aid systems are needed to counteract growing social insecurity and to try to strengthen social bonds. Energy shortages lead to the development of mechanical modes of transport (bicycles, animals used for transport), with a neutral carbon footprint. There is a sudden awareness of the preciousness of water, with the implementation of efficient water recovery systems on an individual scale (rainwater and wastewater recovery filtration systems).

Market gardening, handicrafts and recycling gradually grow, accompanied by new forms of local and subsistence farming (permaculture). Forced adaptation once again opens the way to the traditional Mediterranean diet, which is more plant-based, and completely abandons ultra-processed products, along with a massive reduction in meat consumption (end of intensive livestock farming) and fish consumption (reserved exclusively for subsistence fishing).
In organised communities, Mediterraneans find meaning in their work and a role in society, which are essential components for mental health that many Mediterraneans, especially in the North, have been seeking in vain for years. These new social dynamics that emerged in the late 2040s, are nevertheless far from the norm in a context that remains deeply marked by colliding crises.

LAND AND MARINE ENVIRONMENT

As a logical consequence of the economic and political deterioration, and global warming, the Mediterranean environment continues to decline.

Water stress, combined with poor water management, is the starting point for a succession of crises in this scenario. After several years of severe droughts, more and more water tables are drying up or becoming saline. The water from these tables is becoming unfit for consumption and agricultural use. Dams are struggling to fill up at the start of the season, with adverse effects on irrigated agriculture, which used to ensure food security and a proportion of exports in several Mediterranean countries. Reduced flows are also drastically reducing the yields of hydroelectric plants. Soils are depleted and become more vulnerable to aridity.
The energy shortage prevents continuous operation of water pumps and desalination plants, making some locations that depend on this infrastructure for their water supply uninhabitable. All Mediterranean countries are affected, although at varying levels, causing widespread water shortages and food insecurity. The situation also impacts the health of people and all ecosystems, along with the economic sectors dependent on water supply. This lack of water therefore generates numerous conflicts, limits human development and leads to certain tipping points being reached, such as for soil and systems rich in biodiversity, like forests.

As with most public services, environmental policing activities are under-equipped and under-valued, which gives free rein to pollution and other environmental degradation caused by human activities. This is accompanied by a collapse in investments in, and the maintenance of, waste treatment and purification systems, which further increases the impacts linked to “new” risks. All these degradations affect environments that are often already weakened, which leads to the local collapse of ecosystem functions, and even the extinction of certain species. Some places affected by extreme climate events (fires, floods, erosion) are deserted. Due to a lack of resources and willingness to rebuild, nature takes over. In some places, nature is re-colonising urban wastelands and derelict neighbourhoods.

Marine ecosystems are undergoing a profound structural transformation due to brutal changes related to climate change, acidification, pollution (such as plastics), and the continued artificialisation of the maritime space. The endemic crisis also leads to the overexploitation of local marine resources that are still available. The Mediterranean monk seal (Monachus monachus) and bamboo coral (Isidella elongata) are considered as two species now extinct in the Mediterranean Basin.
Heat waves at sea are increasing and intensifying every year, causing the death of large underwater meadows of the endemic seagrass Posidonia oceanica, the vermetid reefs, and the coralligenous that are home to high levels of marine biodiversity. Endemic species are increasingly competing with invasive tropical species, with large numbers migrating to the Mediterranean due to sea warming.

On land, all ecosystems and biodiversity are undergoing considerable upheaval as a result of both the scale of climate change and the over-exploitation of natural resources, including in protected areas. Forests, too, are heavily impacted by the recurrence of major fires and the extreme intensity of global warming (see Box 19). Soil quality has deteriorated sharply as a result of chronic droughts and the persistent impact of pesticide use. This leads to a crisis in agricultural production. To absorb the mass rural exodus caused by the agricultural crises, cities, especially in the southern Mediterranean, are building new emergency housing, thereby accentuating land artificialisation. In summer, heatwaves and air pollution make the urban environment difficult to live in, with significant negative effects on human health.

Overall, the Mediterranean of 2050 will have suffered a significant loss of biodiversity, and ecosystem processes will have been profoundly altered, resulting in a lower trophic level. Despite this overall depletion of biodiversity and the reduction of biomass, new ecosystems are emerging with species replacements and new forms of exploitation of marine and land environments.
Faced with the risk of massive collapse, any remaining national and international research facilities are developing emergency measures to save what can still be saved, by creating species conservatories.

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Box 19.

THE INCREASE IN LARGE FIRES AND THE NEED FOR A PARADIGM SHIFT

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The combination of land-use change linked to rural abandonment and urban sprawl, and climate change, is responsible for an increase in the risk of forest fires in most countries around the Mediterranean.
An overall pattern of more severe fires is accompanied by the emergence of extreme fires associated with weather conditions that are themselves extreme, combining intense drought, heatwaves and sometimes strong winds. These extreme conditions have been hitting countries around the Mediterranean one after the other (Greece, Turkey and Algeria in 2021, France and Spain in 2022), often setting records for burnt areas.

Prevention and control strategies in this transitional context need to be reconsidered in order to both manage forest fires in "ordinary" weather conditions, and to strengthen the resilience of organisations and territories when these conditions reach exceptional levels. In this context, prevention measures based on the spatial management of fuel in the face of strong natural vegetation dynamics need to be preserved and enhanced. They involve forest management and equipment that has proved effective in making forest areas less vulnerable and easier to protect. However, this long-standing strategy is reaching its limits with the increased risk from forest fires.

The emergence of extreme wildfires is forcing a paradigm shift, starting with strict prevention of wildfire outbreaks in very severe conditions. In these conditions, the warning and detection phase, to prevent and control outbreaks, is crucial to avoiding the danger of out-of-control, destructive fires. However, if the fire spreads, the paradigm shift also involves shifting the strategy towards protecting what's at stake (people in the forest, habitat-forest interface, transport and energy networks, etc.), which will only be effective if regional preparedness has first been considerably improved to mitigate the impact of such disasters.

This new situation particularly calls for prevention measures to be extended well beyond the usual perimeter of forest areas alone (including rural areas in prevention plans, adapting urban planning regulations and transport and energy network defence plans against major incidents, etc.), and for the organisation of fire-fighting measures to be rethought by reinforcing their crisis management components (e.g. management of evacuated people, impact on the flow of goods, smoke-related health problems).

4. Assessment

In the 2020s, the Mediterranean must be prepared to deal with the major uncertainty linked to an increase in potentially catastrophic crises. This assumption only reinforces the urgent need for profound changes in lifestyles and systems of governance, in order to move towards sustainable development.

This scenario proposes such changes, but they are totally involuntary. It is based on the assumption that the Mediterranean region is unable to prevent crises of all kinds, which occur and feed into one other at a speed that defies all predictions.
The Mediterranean is in a situation of general breakdown and forced adaptations. The human, social, cultural, economic and environmental cost of this succession of crises is particularly high. **While certain aspects of this scenario show a Mediterranean in 2050 that is collapsing, it also offers an opportunity to test the resilience and crisis response capacities of the various territories**.
This forced sobriety and adaptation reveal spaces on the fringes where new relationships can be built between the Mediterranean people and their environment.
This scenario can be read in opposition to a resolutely proactive scenario in which the actors anticipate, i.e. reduce vulnerabilities, prevent risks, and build systems capable of absorbing certain shocks and responding effectively, including by strengthening international cooperation.
Clearly, an anticipated transition towards voluntary sobriety and greater resilience could be implemented at a much lower human, economic and environmental cost than this scenario, which has forced sobriety in the North and increased shortages in the South.
This scenario may also raise questions about the collective capacity of regional stakeholders to initiate a transition in the absence of the impetus provided by the crises.

SCENARIO

3

GROWTH AT ALL COSTS IN A FRAGMENTED MEDITERRANEAN

1. Abstract

2050 - Climate and environmental signals have not been heeded. All states faced with the spectre of unemployment, recession, social explosion and excessive debt have been engaged in a frantic race to conquer new markets over the past several decades. With the exception of large financial institutions, international bodies have become ineffective, if not totally discredited.

Economic growth remains the only leitmotiv in this multipolar and disconnected world, where nationalist tensions are exacerbated. This is particularly the case in southern countries, which are still in a phase of accelerated development, demographic growth and catching up with the economies of the North. The priority everywhere is employment, meeting consumer needs and economic power, at the expense of the environment. Markets are the main driver of both partnership and competition between states, which fragments the Mediterranean as it is pulled by centrifugal forces. Each country seeks first and foremost to safeguard its own interests by forging partnerships of various sizes as opportunities arise. In this race to preserve societal balance, which is threatened by economic and social breakdown, environmental protection is still not or is no longer a priority, unless it has a direct economic benefit. The environment, global problems and, consequently, protection of the sea and coastline are secondary to national concerns.

2. Dynamics and actors

INITIAL CONDITIONS FOR THE SCENARIO

Act 1 - The end of solidarity: a lack of international cooperation and coordination has led to the loss of credibility of international governance institutions in the spheres of collective security, the fight against poverty, and the environment. The failure of climate negotiations and unfulfilled promises to finance climate change adaptation in the poorest countries have reinforced the policy of "every man for himself", to the detriment of the environment. As a result of this lack of solidarity from rich countries, which are the main polluters and debtholders, many African and Asian countries decide to catch up by any means available to them... the continental split is now complete.

Act 2 - Pariahs' revenge: the African continent experiences strong demographic growth (population doubled by 2050), which is driving global growth and offering opportunities to the Mediterranean, particularly through mass investments from countries in the BRICS+ coalition, which has been consolidated since the 2020s. The rise in power for BRICS+ has come at the expense of the European Union, which is disengaging from the Mediterranean and reducing Mediterranean cooperation targets to a minimum while it deals with its own regional integration problems and a rise in nationalism.
The isolationism of the United States, returning to a policy of protectionism, also helps create space, leaving room for other emerging powers in the Mediterranean (BRICS+, which are interested in establishing themselves economically in the Mediterranean). Generally speaking, there is a retreat from the model supported by the major democracies. Strong growth policies in the southern and eastern Mediterranean help improve employment and development conditions, and in the North helps recover economic sovereignty and reduce debt. What's more, thanks to investments in the health and education sectors in southern and eastern countries, fertility rates begin to fall, strengthening the development conditions of these countries.

Act 3 - Interested alliances: due to the lack of leadership with a common political vision and will from states converging towards solidarity and cooperation between Mediterranean countries, there has been no catalyst for coherent regional construction with long-term funding that could have launched this momentum. Faced with internal social problems, economic policies are devoted to growth at any cost to ensure a bare minimum of social peace.
It is true that development has enabled southern countries to catch up by the end of the period in terms of public and private water supply, purification and waste treatment services, but this is too late and insufficient to reverse the effects of this choice.
This trend is to the detriment of the health of ecosystems, with over-exploitation of resources and predation on the environment. As a result, there are massive and irreversible disruptions to the functions and productivity of ecosystems, and an increase in the number of environmental disasters, making the Mediterranean a fragile region that is particularly vulnerable to crises and extreme events.

ACTORS AND ASSOCIATED STAKEHOLDERS

In this scenario, stakeholders are impacted by a strong willingness from Mediterranean states to do everything in their power to create wealth by any means. In the southern and eastern Mediterranean, they facilitate policies of rentier exploitation and large infrastructure projects with state-to-state partnerships based on national interests, offering advantageous tax conditions, especially to large corporations.

States on the northern shore of the Mediterranean are also forging advantageous partnerships based on the development of their key economic sectors and their efforts to reindustrialise or adapt to globalisation.
In the South, growth at any cost is driven by BRICS+, which are playing a driving role by forming alliances at the Mediterranean level and by promoting very strong integration with Africa.

Large multinational firms (e.g. petrochemical, energy, pharmaceutical, digital and technology industries) also play a dominant role by making their investments contingent on public policies very favourable to them, particularly in terms of environmental and social regulations. At the supranational level, the role of international bodies is undermined by the rise of nationalism and bilateralism, which results in a major problem of governance, causing resolutions and other decisions at the international level to lack effectiveness.
The European Union is also affected by this trend. Its internal cohesion is cracking and it is losing momentum on the international scene, with little political ambition at the Mediterranean level. Other stakeholders, such as civil society and NGOs, act in a dispersed manner without real cohesion. Their actions are limited when faced with authoritarian and/or nationalist powers. Social revolts and movements are violently repressed. Despite an improvement in living conditions, there are still strong inequalities between and within countries. In some areas, the local authorities fill in the social gaps when state public policies are not sufficiently proactive and redistributive.

DIFFERENT PHASES

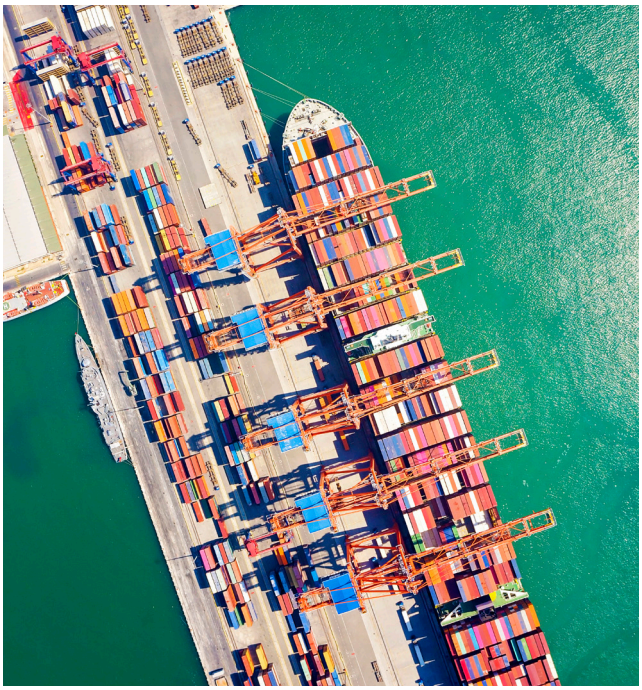
An initial phase with a shift from the status quo (business-as-usual scenario) until the early 2030s when dynamics accelerate. States experience high pressures on their populations or economic lobbies, and are unable to agree on the measures to adopt in order to counter the rise in global warming, and the funding needed for southern countries, some of which are burdened with debt, to adapt their economies towards an ecological transition. Competition for access to resources is accelerating. Climate migration explodes across all continents. Migration policies become stricter, and in Europe, under

the pressure of rising populism, highly conservative and xenophobic governments come to power in half of EU countries. These governments are divided on the policies to adopt, and tensions within and between European countries prevent the cogs of EU policy from turning. The Mediterranean neighbourhood policy suffers the consequences and is reduced to a trickle.

At the same time, on the other side of the Atlantic, the United States suffers from the same climate constraints, with a mass influx of illegal migrants, and opts for very strict quota policies. Despite its considerable capacity for action and soft power, the United States returns to protectionist policies and focuses its actions on the Pacific (Indo-Pacific zone) in the face of an omnipotent China and other Asian countries (Japan, South Korea, India, etc.) that are very economically competitive.
Moreover, the United States begins its ecological transition and no longer focuses its foreign policy as much on securing its sources of supply of black gold and gas in the Mediterranean and the Persian Gulf. Thanks to the technologies they have been able to acquire, they are also banking on deep-sea mining and offshore extraction to achieve energy independence. They lose interest in the Mediterranean and gradually abandon their “protégés” in the Gulf States. This new world order fuels rivalries intrinsic to the Mediterranean.

At the Mediterranean level, internal dynamics are underpinned by the political desire of states to integrate into globalisation and to try to remove obstacles in order to overcome economic difficulties and avoid being marginalised from the global economy.
Faced with structural problems in the Mediterranean, with uncompetitive economies, countries seek growth by any means in response to the current priority, which is the social emergency and employment. Growth is achieved by implementing national strategies, which differ between the North and the South. Nevertheless, one common feature of this search for growth across the Mediterranean is that it is initially at the expense of the environment, even if it is expected that strong growth will eventually provide room for manoeuvre to finance future environmental expenditure.

In the second phase, the United States is no longer the world’s only economic and political power. The dollar is facing competition from other currency systems, especially cryptocurrencies and “Bretton Woods III”, based on gold and commodities, launched by Russia, China and countries in the Eurasian Economic Union to stabilise their currencies.
All emerging countries and commodity-exporting countries have opted for this new Sino-Russian monetary system, which has led to a depreciation of the purchasing power of fiat moneys and high inflation in the dollar and euro zones. BRICS+ are now a major political and economic player, with many African, Latin American and Asian states joining them, especially from the Middle East. The divided countries of Europe are failing in their attempt to form an autonomous economic and monetary block



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and to regain economic sovereignty, especially through reindustrialisation.
In a dispersed manner, Mediterranean states, especially in the South and East, jump on the bandwagon formed by a coalition of states that have little regard for the political regimes in place, and that are leading them towards growth. Isolated economies emerge throughout the Mediterranean. However, some investments prove to be unprofitable and do not have all the desired long-term effects.

In the third phase, from the 2040s, this development model, based on a vision of short-term economic optimisation to the detriment of environmental protection, shows its limitations, despite socio-economic progress.
Environmental degradation, the erosion of biodiversity and an increase in environmental disasters put a stop to this race for growth. The Mediterranean is then plunged into a cycle of economic recession and multiple crises with devastating effects on the living conditions of Mediterranean people and on ecosystems.

3. Scenario description

EXTERNAL CONTEXT

In a context of nationalist isolationism and poorly regulated liberal globalisation, the global powers are engaged in an exacerbated economic war to ensure their sovereignty in the face of rival powers. However, in order to mitigate the recurrence of crises or to secure their economies while preserving their social, political and cultural specificities, some states join forces to form partnerships on the basis of both economic and geopolitical opportunities,

such as BRICS+. The world is therefore now organised around multiple zones of influence (China, United States, etc.) and competing poles. In this context, **the Mediterranean is pulled between centrifugal forces that push the various sub-regions of the Mediterranean area further apart, and prevail over efforts for intra-regional integration.** This process leads to the fragmentation of the Mediterranean region, which is split between several areas, some extended beyond the Mediterranean (Turkish-speaking world, Sunni Middle East, Balkans, Northern and Southern Europe, etc.), which impose specific development policies and establish tailor-made cooperation (energy, education and training, digital technology).

With reshaped alliances, based largely on economic interests, the Silk Roads play an important role, with a horizontal axis of cooperation running from China to North Africa, via Central Asia and the Middle East.
Economic lobbies exert strong pressure, which, coupled with the inefficiency of international regulatory mechanisms, indirectly calls into question international conventions and ecological standards. Environmental priorities are increasingly abandoned and masked by greenwashing, except when they generate economic profit. In the search for economic growth, many countries continue to use fossil fuels, such as gas, especially in the South, in a context marked by geopolitical tensions and the need for energy sovereignty. Moreover, in the total absence of international coordination, stabilising CO2 stock by the end of the century is out of reach. As a result, the world is heading towards warming of over 2°C by 2050. The Mediterranean is warming faster than other regions in the world, set to reach +2.5°C by 2050.

GEOPOLITICS AND GOVERNANCE OF THE MEDITERRANEAN

The Mediterranean becomes the stage of a permanent game of strategic and circumstantial alliances, especially characterised by the intervention of new emerging powers (China, India, Saudi Arabia, Iran, Qatar, South Africa, etc.). These relations are essentially based on logics of power and economic domination, resulting in chronic and structural instability at the regional level, and fragmentation of the Mediterranean.
Relations between Mediterranean states are based on cooperation of various forms and sizes, underpinned by occasionally fierce competition between these countries to attract foreign capital and establish trade agreements with emerging powers, the majority of which have joined the BRICS+ coalition.
Threatened with the major risk of economic and demographic decline, the European Union is under fire due to internal nationalist tensions, demands led by separatist identity movements, a rise in extremist movements that are spreading their ideas and gaining power in some key EU countries, and a growing rejection of ecological constraints. It is no longer able to find a stable compromise and is facing an unprecedented political crisis.
Threatened by the risk of implosion and forced to operate at multiple speeds to plug the gaps and hold its structure together, it fails in its attempt to chart a new course of economic development (based on the Green Deal) and to become an autonomous global power. However, in the Mediterranean, it continues its neighbourhood policies as far as possible, essentially centred on bilateral economic cooperation.

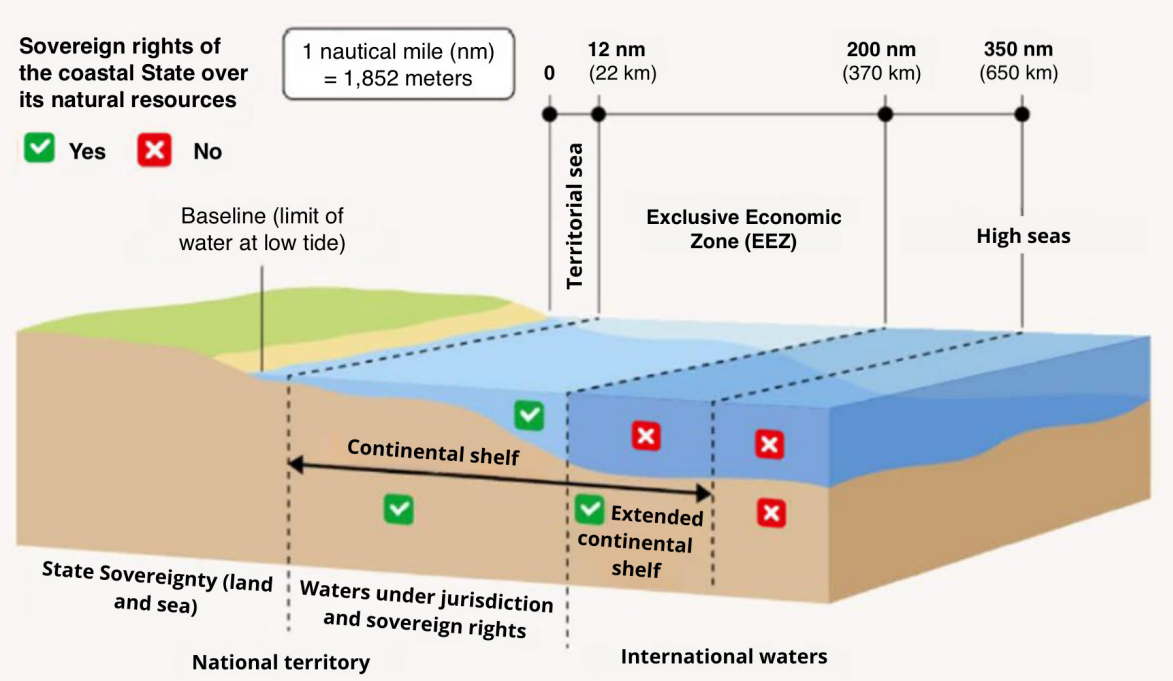
The post-Ukraine war geopolitical context has opened a Pandora's box of territorial claims and has led to the breakdown of collective security mechanisms. Regional and global power struggles intensify in the Mediterranean, leading to tensions and conflicts related to unresolved territorial disputes.
Existing cooperation mechanisms in the Mediterranean, such as the Barcelona Convention, are called into question. There is no clear mechanism for protecting and preserving biodiversity beyond territorial waters, especially as there are no stable EEZs in the Mediterranean (see Box 20). Efforts by international organisations are ineffective, as in the case of EcAp[49], which is no longer enforced, resulting in major losses of biodiversity and resources, aggravated by climate change.

[50] EcAp: The Ecosystem Approach (EcAp) is a strategy for the sustainable and integrated management of resources (living resources, soil, water, etc.) implemented by UNEP/MAP to achieve good ecological status for the Mediterranean Sea.

Box 20.

EXCLUSIVE ECONOMIC ZONES (EEZS) IN THE MEDITERRANEAN

The oceans are a major geopolitical issue. Access to fish resources, hydrocarbons and minerals (polymetallic nodules), and the right to travel, has become a particularly pressing issue with globalisation.
Their use by nations is governed by the United Nations Convention on the Law of the Sea (UNCLOS), adopted in 1982 in Montego Bay. It establishes a zoning system, defining the Exclusive Economic Zone (EEZ), which is key as it gives the coastal State the right to exploit resources up to 200 miles from the coast.



Source: L'Atlas de l'eau et des océans, Enjeux géopolitiques, Le Monde/La Vie, hors-série n°22, 2017.

In the Mediterranean, as there is no point more than 200 miles from the coast, the entire basin should be allocated to the coastal states on the basis of international law. The Mediterranean Sea is entirely covered by national continental shelves, so there is no need for coastal states to claim their EEZ, as the zone automatically belongs to them. However, due to difficulties in bilateral relations, in many cases there are disagreements over the boundaries of these continental shelves, and often the agreed boundaries are contested by third countries (e.g. in the eastern Mediterranean). The situation is different for the water column because EEZs only exist if coastal states declare them. In the Mediterranean, coastal states have refrained from declaring EEZs, given their proximity to neighbouring states and the complexity of establishing boundaries.

Since the late 20th century, Mediterranean coastal states have tended to declare extended jurisdiction beyond territorial waters through undefined EEZs or to declare fishing or marine environment zones. Beyond these declarations is the sensitive subject of offshore oil and gas exploration and production, as well as potential deep-sea mining. Due to the absence of agreed boundaries, there are several "grey areas". However, this does not prevent States from implementing their policies and agreeing on provisional joint management measures. As a result of these various negotiations, the proportion of high seas in the Mediterranean has fallen from almost 70% to around 30% over the last 30 years.

Given this situation, governance of the Mediterranean is excessively complex, and cooperation between states is paramount in order to establish a good governance process.

DEMOGRAPHICS AND REGIONAL PLANNING

By 2050, the Mediterranean population will reach around 689 million inhabitants, i.e. an increase of 32% compared to 2020. However, demographic trends are contrasted depending on the Mediterranean sub-regions, with very significant increases in the South (+57 %) and East (+41 %), and relative stagnation in the North (+2 %).
Under the pressure of nationalism, migratory flows are strictly controlled and limited to functional economic or demographic needs, thanks in particular to the introduction of quotas for labour mobility in most northern Mediterranean countries.
However, strong growth policies in the South and East make it possible to contain the need for migration, thanks to job creation and the need to avoid a brain drain. Nevertheless, there is a mass increase in illegal migration, as a consequence of global warming, which is increasingly felt on the African continent and on the southern and eastern shores of the Mediterranean, along with the resurgence of localised territorial conflicts.

Cities absorbing these flows of migrant populations from overseas and a mass rural exodus in a fragmented Mediterranean Basin have been transformed into commodified city-states, over a large part of their territories. These city-states are subject to neo-liberal or rentier logics of property speculation and transit, and are controlled by powerful private financial networks.
In these global and uniform cities, where a small proportion of the population captures all the income, an increase in inequalities is expressed geographically in a segregation between the city centre, the inner suburbs and the outer suburbs. Cities in the southern Mediterranean are no exception, with an acceleration of the urban transition and rates of urbanisation and metropolisation rates comparable to the North. The largest cities are experiencing considerable growth, with populations of up to 50 million residents.

Like cities, the coastline is now almost totally artificial, with some protected enclaves reserved for an elite. It faces strong pressure on land use, with the chaotic pursuit of growth in activities and infrastructure, especially around large tourist, industrial, energy and property projects, such as the construction of marinas or cruise ports, secondary residences, tourist real estate, hotels, amusement parks, and offshore wind farms, etc.
Faced with lobbies linked to the commodification of land use planning and the prevalence of mafia-type organisations, planning regulations to preserve the sustainability of the coastline are simply not enforced. The coastline is retreating significantly, especially because the Barcelona Convention ICZM Protocol and the rules at its core are not implemented.

High environmental risks, especially related to climate change, are managed through technology and mass private investment in large and costly infrastructure (e.g. sea walls, desalination plants) in regions that have the capacity to do so. Territories in countries that have not been able to adapt to this rise in water levels are simply abandoned, with the inhabitants of these areas swelling the population of large cities and climate migration flows.

ECONOMY AND DEVELOPMENT POLICY

The economy naturally plays a central role in this scenario. This is primarily due to the international context in which the global economic system has not initiated any major paradigm shift and still considers economic growth and wealth accumulation as the ultimate goal to be pursued. Despite recurring crises, this necessity remains unavoidable at the global level, especially in developing countries after the failures of climate negotiations and unfulfilled promises to finance adaptation to the effects of climate change in the poorest countries.

Giving continued priority to the economy is justified above all by the need to meet immediate development and job creation needs, particularly in southern and eastern Mediterranean countries, within a context of strong demographic growth and the arrival of many young people on the labour market.
It is also a matter of tackling the risks of economic marginalisation and loss of competitiveness of the Mediterranean economy, including in the North, and regaining economic sovereignty for various States, which had been lost in previous decades.
In the absence of an alternative model to the market economy, economic growth at any cost, based on the

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immediate maximisation of gains and opportunities in all directions, is prevailing in the Mediterranean. Driven by major economic players (states, multinationals, private companies, large private and public banks, etc.), it is reflected at the territorial level by the spread of poorly regulated, often informal activities, with the development of self-employment, the increase in contract firm jobs and parallel markets.
At the same time, everything is done to attract international capital, even if this means lowering taxes and opening up the possibility for external firms to exploit local resources. The Silk Roads, China's monumental project for the 2020s, has paved the way for the conquest of new markets in Africa and the Middle East, and boosted competition between economic powers to seize resources.

The economy in the various Mediterranean regions is still mainly based on rentier capitalism, through tourism, real estate, oil and mineral resources (phosphate, etc.), some speciality agriculture, and on the development of traditional activities (maritime transport, artisan work, etc.). However, each country is jointly developing proactive and specific strategies for diversification and targeted protection of its economy, paying attention to all new market opportunities, including in the digital and energy sectors, specialising depending on the comparative advantages (labour costs, resources, geography and climate, infrastructure, diasporas, quality of life, etc.).
Development is centred on rentier exports, infrastructure construction and the development of niches in the new technologies sector (solar, hydrogen, digital platforms, etc.). These are mainly isolated economies with strong territorial inequalities.

Refocusing on comparative advantages also affects the agricultural sector, with the development of export agriculture and confidence in the global market to meet food needs.

The industrial sector, especially high-tech (chemicals, pharmaceuticals, aeronautics, arms), remains essential to the economic development of northern Mediterranean countries. However, this sector has undergone significant restructuring - some of which has helped to rebalance industrial growth between North and South.
Some very workforce-intensive sectors of the manufacturing industry, which have become unprofitable and less productive on the northern shore, are abandoned or relocated, such as the construction of cars with internal combustion engines, which is transferred to the southern Mediterranean en masse, after the EU prohibits their sale in 2035.
Furthermore, in both the North and South, due to a lack of leeway in finance and cooperation, strategies for reindustrialisation and investment in new sectors such as digital technologies or some energy sources are only partially meeting their targets.

Mediterranean countries are in fierce competition for economic partnerships, which leads to strong instability and sometimes conflicts over resources, including water, which has become a scarce resource. Countries and large cities with strong economic potential and relative stability, particularly in the SEMCs, attract capital and benefit from growth. Their wealthy middle classes fuel the development of new forms of consumption, and therefore new activities that increase the ecological footprint of these societies/countries.
Other territories are marginalised and sink into poverty. Plunged into an economic slump, they suffer from severe food crises affecting the most vulnerable fringes of society. Revolts break out, fuelling extremist movements and causing strong repercussions on internal political stability, sometimes even leading to civil war. These abandoned countries or regions depend on humanitarian aid to meet the basic needs of their populations (food, healthcare, drinking water, etc.).

Without market regulation from states, and due to the lack of cooperation to establish common indicators of sustainability and waste reduction, goods and commodities are not produced in environmentally-friendly ways and continue to produce a lot of waste which feeds a recycling market that generates economic profit. In some countries, there is a revival of the mining industry (hydrocarbons, rare-earth elements, etc.).
There is widespread development of offshore wind projects, desalination activities and deep-sea mining and gas production in EU countries and the northern shores of the Mediterranean, but this is more disparate in southern countries, with some large investments in the renewable energy sectors.

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Hydrocarbons still account for 70 % of the energy mix, despite an energy transition initiated in the North with an increase in the share of renewable energies and nuclear power. Primary energy needs are increasing, with the proportion doubling on the southern shore in the space of 30 years.
The renewable energy sector (solar, wind, etc.) grows to reach 17% of total energy demand by 2050. Building on restructuring linked to the war in Ukraine, southern and eastern countries pursue oil and gas exploration, with significant carbon lock-in by hydrocarbon producers.

Some countries whose economies are linked to fossil fuels sit on both sides of the fence. They export hydrocarbons to African countries where demand has risen sharply, and solar energy to countries in the North that have made progress in decarbonising their economies.
Green financing opportunities have significantly expanded, but their accessibility depends on the profitability of projects, the attractiveness of countries or regions, and the environmental issues at stake.
Large, profitable projects are favoured. Consequently, there are strong geographical disparities depending on the stability of countries, geopolitics, and their guarantee and insurance systems.

The development of a sustainable blue economy remains generally uneven and slow, due to the lack of cooperation and coordination on major collective issues such as the decarbonisation of the economy, including maritime transport. It is limited to activities likely to generate immediate economic gains (exploitation of marine resources, maritime transport, some segments of the tourist industry, etc.).

In a context of widespread competition between Mediterranean countries, port networks compete in the race for international transshipment traffic. China, with its policy of influence in support of the economic development of the "Silk Roads", takes control of a growing number of strategic Mediterranean ports in order to enhance its production and services. These ports benefit from this climate of competitive investment between major powers.

Following a period of strong support for fishing activities in the 2020s and 2030s, they are in rapid decline and replaced by aquaculture. The rise of sea temperatures, pollution and overfishing, as a result of the deregulation of standards and monitoring systems, have undermined the efforts made since the 2010s for concerted management adapted to each type of fishing.
Due to a lack of coordination between states, some of which are permissive, and despite increasingly sophisticated monitoring systems, illegal, unreported and unregulated fishing reaches record levels (35 %). In the face of this lack of governance, incursions by fishermen into Marine Protected Areas become more common. These areas find it increasingly difficult to maintain healthy ecosystems.
Despite many constraints (increasing pressure on freshwater availability, various forms of pollution, conflicts of use in an already highly coveted coastal zone), aquaculture performs well (5 Mt vs. 3 Mt in 2021) and continues to develop, but in a more opportunistic than planned manner.
From 2030 onwards, the fisheries market is drastically transformed. This is due to the climate of insecurity in the aquatic products supply chain, and growing consumer mistrust linked to repeated scandals especially related to pollution and fish feed.

Seafood products are gradually replaced by "fake fish" reconstituted from various components and molecules derived from biotechnologies, with high added value, manufactured by the agri-food industry, which has found a promising new source of income in SeafoodTech.
After the collapse linked to the COVID crisis, all countries reinvest in tourism, first in the North, then progressively in the South, which invests major efforts to increase the safety of travel and trips.
After 2030-2035, with less favourable climate conditions and pollution likely to dissuade some tourists from certain Mediterranean destinations, operators and large private groups make mass investments in order to make some sites more attractive. They adapt their product offering towards leisure activities that incorporate various sophisticated activities and entertainment by creating new sites and cities designed to reproduce the glory years of Mediterranean history and civilisations[50].

This concept of "Famous MED Tour" spots involves cruise companies, which plan excursions to these sites during organised stopovers. Large hotel groups also diversify their product offering by adapting it to wealthier customers during the off season. They privatise unspoilt coastal enclaves and extend reclaimed land areas into the sea with the help of major infrastructure. New technologies are also developed to help preserve bathing areas for these high-end tourists, with high-precision sea-cleaning robots that capture plastic waste and invasive species such as toxic algae and jellyfish, whose numbers have increased exponentially. When there is a profit to be made in the tourism sector, some investments improve the quality of the land and marine environment, while some poorly adapted solutions are also put in place. For example, some fashionable beaches are equipped with air coolers fitted with solar sensors, creating a dome-shaped screen of invisible waves, protecting against UV rays and providing air conditioning.
Finally, in order to ensure the survival of the tourism sector, especially mass tourism, many countries finally bow to pressure from tourism lobbies and adapt school holiday periods in line with rising temperatures.

[51] Sites imitate Luxor at the time of Ramesses II; Athens under Pericles; Rome under Augustus; Pompeii before the eruption; Damascus at the time of the Umayyads; Rome, Florence and Venice during the Renaissance; Istanbul under the Ottoman sultans; etc. They also draw inspiration from Mediterranean ecosystems, traditional rural areas, and famous battlefields (Troy, Thermopylae, etc.).

SCIENCE AND TECHNOLOGY

Research and innovation are the main drivers of growth in the industry and technology sector, for the development of civil and military processes with a high economic potential that can be quickly used on the market.
Research and development in emerging technologies is leading to global advances in areas such as quantum computing, artificial intelligence and biotechnology. But given the delays in research and the lack of cooperation that characterises this scenario, individual countries do not have the capacity to invest in all these fields at once, and must choose their "niche" depending on their direct economic needs.
Caught up in global competition and often confronted with a drop in public spending on research and innovation in their countries, Mediterranean universities are increasingly required to develop partnerships with private and industrial players who are part of competitiveness clusters and specialised clusters.
These networks of universities and clusters focused on technosciences are built on economic partnerships and national specialisations. These collaborations are supported by national governments, which facilitate these agreements by developing protective customs policies and favourable tax measures. The creation of new startups, including in some cleantech sectors, multiplies with the support of stock market mechanisms to support innovation. Public investment in research, particularly in northern Mediterranean countries, is focused on local needs not covered by private research.

Digital technologies are the targets of fierce global competition, with the rise of China and India competing with the United States' monopoly in this field. These countries forge partnerships with Mediterranean universities that specialise in high-tech and digitalisation, and adaptation to local markets. But despite their power strategy, no country in the region has the capacity to impose its standards on these economic giants.
Surveillance capitalism hits its peak, with the commodification of personal data.
The digital economy develops to the detriment of freedoms in many Mediterranean countries, sometimes going as far as the implementation of massive population surveillance systems in some countries (widespread use of video surveillance, police equipped with miniature drones with facial recognition that patrol the streets, etc.). It also comes at the expense of security, with a sharp rise in cyberattacks and cybercrime.

Marine observation and surveillance systems, which have become very powerful, were first developed to gain knowledge of marine ecosystems (e.g. digital twins), but in the long term they have proven to be a double-edged sword. When used for commercial purposes, they add to pressure on species and ecosystems. The knowledge acquired enables intensive exploitation of the seabed, which benefits the mining and biotechnology industries, in the search for new molecules, especially for use in the pharmaceutical and cosmetics industries.

SOCIETIES

Growth has had the expected positive effects, particularly in terms of employment. Unemployment rates have fallen substantially, although there are disparities between countries in terms of economic performance and reforms undertaken, particularly in the education and training sector. There are also significant differences between regions within individual countries, due to redistribution policies and solidarity systems organised by national governments. These inequalities persist because states apply taxes that favour large companies and capital, in order to attract foreign investments. Few states initially implement proactive and ambitious policies for wealth redistribution. In countries where the state plays a minimal role in welfare, local authorities and/or charities take over to bridge the gaps of the social divide. Growth has also led to the development of a middle class in the southern and eastern Mediterranean, which promotes the consumption of goods and services, thus contributing to the development of domestic markets. As growth continues, informal employment gradually declines, which increases tax income and ensures a better balance between the exemption of capital from taxation and the financing of public services.

Benefiting from an upturn in the labour market, young people and women are the main beneficiaries of better access to employment, especially in cities. Public-private funded education and training means that education and training programmes gradually align with the needs of the labour market and employers. Young people from the South choose to migrate to the North to work in the personal services, health, tourism and new technologies sectors, but fewer of them make this choice than in previous decades, between 1990 and 2030. Despite improved employment opportunities, the younger generation chooses not to get involved in the social and political spheres, thus widening the generational gap. This withdrawal from public affairs is a form of resignation on a global scale by a "no future" generation, in the face of most states abandoning the fight against climate change and making unsustainable environmental choices. To escape the reality of a society they consider corrupt, these young people in need of hope create new communities by taking refuge in the virtual worlds of the metaverse.

The social status of women has undergone significant changes, particularly in the SEMCs, with increased access to employment (over 25 % employment rate for women) and changes in family structures. However, these developments are not without clashes with the dominant patriarchal model, which is still very prevalent in Mediterranean societies.
Their sectors of activity are still quite specific and traditional in the fields of care, where they play an essential role in ageing societies, education and public services. Nevertheless, there is definite progress in the science and technology sectors, entrepreneurship and trade.
Women's employment in the digital sector is growing in southern Mediterranean countries, thanks to investment

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in education and training, which are increasingly aligned with changes in the job market. In the North, as well as in the South and East, the gender pay gap remains significant in a large number of sectors. In general, after making progress in the 2020s and 2030s, the discourse on gender equality has stagnated as a result of blurred feminist messages, which have also been seized by nationalist and identity-based movements.

Growth at any cost has not eliminated social tensions caused by modernity in southern and eastern Mediterranean countries. The western model still causes tension, and sometimes rejection, with a socio-cultural split between westernised elites integrated into globalisation, the middle classes in an in-between situation with a kind of build-your-own identity, and the rest of the population, the majority of whom are attached to traditional values with a strong religious element that structures their way of life. In the North, individualistic and hedonistic values take precedence, accompanied by a decline in ecological values and a growing rejection of environmental regulations. Against a backdrop of rising populism and xenophobia, hostility to all forms of immigration increases, hampering cooperation and cultural exchanges between countries. These identity-based aspirations maintain cultural and religious divisions between Mediterranean countries.

Throughout the Mediterranean Basin, the traditional rural world is marginalised and dismantled, with a progressive abandonment of its social structures, culture and practices. Faced with climate change, water stress, soil degradation and the correlated food insecurity, there is a mass rural exodus in the southern and eastern Mediterranean.

GOVERNANCE

At the Mediterranean level, governance is marked by the deterioration of policy coordination within and between countries in a context of growing differences between regions and countries in each Mediterranean area. Paradoxically, there is an overall democratic decline throughout the Mediterranean, as employment and security are the main goals of societies, sometimes to the detriment of freedom. In Europe, populist and nationalist parties occasionally come to power. Environmentalist and anti-growth protests decline in the face of latent authoritarianism and the benefits of growth that maintain the myth of an affluent society. Some power is delegated to the private sector and experts who rely on economic assessment tools. As a result, in the eastern and southern Mediterranean, the democratic model is no longer a cure-all.

After recovering from the Arab Springs, which brought nothing but disillusionment and the collapse of public services, and without support from Europe, these countries engage in a race for excessive growth and turn to the Chinese rather than the European political model, based on submission to order and the deprivation of freedoms. Freedoms are therefore restricted and information is placed under guardianship. Misinformation on online media, which use artificial intelligence mechanisms to produce and disseminate information, makes them very unreliable. Under the pretext of fighting terrorism or plots against the state, some states develop highly sophisticated surveillance systems, a sort of “Mukhabarat in the digital age”, which monitor people even in the private sphere. Despite this tendency towards authoritarianism, civil society plays a controversial and heterogeneous role depending on the country, but manages to make itself heard. It does so especially through social media, but often in a confused manner, with a number of pressure groups whose objectives and representativeness are often unclear. These constant controversies weaken the credibility of their positions.

One of the consequences of the collapse of democratic debate is the difficulty in finding acceptable compromises on how to use the fruits of this growth. This includes the taxation of individuals and corporations, the allocation of budgets, the level of social redistribution and decentralisation, and the choice of priorities. In a weakened political context, opaque methods, interest and other groups, and supply rationales taken even greater precedence over transparency and fairly meeting social demands and emergencies.

LAND AND MARINE ENVIRONMENT

Although awareness of environmental problems and climate change has not disappeared in Europe, measures in these fields are no longer a priority, except when they represent an economic opportunity.
"End of the month" comes increasingly before "end of the world", and in the context of inflation and latent crisis, everyone now feels that the efforts required to make the necessary ecological transition come at too great a social and economic cost with no guaranteed effectiveness.
Europe's ambitious mitigation policies are sharply scaled back, especially as past results have been very disappointing. Due to a lack of sustained cooperation, neighbouring countries have not taken serious steps to reduce their respective GHG emissions. The pace of reduction is aligned with the investments that private actors are willing to make.

The European Union, also weakened by international competition and the rise of populism and nationalism, finds itself unable to truly steer environmental policies at the European and regional levels. This situation is combined with the pursuit of targets for economic growth strategies and very strong pressure from economic lobbies, which have resulted in some international conventions and ecological standards being overturned and environmental priorities being abandoned.

In the southern and eastern parts of the Mediterranean, the trade-off between growth and the environment (or the fight against climate change) is even more unfavourable to the environment. The argument is that the responsibility lies with the former developed countries and that there is not enough room for manoeuvre to engage significant efforts.
Only the economic consequences that climate change could cause, such as on farms (development of crops that are more resilient to environmental change, precision farming aided by digital technologies, GMOs), or major risks for certain populations or ecosystems are taken into account. To meet the needs of urban populations who demand better living conditions after this growth, local waste treatment and purification capacities increase significantly in southern countries at the end of the period, but their impact remains limited on this scale. There is no official backtracking on legislation or commitments, but neither is enforced.

Under these conditions, marine ecosystems and biodiversity undergo structural transformation due to mass disruption (habitat loss and degradation, pollution, litter and eutrophication), as a result of climate change and anthropogenic activities, such as cadastrialisation of the sea and intensive deep-sea mining, desalination, offshore energy production, and oil and gas exploration. The presence of non-indigenous species has increased significantly, while the presence of native species and other vulnerable species has declined (over 5,000 species). Most reserves are fully exploited or overexploited, and fish stocks are heavily impacted (90% of fish stocks are overexploited). Due to a lack of resources and sufficient interest, MPAs are not managed effectively and measures to preserve species are neither effective nor efficient.

As with the sea, the conservation of land biodiversity is not a priority compared to economic challenges, except in a few protected enclaves. Resources are intensively exploited to supply the market with consumer goods.
Forest areas are in sharp decline. Increased heat stress and droughts limit forest growth, weakening trees, increasing dieback and making them more vulnerable to pests and pathogens. Mega-fires, mainly linked to long periods of drought, are increasing throughout the region. Without regional cooperation and the resources to tackle them in some countries, they last for weeks, causing inestimable damage, sometimes threatening entire towns.

Despite major investments in desalination, water transfer infrastructure and the irrigation of agricultural land, water stress affects all Mediterranean countries. This scarce resource has become a crucial issue. It is a source of conflict, with water wars within states and between neighbouring states, particularly due to the multiplication of large dams, which also result in changes to sub-regional ecosystems.

From the 2040s, the consequences of the destruction of biodiversity, the artificialisation of land and landscapes and pressure on water resources will be drastic, leading to a drop in agricultural productivity, an increase in natural disasters (deforestation and landslides) and the emergence of zoonotic diseases.
In general, ecosystems become less diverse, less stable and increasingly vulnerable to environmental change, sometimes to the point of collapse. By 2050, the Mediterranean environment will have been severely degraded, having already undergone irreversible changes with detrimental effects on all Mediterranean countries, which will have to take urgent adaptation measures.

4. Assessment

This scenario may seem unrealistic in the current ecological context. However, the search for strong growth, even at any cost, remains a very important political priority, obviously in southern countries, but also in northern countries, which means that this scenario remains entirely plausible.

The plausibility of this scenario also rests on the perception of weak signals that may tip the balance of the current equilibrium over the next 30 years, particularly for international governance and the place of the European Union as it strives to meet the challenges of its internal cohesion. BRICS+ states can fill the gap in international governance, by providing more economic rather than political leadership, and above all, through relaxed capitalism that pays little attention to the environment or the climate, and that disregards the nature of the political regimes in place when entering into contracts. The success of these countries could also inspire and provide a "tailor-made" development model for some Mediterranean states.

However, this scenario has its limitations, as it is essentially based on the exploitation of resources and does not take into account the environment, except according to a short-term economic rationale, and also fails to consider the consequences of resource depletion and the carrying capacities of ecosystems. **In this scenario, the Mediterranean has not resolved the contradictions between economic development and the preservation of critical resources such as water and soil.** Following the path of growth at any cost proves to be a dead end. After a period of economic boom, the boomerang effects of environmental destruction are a reminder that the externalities of economic growth at any cost can prove to be severe and untenable in the long term.

SCENARIO

4

EURO-MEDITERRANEAN PARTNERSHIP FOR A BLUE-GREEN TRANSITION

1. Abstract

By 2050, the Euro-Mediterranean partnership will have significantly altered the regional landscape, helped achieve carbon neutrality in the majority of countries, and ensured that the region is well integrated into globalisation. Strong regional cooperation, leading to the establishment of a common economic market based on technological and digital innovations, will have been established between northern, southern and eastern Mediterranean countries. **The European Union will have extended its Green Deal model to southern and eastern Mediterranean countries, based on a concept of sustainable development that attempts to combine economy and ecology.** Having learned lessons from the failure of unilateral or bilateral responses to crises, whether health, political or environmental in nature, Mediterranean countries work to build a strong partnership across the Euro-Mediterranean region. The strategy to achieve this is the implementation of a blue-green transition at every level, based on technology and economic incentives.
This transition is driven by heavy investments in digital technologies, the blue economy, and the energy transition, after a slow increase in awareness and political and social unrest. It is based on techno-scientific progress in a market economy, but is not unanimously accepted and is not without perverse effects.

2. Dynamics and actors

The road to the concrete implementation of the new Euro-Mediterranean partnership involves slow progress, controversies and setbacks, before being recognised as a success by most people.
First, in the 2020s, the strategic decision of the EU to develop a common economic and technological market with the southern and eastern Mediterranean is not immediately accepted by all. In Europe, there is opposition demanding the Union to focus on its internal issues. Battles of ideas take place with every decision and step forward in this new partnership.
In southern and eastern Mediterranean countries, there are also concerns about the partnership, which has been proposed by countries in the North, with a fear that it will be unequal and only benefit the EU.
Finally, the billions of Euros needed to make the partnership a reality, scare politicians, who are mostly sceptical, and have no guarantee that their investments will pay off.

In addition, certain pressure groups, particularly those associated with intensive agriculture and fossil fuels, play a key role in opposing this partnership and delay political decision-making. However, Mediterranean societies desire collaboration and push for the partnership to happen and involve all layers of the population.

After several years of turbulence and the rise of nationalism in a number of states, the start of the 2030s sees the first major cooperation projects between northern, southern and eastern Mediterranean countries bear fruit and tensions eased. Those who defend the "Mediterranean New Deal" also iterate the argument of the ageing population in the North, which requires a long-term Mediterranean-wide strategy in order to maintain the productive dynamics of Mediterranean countries.

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INITIAL CONDITIONS FOR THE SCENARIO

This scenario is possible if the EU shows strong leadership to push for this new Euro-Mediterranean partnership. The EU also needs the support of several large countries to carry the vision of a transition based on digital and other technologies, and convince other countries to commit to it in order to relaunch the Mediterranean region as an essential geopolitical and economic player. The European Green Deal must prove itself in order to be presented as a model to be adopted and extended to southern and eastern Mediterranean countries. In a climate of increasing major environmental and climate change, the Mediterranean New Deal needs to include strong mitigation and adaptation policies, particularly in southern and eastern Mediterranean countries, in order to be coherent and offer concrete ways to help these countries implement these policies (including through massive financial transfers, public compensation for damage, etc.).

ACTORS AND ASSOCIATED STAKEHOLDERS

States play a strong role in this scenario, particularly within the Mediterranean Alliance. They are the ones who adopt the decisions proposed by the Alliance, and who are responsible for implementing them at national and local levels.
The EU is the real leader in this scenario. It leads the Euro-Mediterranean partnership, which it sees as an extension of the Green Deal model.

Transnational corporations dominating the technology and innovations market have a strong role and considerable power in this scenario. They are the ones who benefit from the digital and technological shift, offering the new tools and innovative solutions needed for the energy transition, or the implementation of increased digital-based environmental monitoring, for instance.

Civil society is strongly divided between representatives of civil society considered as integrated and legitimate on the one hand (those who sit in the Alliance), such as representatives of NGOs and recognised associations, and on the other, broader civil society not represented in the institutions, which expresses its disagreement with the digital and technological shift.
This civil society makes itself heard through demonstrations and protest marches. It organises its own conferences and meetings. Its leaders point to a rise in inequalities within Mediterranean countries, especially between those with access to new technologies and the related jobs, and others, people who are less qualified or living in less urbanised areas.

DIFFERENT PHASES

Between 2020 and 2030, people gradually become aware of the issues related to climate and environmental change. Large international conferences are still organised, followed by the launch of green and blue initiatives, but states do not launch any large-scale joint projects to change the model.
After several large-scale crises, non-state actors such as non-governmental organisations, activist groups and insurance companies, hit hard by repeated natural disasters and the destruction of infrastructure, sound the alarm to initiate large-scale changes. Governments take note and for both economic and social reasons, agree that things cannot continue this way. In the meantime, there is increased ad hoc cooperation on major projects.

In the 2030s, new and more ambitious policies are implemented. **After meeting several times to establish a new basis for cooperation, the strategy adopted by the EU and Mediterranean states is to invest heavily in digital and new technologies in order to start a transition to a more sustainable economic and social model.**
All sectors of the economy are affected, and must be redesigned and restructured with a view to better risk management and a stricter sustainability agenda. This requires, for example, the relocation of large infrastructure in coastal areas, which is extremely costly. Infighting takes place with actors who want to force the decarbonisation of the economy.

The transition is conceived on a Mediterranean scale, in collaboration with all the countries, but the northern states are still dominant and more advanced when it comes to sustainability. Many technologies that emit fewer greenhouse gases already exist in the North, and are therefore spreading more rapidly. Several years are needed for the transfers from the North to the southern and eastern parts of the region to take place.

As time goes by, these technologies are increasingly integrated into the economies of southern and eastern Mediterranean countries, and the partnership becomes more equal. The methods on which the partnership is based change: there is a shift from project planning to a more flexible sector-based mode of cooperation, like the smart economy, as investment efforts are supported through the use of economic instruments.

In the last decade (2040 -2050), efforts start to pay off. Technologies have been developed in the South and East, creating job opportunities, especially for young people, who migrate less from their home countries to the North. The housing and transportation sectors gradually cut their greenhouse gas emissions, with the help of green and blue technologies. However, the promises of global hyper-technologicalisation are held back because it remains very energy-intensive, requires lots of scarce resources, and heavy investments. It also produces technological waste that is difficult to treat and creates significant social inequalities.

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3. Scenario description

EXTERNAL CONTEXT

By 2050, global temperatures will have risen by 1.7 degrees, and by 2 degrees in the Mediterranean. With a few exceptions, carbon neutrality will be achieved or close to being achieved by 2050 in the Mediterranean. However, this is not without its problems. An initial phase of strong environmental degradation takes place (forest fires, floods, etc.). As a result, there is increasing social pressure calling for a Mediterranean-wide political awakening. Governments recognise this and organise an extraordinary Euro-Mediterranean forum. The idea of creating a Mediterranean common market emerges from this forum.

The European Union, which has been implementing a “Green New Deal” at its own scale since 2022, takes the lead in this organisation. The success of the Green Deal gives it a certain legitimacy as it has progressively achieved all its carbon neutrality goals while maintaining strong growth and a sustained level of innovation. The EU is a model of successful transition.

Within this new Euro-Mediterranean partnership, it highlights the economic opportunities that the transition offers for the entire region and the need to invest in and disseminate new digital technologies. Both state actors and economic actors are invited to the negotiating table for this partnership. Transnational corporations and non-government actors such as the Big Five tech giants play a leading role in the emerging "World 4.0".

In a context where the effectiveness and legitimacy of national and international institutional powers are being questioned, global governance is increasingly structured around coalitions of interests or projects that bring together NGOs, foundations, local authorities, community networks and the media, under the growing influence of digital multinationals.

At the same time, the transition to "World 4.0" is accelerating with the application of artificial intelligence, big data, robotisation, 3D technologies ("additive manufacturing"), the blockchain and the bioeconomy, etc.
At the global level, states are guided by the European Union and its Green Deal model. They meet several times, notably at COP (Conference of the Parties) meetings, to more clearly define the ecological limits that need to be complied with. More measures, regulatory standards, economic incentives and evaluation methods are being put in place through advanced technological tools, and legislation is being tightened.

The war in Ukraine has ended in the withdrawal of Russian forces, a diplomatic settlement and the prosecution of war criminals at international courts. The European Union remained united in the crisis and is playing a major role in the legal and diplomatic resolution of the conflict. International law and justice have emerged much stronger from this crisis, even though they had been challenged since the early 2000s by the rise of several authoritarian states. A geopolitical context that is more conducive to resolving conflicts through diplomacy is therefore taking shape.

GEOPOLITICS AND GOVERNANCE OF THE MEDITERRANEAN

This context, alongside the influence of European diplomacy, helps bring peace to several internal conflicts in the Mediterranean. This allows for stronger cooperation between the European Union and southern and eastern Mediterranean countries. This cooperation focuses on key aspects of environmental protection and sustainable development. The EU, which has strengthened its global political and economic power, plays a major leadership role in the negotiations.

The EU implements a new and ambitious strategy to help make the Mediterranean Basin a space for dialogue, trade and cooperation, guaranteeing peace, stability and prosperity. It aims to help southern and eastern Mediterranean countries more effectively as they face institutional and structural dysfunctions, by drawing inspiration from countries that have succeeded in their transition, in order to disseminate these successful examples.

The EU strategy has several stated objectives:

- 1) human development, good governance and the rule of law;
- 2) improving resilience, building prosperity and the digital transition;
- 3) peace and security;
- 4) open borders (including for migration) and mobility of people, knowledge and capital;
- 5) green and blue transition: climate resilience, new energies and the environment, etc.

The new Euro-Mediterranean partnership proposed by the EU is called the "Mediterranean New Deal". Since its launch, the signatory countries meet every year at "Med COP" meetings, in order to report on the progress of cooperation projects in the Mediterranean and define the priorities for the coming years. The partnership is a source of opposition and debate between and within countries. Some southern countries see it as a form of interference by the EU and northern countries, while some northern Mediterranean countries refuse to invest so much money in this policy.
However, after several years of controversy and slow progress, the partnership experiences success and allows the Mediterranean region to (re)position itself on a global scale as a major geopolitical player, acting as a bridge between Europe and Africa.
At the same time, some countries in the eastern and southern Mediterranean are taking full advantage of the partnership with the Union. Thanks to proactive economic policies aimed at developing competitive businesses in the field of transition, supported by substantial investment from the EU, they are succeeding in boosting their economies and establishing themselves in the global economy. After the Asian "dragons" and "tigers", there is now talk of the emergence of Mediterranean "eagles". New prosperity in the region supports peace-building.

Building on the foundations laid by previous governance bodies set up in the Euro-Mediterranean Basin, **the countries in the partnership decide to create a new governance body: the Mediterranean Alliance**. This Alliance is based on multi-scale and multi-stakeholder governance (especially of the sea) and comprises governmental and non-governmental bodies.

Not all Mediterranean states join this institution from the outset. Only a few countries are involved at the start, but this increases as projects are established and more and more successes are had, particularly for some states committed to the partnership very early on which have seen their economies grow thanks to trade with Europe, and the majority of Mediterranean states become signatories and participate in the Alliance.

The Mediterranean Alliance sometimes works at the slow pace of legal progress, but for maritime governance, chooses to reduce international waters, so that all economic activities fall under the jurisdiction of a coastal state that complies with IMO regulations. A common regional framework is developed to ensure effective environmental monitoring in the Mediterranean. State agencies or ad hoc international committees are in charge of this, relying on private operators who design highly sophisticated observation and monitoring tools. These private actors therefore have a central role and strong influence in this new system.

DEMOGRAPHICS AND LAND-USE PLANNING

When it comes to demographics, the gap slowly widens between northern and southern and eastern Mediterranean countries, following a business-as-usual curve. The population reaches 634 million in 2050. Compared to 2020, it has increased strongly in the South and East, and decreased slightly in the North. Overall, the Mediterranean population is ageing.

There is still strong legal migration between southern and eastern Mediterranean countries and Europe (which is mainly linked to socio-economic instability in these countries), but it is better managed, thanks to better cooperation with the EU. In the North, the legal arrival of foreign populations, particularly for economic or demographic reasons, is better perceived, and resettlement takes place under better conditions, particularly thanks to the regional cooperation agreement on migration signed in the early 2030s, at Med-COP 7. However, illegal migration persists. New surveillance methods, based on new technologies such as drones, are put in place to try to control it. Migration from Sub-Saharan Africa is still high and the subject of heated debate between southern and northern Mediterranean countries. The EU makes no provisions for this in the Euro-Mediterranean partnership.

The phenomenon of the “brain drain”, caused mainly by a lack of job opportunities for young graduates from southern and eastern countries, is gradually subsiding. Southern states decide to invest in relations with their diaspora, by creating a dedicated government body, based on the same model as India or China. On the other hand, the working conditions of graduates, particularly engineers, improve, along with their social status, which had previously been less highly regarded. Finally, better dialogue between the countries of origin and destination of job seekers, and the development of the private sector in the countries of origin, in particular through better social security cover for employees, ultimately convince many higher education graduates to return to their countries of origin to build a sustainable and flourishing economy.

An urban-rural balance is sought after, thanks to the intelligent location of new transition projects. Urban and rural areas work together on projects on an ad hoc basis, particularly in the fields of agriculture, risks and pollution. Some rural areas manage to be well-developed and are attractive. However, most of the deep countryside is still marginalised in the majority of Mediterranean countries as there is no comprehensive land-use planning policy. The most remote regions and territories do not benefit from the technological advances made in cities,

especially in the transport and mobility sector. The most remote territories remain excluded from communications infrastructure. Inequalities are therefore still present, particularly between the coast and the hinterland of countries.

In cities in the North, people become more involved in urban management and set up networks between urban centres known as "polycentres", which are designed to be resilient and connected. The transition driven at the national and international levels to achieve carbon neutrality by 2050 is also felt at the local level, as local authorities think of ways to manage towns and cities in a sustainable and cooperative way, involving residents. The most developed local authorities collaborate with central governments in a co-decision-making system that combines a vertical and horizontal approach. In the South and East, a number of experiments attempt to reproduce this model of governance. Networks of Mediterranean cities on the three shores of the Mediterranean are organised to share experience and best practice.

In urban areas in the North, priority is given to non-polluting mobility, in particular through the development of electric and then hydrogen-powered vehicles. In southern cities, governments invest in and support the development of public transport. Cities are designed to be resource-efficient thanks to the widespread use of the circular economy. Adaptation and mitigation solutions are largely based on technological progress and digitalisation (water management control using sensors, etc.).

Projects based on regional cooperation, such as PRIMA (Partnership for Research and Innovation in the Mediterranean Area), are better promoted and extended to urban planning and urban governance in order to produce concrete impacts in terms of jobs in cities and outlying areas.

Mediterranean coasts are still highly urbanised, but efforts are under way to make urbanisation compatible with new energy or blue economy projects (wind turbines, sustainable aquaculture, sustainable tourism, etc.). Marine areas close to the coast are developed to take into account the future risks of sea level rise (including using dykes). Activities requiring "built" developments (construction, docks, etc.) are regulated, except those requiring immediate proximity to the sea. Coastal planning policies are more interventionist, but conditional on targets for saving resources and reducing CO2 emissions. Human activities and land use are controlled thanks to more coherent and prescriptive regulations, aligning local constraints with the geography of activities and protection goals.

ECONOMY AND DEVELOPMENT POLICY

The EU, as the main driving force behind the new Euro-Mediterranean partnership, wants countries to cooperate to fight climate change and accelerate the transition to sustainable resources. It therefore encourages the use of new forms of low-carbon energy, gradually replacing fossil fuels. For example, the EU promotes clean hydrogen production in the South and East by expanding its "hydrogen strategy", through regulatory and financial incentives, as well as the regional integration of electricity markets and grids. Wind and solar power are also developed on a large scale, thanks to financial support from the EU and States, or foreign investment. Large centralised renewable energy production projects (solar farms, offshore wind farms, hydrogen) and nuclear projects are established along with a dense network of North-South interconnections. The industry and transport sectors, which are highly polluting, especially in southern and eastern Mediterranean countries, have been significantly decarbonised, thanks to European and international public and private funding. There is also mass investment in the manufacturing of electric vehicles, with coordinated cooperation strategies between North and South.

However, this financial aid is backed by strong "green" conditions. On the southern and eastern shores, the energy transition is slow and gradual. It requires heavy investments at all levels, and comes up against strong resistance. Energy networks gradually become interconnected, but old energy use habits persist and are slow to change. In addition, the traditional polluting sectors continue to operate and slow down the real transition to a more sustainable energy sector coordinated at the Euro-Mediterranean level. All kinds of methods are used to shift towards more resource-efficient production and consumption models: education, taxonomies, funding, incentives, innovation, experimentation, etc. in a context marked by urgency and changing values. **Governments intervene to encourage changes in behaviour through taxes, subsidies, and new standards, with priority given to economic tools.** Taxes on goods and services that support the ecological transition and sustainable development are reduced, including a tax cut on agricultural land and natural capital. On the other hand, subsidies for fossil fuels or polluting activities are reduced or abolished (see Box 21).

Box 21.

SUBSIDIES AND ENVIRONMENTAL POLICIES: A KEY ISSUE FOR THE FUTURE

Robin Degron, Constantin Tsakas, Guillaume Benoit - Plan Bleu

Like tax policies, subsidies to support certain activities (fisheries, agriculture, etc.) or to facilitate access to certain essential goods (energy, food, housing, etc.) have major positive or harmful impacts on the environment. Major public spending is devoted to these policies. In most southern and eastern Mediterranean countries, subsidies for the consumption of basic commodities account for one of the main costs in government budgets. They are considered socially indispensable, particularly in periods of income pressure. However, they have a number of shortcomings, such as the fact that they are often undifferentiated, without taking into account the income conditions of beneficiaries, and tie up huge budgets without any real evaluation of their effectiveness or their ecological impacts (air pollution, biodiversity, greenhouse effect). For example, it is estimated that abolishing subsidies for certain activities or uses that are harmful to the climate, such as fossil fuels, could reduce CO2 emissions by a quarter. The funds distributed could be redeployed to better support governments, local authorities and businesses on the path to ecological transition or adaptation to climate change.

Much work, including by Plan Bleu, highlights the need to rethink medium-term green public finances as a whole, integrating not only budget expenditure (e.g. subsidies for fisheries (already in a situation of overexploitation) or for the cultivation of soft wheat (which is poorly adapted to climate change), but also tax expenditure, or even taxation or payment for ecosystem services. Aid conditionality is particularly important in the case of marine protected areas and sensitive coastal nature spaces.

However, often, due to the lack of low-cost alternative supply, imposing environmental conditions is not enough to solve the problems caused by these subsidies. Solutions must also be found within a broader framework of sustainable development that fully integrates social issues and poverty. In the South, one approach would be to shift from commodity subsidies to direct transfers to disadvantaged families in the form of social safety nets or minimum incomes with conditions, for instance, on children's education. This is a critical issue.

However, these changes come up against inequalities in terms of economic, social and geographic situations. In order to reduce them, the decision is made to redistribute a proportion of the new financial income generated from the taxation of CO2 emissions, resource use and the expansion of the trading market (ETS) to the Mediterranean. In particular, the aim is to finance the conversion of certain activities in southern Mediterranean countries, especially those related to fossil fuel production. In the North, some countries are proposing a new tax on capital tied to unsustainable activities. However, this system struggles to become widespread, with some countries instead setting up attractive tax systems for international capital.

New technology hubs are developed in the Mediterranean, particularly in southern countries, creating job opportunities for young graduates, who remain in their home country to contribute to its economic vitality. Major projects are on the table, the largest and most symbolic of which is to build a bridge between Spain and Morocco. However, territorial inequalities between urban and rural areas are still quite prevalent. Large-scale projects are concentrated in the major cities, while rural areas have less access to the job opportunities created by these projects.

Technology transfers are facilitated by the establishment of a common economic market that offers an avenue for positive development of the Mediterranean region. However, the social and technical contexts vary around the basin, and these transfers are different from one country to another. For example, in the South, they are accompanied by funding earmarked for education and the development of a competitive industry, which are sine qua non conditions for the technological transfer to take hold. This serious approach is paying off. Several countries in the region catch up technologically and specialise, enabling their economies to take off and become part of the globalised economy. The EU's economic policy towards its neighbours is accompanied by an extension to southern and eastern countries of the border tax established in Europe to offset the CO2 emitted in the production of imported goods. The European Union has invested heavily, and continues to do so, in data protection, including by introducing new protocols. However, data protection is not enforced in all areas, and the issue remains at the heart of political tensions. In the new digital economy, Europe is seeking to regain some independence from the American and Chinese tech giants. It supports European economic actors in the creation of new networks. In the southern and eastern Mediterranean, previously isolated islands of digital excellence are supported by the EU, enabling them to be integrated into regional and global networks.

The fisheries sector is adapting well to the impacts of climate change. It manages to remain stable and not disrupt ecosystems. Measures are put in place to reduce incidental or illegal fishing. However, there are protests, especially from small-scale fisheries. Quotas are imposed to reduce incidental catches, and surveillance is increased to ensure that the limits are not exceeded. To be profitable while complying with the strict quotas, large quantities need to be fished.

The new policies are therefore favourable to large-scale fisheries, and small-scale fisheries suffer greatly.

Tensions with other countries that come to fish in the Mediterranean are also felt, as they do not always comply with the imposed quotas. At the same time, the aquaculture sector is developing rapidly.

The Mediterranean is still a tourist destination in 2050. However, tourism has significantly diversified: the former "low season" is now also a period that attracts high tourist numbers. Tourism outside coastal areas and agritourism attract both local and foreign visitors. For historical sites that have been attracting thousands of tourists to the Mediterranean for years, technology serves a new form of tourism that promotes and protects these sites from overcrowding. Tourist numbers are managed by highly efficient regulation systems, and compliance with environmental standards is central and highly controlled. Some tourism is also virtual, with tours of protected sites combining authentic and virtual nature.

Overall, this Euro-Mediterranean partnership benefits all partners involved. As part of its drive to re-regionalise its value chains in order to increase its autonomy and resilience, the EU encourages a return to the region of certain types of production previously relocated to Asia. Trade is increasing from North to South and East and vice versa.

SCIENCE AND TECHNOLOGY

The scientific and technological cooperation model is reworked across the Mediterranean to make it more sustainable and efficient, and benefit all countries in terms of innovations and jobs. The aim of the new system supported by the Euro-Mediterranean partnership is to strengthen the ties between research and business (through incentives for entrepreneurs to invest in research and development).
Consortia are created between universities and public and private research centres to promote effective knowledge sharing. These pooled research capabilities enable public-private partnerships to be developed and transform research projects into concrete innovations.

Technology is pervasive and the driving force behind sustainable development. For example, sea-related activities are changing, with the installation of offshore wind farms, and hydrogen-powered ships, etc. In the marine sector, this technology is expected to enable stricter law enforcement (in particular the Barcelona Convention protocols).
A supranational surveillance fleet, Interpol MedSea, is in charge of enforcement and sanctions. It operates

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through a public-private partnership. The surveillance equipment is private and based on the latest technological innovations, while the surveillance units are common to the Mediterranean and not managed by individual states. Innovative tools produce real-time data on the state of the environment. At the COPs, the Mediterranean Alliance grants subsidies to member states on the basis of the results they have obtained in managing the good environmental status of the sea and the environment.

There are increasing numbers of technology transfers, especially from European countries to southern and eastern Mediterranean countries. These transfers involve the use of a number of open patents in strategic areas. Technological cooperation aims to create a Mediterranean innovation space focused on digital technologies, the blue economy and the energy transition. To support this, university and training policies are focused on technological skills and knowledge, especially when linked to digital technologies, platforms and networks. However, some governments are more determined than others, and successes are not being achieved on the same scale or at the same speed everywhere.

The widespread and accepted technological evolution enables relatively successful adaptation to degraded environmental conditions. For example, precision agriculture and remote sensing are developed to adapt to water shortages, especially in summer. New crops, which require less water, are also being planted. However, these changes in practice require investments and cause inequalities, as not all farmers can afford them.

Principles of the blue economy on which there is consensus are spreading and governments and businesses are following the recommendations of the EU and major environmental NGOs. For example, maritime transport is highly decarbonised (in particular thanks to the increase of motorisation technologies with a lower carbon footprint such as hydrogen, biofuel and green ammonia), and the trajectories of cruise ships have changed (shutting down engines in port, ban on sulphur emissions).
New forms of cruising (using sails) are on the rise. The protocol on nitrogen emissions (Nitrogen Emission Control Area: NECA) is adopted. However, these transformations are limited to technological changes and require the massive use of strategic resources such as lithium. In order to preserve the good environmental status of the Mediterranean and to comply with strict environmental standards, Mediterranean countries procure them from outside the Mediterranean, which is a source of competition between states.
New technologies also produce a lot of waste, which is difficult to manage in an efficient and circular way. Some technological waste is relocated outside the Mediterranean region, particularly to African or Asian countries, and the situation creates controversy at the international level.

SOCIETY AND GOVERNANCE

There are still many inequalities within Mediterranean countries, despite an overall decrease due to improved living standards. This strong path towards modernisation based on technology, digital technologies and market instruments has left many people behind, especially in southern and eastern Mediterranean countries. For example, artisan trades are heavily impacted by the switch to all-digital technology. In addition, rural areas are marginalised because they are not well connected to cities and new communication networks.

Modernisation based on digitalisation and a strong technological component comes with trade-offs. For example, with scientific advances, there are recurrent debates on ethics, eugenics, transhumanism, the mainstreaming of AI, and the status of living organisms, without reaching any definitive conclusions or defining limits. Moreover, Mediterranean society in 2050 is unequally exposed to many risks.
These risks are natural (earthquakes, floods and landslides), industrial or technological (oil spills, marine pollution, industrial accidents) and linked to climate change (heat waves, droughts or forest fires). In any case, they are increasingly interconnected, and technological modernisation makes industrial and technological risks those most likely to increase between 2040 and 2050.

These risks are managed in a technocratic and private way, which does not guarantee the same exposure for all categories of the population. There are regional disparities in risk prevention policies. While the most developed regions have the necessary funding to build prevention infrastructure, others with fewer financial resources prefer to focus on risk awareness and public education.

Without systemic anticipation and prevention policies, inequalities in terms of exposure to risks will increase, more severely affecting fringes of the population that are already vulnerable, such as the poor, women and migrants, etc. After disasters, areas with high economic value attract all the funding for infrastructure renovation (thanks to the tourist economy), while others are abandoned.

In society in general, intercultural dialogue is improving. Countries with more traditional values are evolving towards more individualism, and traditions are slowly becoming more liberal (less religious influence in the South as well as in the North, increased democratic aspirations and care for the environment).
In 2050, Mediterranean civil society plays a balanced, and even major role in many bodies, although differences between the North and South, and between countries persist. However, it is making its voice heard in the decision-making process, thanks to increasingly reliable and efficient network tools. In some countries (especially in the North and in some southern Mediterranean countries), it has even become a permanent actor in everyday political life, not only during elections. This is facilitated by better environmental awareness in the North, South and East, which starts in primary school, and visibility in the media and government agendas, which have a duty of transparency when it comes to these issues.

However, civil society appears divided, between a civil society that is considered legitimate, which sits on official decision-making bodies such as the Mediterranean Alliance, and a more fragmented but no less significant civil society, which disagrees with the main driving force of new Mediterranean cooperation: technology and the green and blue transition, whose objective is economic growth. Therefore, despite remaining marginal, neo-Luddite social movements regularly speak out against technology and the social exclusion of the most vulnerable groups due to this model.
The widespread use of AI in some industrial and service applications is destructuring many segments of the labour market, particularly in the service sectors (banking, legal, consultancy, health, information, cultural creation, training, education, etc.). Many people are forced to accept increasingly insecure jobs, which are increasing in number. This contributes to widening inequalities and fuelling social tensions.

However, in the southern and eastern Mediterranean, social appeasement is subject to strong resistance and moments of crisis. In some countries, it takes several years or even decades to overcome problems of corruption in some parts of the administration and to really involve civil society in governance. External mediation is sometimes welcomed to resolve these internal conflicts.

In many Mediterranean countries, governments increasingly see youth as an asset and a driving force in innovation and adaptation to climate change. Unemployment rates fall, thanks to improved education and training strategies. Heavy investments are made by Mediterranean countries, especially in the South and East, to improve education systems, with the main objective of better aligning education with the labour market. In this respect, new initiatives are created, such as the "Inter-disciplinary Learning Centre for the Future of the Mediterranean"[52] to connect research laboratories and businesses offering jobs. An international undersea station is built for scientific research, and to democratise access to science on subjects related to the sea and the issues associated with it. It is also used regularly by schools for awareness-raising and observation programmes.

Young people are provided with assistance to enter the job market. Digital technologies are used to better target the needs of employers and job seekers, but also, in some areas, to monitor the efficiency of individuals at work. However, many young people from the South continue to migrate to the North to find employment, and find jobs in the healthcare and elderly care sector, which needs workers. More inclusive education and service policies are also implemented in southern and eastern Mediterranean countries in favour of women, to increase their employment rate. Governments undertake to implement mechanisms to monitor these policies. Awareness-raising campaigns are also organised, particularly to ensure that more women enter digital professions.

The informal sector, which is quite substantial in southern and eastern Mediterranean countries, will shrink in the 2030s. Incentives are put in place by the European Union, and adopted by countries to encourage these parts of the economy to become formal, thanks to measures that facilitate access to insurance, reduced transaction costs (especially administrative costs), and assistance to make digital transactions more accessible. However, the dynamics of the transition in the South and East are still not enough to incorporate most businesses and job seekers into the formal sector, in a context of strong demographic growth.

[52] Ayadi, Rym, and Carlo Sessa. *Towards Transparent, Responsible, Inclusive and Sustainable (TRIS) development in the Mediterranean*. EMNES-EMEA, 2020.

LAND AND MARINE ENVIRONMENT

Better cooperation and strict regulations in terms of environmental management are paying off. Ecosystems and biodiversity are regulated using market mechanisms or economic tools, and their value is assessed. The concepts of ecosystem services, pollution and carbon trading schemes, the ecological value of nature, and the valuation of carbon sinks are now regularly applied and used. Some biodiversity benefits from the indirect effects of carbon neutrality policies (plant and forest plantations). Another previously endangered part of it is regenerating thanks to new processes based on scientific discoveries.

National conservation policies have been implemented, focusing primarily on protecting hotspots and conserving emblematic species, but with far fewer resources than policies for climate change mitigation and new energies. Some funding is allocated to research in order to increase efforts to explore marine biodiversity, leading to the discovery of new species and the extension of protection to previously unknown species. DNA barcoding, aimed at identifying and cataloguing the genes of different species, receives funding to better assess the effects of climate, pollution and the ecological fragmentation of land on biodiversity. Using this technique, micro-organisms are used to remove pollution from sites, enabling endangered species to return.

However, some experiments have negative rebound effects, causing people to mistrust science. Moreover, these policies have not prevented some structural transformation in biodiversity and ecosystems, which is considered by some Mediterranean populations as a failure on the part of public authorities who are too focused on technological advances. In some areas, such as deep-sea mining, the rhetoric remains ambiguous and no clear decision has yet been made.

The European Union has initiated a series of actions to help southern and eastern Mediterranean countries adapt to the land and marine impacts of climate change, especially in the most vulnerable areas. Water resources in the Mediterranean Basin have decreased considerably since 2020, but regulation, stricter controls, and innovative technologies allow for better management. Leakage and waste have been greatly reduced. However, these adaptation policies remain limited. Individual and collective behaviour is slow to change, along with the necessary structural reforms, for example in agriculture.

Some measures taken in the name of the energy transition and to secure water supply show their limits, and sometimes have detrimental effects. For example, this is true for the production of green hydrogen, which, after attracting a large amount of funding, experiences decline, mainly due to leakage problems that have a major impact on the expected yield. On the other hand, because of the industrial risks of leaks and explosions, some plants have construction delays due to protests by local residents.
To secure water supply, desalination plants are developed more intensively, while stressing the need to improve treatment technologies (in particular by favouring membrane treatment over thermal treatment). However, these technological advances are slow in coming, and the environmental impact of these measures is much more nuanced than expected.

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4. Assessment

This scenario reflects a positive business-as-usual model. It is an idealised but fairly realistic scenario, that is plausible. However, this kind of transition would require very heavy investments, and would be met with very strong opposition. It is not clear that the EU could lead such a partnership in the face of such strong internal and external opposition.
It should be noted that the Euro-Mediterranean partnership launched by the EU based on a "blue-green transition" deliberately leaves room for doubt as to the exact definition of the term "blue-green transition". This term has the same ambiguity in the expression "blue economy", which can be interpreted as the economy of all sectors related to the sea, or "the sustainable use of ocean resources for economic growth, improved livelihoods, and jobs while preserving the health of ocean ecosystems" (World Bank definition).

The ambiguity is still present today, insofar as the Euro-Mediterranean partnership has implemented a transition towards decarbonised activities (especially at sea), but that relies heavily on digital technologies and digital innovations, which have had, and still have, negative impacts on the environment. It involves a hybrid strategy, which is environmentalist but also economic growth-oriented, in line with the European Green Deal, and the generally held view of sustainable development, implemented by most countries.
The effects of this scenario on the environment are mixed. On the one hand, stricter regulations in terms of environmental standards and economic regulation of the state of the environment reduce negative impacts on the environment and ecosystems. On the other, the "100% technology" approach and the development of major projects have negative rebound effects on the environment. Technologies do not save the environment, and they do not only have positive effects, such as offshore wind power, which damages marine biodiversity.
Moreover, this scenario does not see the elimination of already existing inequalities between Mediterranean countries and within countries, between the different strata of the population. The shift to "World 4.0" also creates new inequalities, between populations inside and outside of markets. Inequalities increase between the entrepreneurial middle classes and other groups. A large part of the informal economy remains so, and does not reap the beneficial effects of the new blue-green model promoted by the European Union.
In the southern and eastern Mediterranean, some see the partnership led by the EU as a form of European neocolonialism, with the imposition of a market approach. The voices that oppose this transition feel that they are being subjected to a future for the Mediterranean that does not reflect them.

In this scenario, **the only response to the climate and environmental crisis is the decarbonisation of the business-as-economic model, particularly the decarbonisation of energy. Other avenues for adaptation are not explored, such as reduced consumption, a change in industry business models, or land-use planning.**
Finally, this scenario requires heavy investments in environmental technologies (electric power, hydrogen, etc.), and, despite aid, northern Mediterranean countries still have much more money to invest than southern and eastern countries. For example, this difference in resources prevents some less developed countries from successfully converting old sectors of their economies to the "New Economy 4.0". A duality therefore persists in this scenario, preventing the Euro-Mediterranean partnership from being perceived as a real and equal collaboration between the 22 contracting parties to the Barcelona Convention.

SCENARIO

5

ANOTHER SUSTAINABLE DEVELOPMENT MODEL SPECIFIC TO THE MEDITERRANEAN

1. Abstract

Mediterranean countries and societies are very sensitive to the worsening state of the environment and climate, together with international pressures, and **come to understand the dead-ends associated with a wait-and-see attitude towards the environment, and maldevelopment. They therefore commit together to a process of transition towards a new model for sustainable development, taking into account the strengths and weaknesses specific to the region.** After an initial phase mobilising civil societies and territories to establish networks for sharing best practices, disruptive initiatives are implemented at the institutional level.

In a context of "deglobalisation" that promotes endogenous regional development, an equitable partnership is created, based on strengthening South-South cooperation and renewed governance. This partnership has the dual objective of reducing regional inequalities and managing certain resources as common-pool resources, ranging from sea and heritage protection to research.

At the national and local levels, the emphasis is placed on a number of aspects. Firstly, on reducing vulnerabilities and external dependencies. Secondly, on investment in new development and organisational models that meet goals for strong sustainability that give priority to the climate, vital resources such as water, soil, coastlines, marine ecosystem conservation, as well as employment, and poverty reduction. To support generational change, cultures, religions and civil societies engage in dialogue and participate, through varied contributions and cooperation, in developing new ethics and cultural pluralism as a fair transition. Based on a realistic expectation of the opportunities and risks associated with the context of the coming decades, the aim is to urgently and collectively develop a new pathway towards the sustainable development of the region. **The Mediterranean invents a specific model that sets the example for the rest of the world.**

2. Scenario framework

Like Scenario 4, Scenario 5 is one of the potential pathways towards sustainable development of the Mediterranean. However, in this case, the drivers of change are not so much Europe, integration into globalisation and technology, as they are a change in the international context which is more conducive to sustainable development, a more balanced North-South relationship, and strong participation from local authorities and civil society.
Above all, it is characterised by the political willingness to pursue strong sustainable development through a profound transformation of lifestyles, economic models and forms of governance, while respecting the cultural diversity and specific characteristics of the region.

Three key assumptions structure the scenario. First, **the idea that sustainable development cannot be reduced to the implementation of specific environmental measures, but involves all aspects of development.** Given the diversity of situations, this means that there cannot be a single "standard" model of sustainable development, but instead a variety of models, depending on specific geographical, physical, economic, human and other factors. Secondly, the conviction that a specific model for the sustainable development of Mediterranean countries is both necessary and possible in order to tackle the serious challenges and constraints specific to the region and take full advantage of its specific assets. There are many of them: sharing a common sea, its geographical centrality, attractiveness, quality of life and lifestyle, diversity and specificity of production, landscapes and "terroirs", exceptional cultural and natural heritage, climate adaptation of habitats, its exemplary diet, solar and marine potential, youth and demographic growth (in the South-East), family solidarity and resilience, etc. Finally, the sense that a transition to this kind of model is possible under five conditions: strong international pressure in favour of sustainability, a more balanced North-South allowing for more egalitarian cooperation within a community of partners taking on shared yet separate responsibilities, extended responsibilities and the active involvement of territories and civil societies, a renewed regionalisation of economies associated with the desire to reduce dependencies, and finally a dual change in socio-political perceptions.

This dual change is first justified by the fear shared by all countries in the region that they will see their economic base directly threatened by climate change and unsustainable development, as it relies heavily on the rentier exploitation of natural resources. It is also the result of a more accurate understanding of the many potential benefits linked to transition, such as better living conditions, social stability, debt reduction and less economic insecurity, stronger democracy, and finally the protection of irreplaceable shared natural or cultural heritage, including the sea.

3. Dynamics and actors

Along with the pressures of the context, the willingness of actors is the determining factor in this scenario. However, unlike Scenario 4, the impetus does not come from a central player like Europe, but from the active involvement of everyone, at all levels.

Civil societies and territories are organised into networks for experience sharing, acting as triggers, as sustainable development is taken into account primarily based on local realities and experiences. However, in addition to the decentralisation that this implies, this citizen or grassroots involvement is not enough.

It is a matter of raising awareness and getting all actors involved, from the international level to local people and businesses, with:

- **At the international level**, an institutional system that recognises the major responsibility of northern countries in the ecological and climate crisis, as well as the specific nature of the Mediterranean by giving it priority as an exceptionally vulnerable region. This system should also provide increased legal and financial resources (three-fold increase in funding for adaptation, the law of the sea and stronger surveillance resources for enforcement);
- **At the Mediterranean level**, the creation of sub-regional blocs in the South and East, balancing out the 27-country Europe, through an association of Arab countries, Balkan states, or between African countries. This is followed by the commitment of these sub-regions to new forms of cooperation with a view to joint yet separate co-responsibility. To formalise this partnership, two cooperation institutions are established, with a joint agency for cooperation in the event of disasters and a Mediterranean Bank for Cohesion and Sustainable Development (MBCSD), focused on climate change adaptation and development that preserves natural resources. This institution is financed by national and international contributions, in particular by the recognition of the ecological debt of developed countries.
- **At the national level**, a real effort is made to place sustainability at the heart of public policies, training and research. All these efforts are made to achieve a fair transition to a different development model. With this in mind, priority is given to reducing dependencies, protecting resources and land-use planning.
- **At the local and civil society level**, the transfer of certain powers to local authorities, rural communities, associations and populations. This would give the various local players a central role in the implementation of sustainable development and resilience strategies. These actors would become responsible for the management of certain resources, who administer them as common-pool resources. Finally, a network for exchanging local experiences has been set up between the different shores, so that they can learn from each other.

- **At the economic and business level**, compliance with new CSR standards, innovation in job-rich and sustainable activities that capitalise on the Mediterranean's unique assets, and diversification of business models.

This will not all happen at once, and will take time.

That is why this scenario should be seen as a process with several stages:

– The first step is to recognise the limits of globalisation in the face of the worsening ecological crisis. All over the world, **political and economic players move towards a re-regionalisation of economic activities.** There is a growing awareness that, in the face of socio-ecological challenges, an endogenous development model specific to the different regions will make for greater resilience and sustainability, in particular by limiting the transport of goods and enabling legal controls. European and Mediterranean companies are relocating their value chains around the basin. Foreign investment is now much more local, which benefits the Mediterranean;

– A second stage will raise awareness and mobilise all existing institutional and other resources to build sustainable development in the Mediterranean. Dialogue between the different shores plays a crucial role in this shared dynamic. The new interdependence of Mediterranean countries encourages closer political ties, which are essential to ensure the region's economic stability. Multilateral cooperation bodies are established to preserve this stability. **They ensure equal dialogue between the various countries,** which are then able to enforce laws more effectively, issue moratoria on unsustainable practices and protect natural resources (deep-sea mineral resources, investments in fossil fuels, etc.);

– A third stage is the development of dialogue between economic players and civil society on the different shores, thanks to the mobilisation of resources for exchanging best practice. This could be **a "Rio" on the Mediterranean scale, where the revamped Mediterranean Commission on Sustainable Development (MCSD) would play an important role**, with the networking of think tanks and the creation of knowledge sharing platforms. For example, farmers in the South would help farmers in the North to adapt their crops to new climate parameters;

– The final stage would be one of cultural and political transformation. **Through generational change and reduced social inequalities, the diversity of Mediterranean cultures will converge towards a certain number of shared values** (e.g. justice and respect for the rule of law, ecological responsibility, the role of women and youth, Mediterranean solidarities). Then, the institutional changes previously mentioned would become a reality, with the extension of international law, the creation of regional sub-blocs, a new North/South cooperative balance, decentralisation and the extension of democratic rules, and transition plans, etc.

This mobilisation is supported over time by social transformations and should gradually bring about an in-depth change in economic models, lifestyles, production and consumption patterns, as well as land-use planning towards an alternative development model specific to the Mediterranean. This would be more sustainable, fairer, more ecological, more resilient and more autonomous, while remaining open to the world.

4. Scenario description

EXTERNAL CONTEXT

Degradation of the ecological situation and climate is the key factor in this context. By 2050, temperatures are set to rise by 1.7°C worldwide and by 2°C in the Mediterranean. This results in both increasingly frequent extreme events and major structural ecological changes, but also a strong response from the international community and governments, economic circles, funding bodies and public opinion.
The perception of a potential tragedy linked to these changes convinces a majority of these actors that a major shift towards a strong vision of sustainable development is essential. There is a broad consensus on the need to implement the Paris Agreement, and then recognise the ecological debt of developed countries. This opens up new opportunities for markets, international investment and financing, but also new constraints.

Standards and rules under international law become stricter, global taxes are created (e.g. on shipping and air transport), aid is made conditional, consumers impose new requirements, and a number of bans are enacted (e.g. global ban on the purchase of new vehicles with internal combustion engines in 2040). Almost all economic sectors are affected, especially those related to the sea and oceans.

At the same time, **globalisation as it has functioned since the 1990s is called into question**, along with the hegemony of certain states or economic giants, market deregulation, an increase in regional imbalances or dependencies and booming mobility. Faced with the increasingly dramatic consequences of global change, all the world's political and economic players acknowledge the failures or limits of the finance-driven globalised model, and recognise the advantages of a regional economic development model based on the relocation of value chains and sustainable production and consumption patterns.

In the light of globalisation, states join forces to form "regional" blocs to handle excessive debt and recurring crises, and preserve their specific social and cultural attributes. Value chains are changing to reflect a new trade-off between efficiency, proximity and crisis resilience, especially as the cost of long-distance transport rises. Harmonisation and solidarity mechanisms are developed within these "regions", with priority given to intra-regional

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trade, reducing dependency (on food, energy, etc.), and protection from external markets (e.g. carbon taxes at borders). The world is organised around these multiple poles, which nevertheless aligns with a global governance of common goods.
The post-Ukraine war geopolitical context gradually improves, with less interventionism from major powers. Changes conducive to relative pacification of the Mediterranean region contribute to this momentum: successful reform of the United Nations system, better global security, settlement of one or more existing conflicts, regional withdrawal of China, the United States and Russia, stronger Europe. Several factors favour the creation of new sub-regional alliances, especially in the South: pressures resulting from the economic and ecological situation (e.g. on oil producers), the easing of religious conflicts, rapid transformation of Arab and Middle Eastern countries, strong influence of Africa and absolute need to contribute to its development.

However, fewer conflicts do not exclude increased tensions and uncertainties related to the scarcity or substitution of resources, whether for agricultural and food products, raw materials, land, water, plant products, marine resources or energy. The issue of resources and their prices and limits now occupies a central place in political agendas.

All this takes place in a global context marked by a global change in ways of living, working, producing and socialising, and by a change in value systems. These changes are especially associated with the general rise in levels of education and the development of digital technology: better access to knowledge and information, role of social media, more remote work and collaborative work, importance of applications and service platforms, artificial intelligence, but also an increase in individualism, intangible values and demand for greater democracy.

GEOPOLITICS AND GOVERNANCE OF THE MEDITERRANEAN

Thanks to these profound changes in the international context, and in the face of the threat of major ecological and social disruptions, there is a slowdown and then reversal in the increasing fragmentation of the Mediterranean region, gradually leading to greater sub-regional cooperation. Throughout the region, a strong and fair partnership emerges on all economic, political, cultural and ecological levels. A community of interests and culture is built around the Mediterranean, with ties to Europe, Africa and the Middle East, based on a common sustainable development project.

This cooperation is initially driven by local authorities and non-profits through the implementation of concrete sustainable development projects on the ground, including projects from the South to the North. Operating in active networks, these two types of players become essential driving forces in Mediterranean geopolitics.

Mediterranean cooperation takes a second decisive step forward by taking on an economic dimension. Against a backdrop of the re-regionalisation of value chains, companies in the North move a significant proportion of their production and investment to the South and East. Economic exchanges of all kinds increase between the three shores, in particular trade, which triples, while complying with ecological constraints. These include common minimum standards, "Mediterranean" labels, codes of "good conduct", etc.
This dynamic helps rebalance North-South trade, while shifting the focus of all the countries in the region to the Mediterranean Basin. In a context where international flows are declining and value chains are relocating, the centres of interest of political and economic players in the Mediterranean shift from America and Asia to the Mediterranean.
As investment flows are repatriated around the basin, the ecological interdependence that already exists between the countries bordering the basin is now bolstered by strong economic interdependence.
This makes it vital for all governments to ensure the political, economic and social stability of the region. This stability is vital to the region's economic health, including for the European Union, which has supported and is investing massively in this move to regionalise production activities. To guarantee this stability, solidarity develops between countries. The main aim of this solidarity is to build shared capacity for crisis resilience and to ensure the sustainability of certain common assets that are essential to the region's survival, such as the sea.

This solidarity is embodied through shared institutions. This is behind the creation of the Mediterranean Bank for Cohesion and Sustainable Development (MBCSD), which will play a central role in regional governance. Founded with capital provided by the 21 Member States and contributions from the sub-regions, including the European Union, it also includes specific resources from the payment of ecological debt by countries in the North, recognised in the 2030s. It invests in and supports the economic development of the basin.
It also funds major training and research programmes, and land-use planning strategies, in order to strengthen local resilience. It also raises substantial funding to protect natural resources and ensure their long-term management. At the same time, it provides a multilateral forum for discussion between member states, all meeting as equals.
Finally, as a symbol of this new regional solidarity, the MBCSD sets up an Ecological Disaster Response Fund (EDRF), financed by the Mediterranean community. As soon as a region in the basin is affected by natural disasters, which are becoming increasingly frequent, this fund is mobilised to finance emergency aid and provide care for the affected populations.

The new status of the Mediterranean in the political priorities of states around the basin around is reflected in other initiatives, such as the coordination of statistical and observation systems, stronger enforcement systems for the Barcelona Convention (ratification by countries who have not yet signed it and concrete implementation of its protocols), creation of a technical agency on major risks, roll-out of the position of "Minister for Mediterranean Affairs" in each State, and shared diplomatic positions, particularly for climate and the sea, at the international level.
The European Union, which has extended to the Balkans, encourages this movement. This is reflected in the negotiated extension of certain structural policies, such as research, agricultural guarantee funds, trade policies, and the introduction of a carbon tax at borders, etc.

Stronger cooperation, based on dialogue, excludes any form of interference or domination relationships, which had previously marred relations between countries on different shores. One of the conditions for its sustainability is the establishment of a better balance between the Mediterranean sub-regions.
This happens gradually from the 2030s, with the **formation of political sub-groups in the southern and eastern**

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Mediterranean. These sub-groups take various forms: between the Maghreb-Mashreq countries, in an association of African or Arab countries, in the creation of a Turkish-speaking area or possibly in a Balkan alliance.

These are just some of the many possible bridges between Europe and Africa or the Middle East that are changing the geopolitical landscape. In the region as a whole, this renewed focus on the Mediterranean also makes it essential to reduce cultural tensions linked to the past.

A major remembrance and awareness-raising campaign on the cultural heritage shared by the three shores of the Mediterranean is therefore launched, along with symbolic events and opportunities for exchange, such as promoting intercultural media, the equivalent of Erasmus at a regional level, youth programmes for the environment and support for inter-Mediterranean non-profits, and increasing the popularity of the Mediterranean Olympic Games. There are so many opportunities to spread a culture of sustainable development, particularly about preserving the sea.

DEMOGRAPHICS ANDLAND-USE PLANNING

Thanks to a more rapid demographic transition than expected in the South due, in particular, to the education of women, the increase in the region's population is moderate (580 million in 2050 compared to 520 million in 2020). Although the contrast between North and South/East remains very significant (-12% in the North, 18 % in the East and 31 % in the South), with an accentuated demographic decline in the North, which in some countries could even lead to collapse, the issue of ageing is now raised across all countries. This issue has significant effects on health and intergenerational relations (cohabitation, retirement, conflicts of values, care, inheritance).

This moderation of population growth is one of the factors contributing to the decrease in migratory pressure. An increase in employment opportunities linked to the transition to sustainable development and the regionalisation of value chains reduces the need for young people in the Mediterranean to seek their future elsewhere. Finally, the rural exodus in the South/East slows down, further reducing internal migratory flows.
Facilitated population mobility is becoming a two-way street, linked essentially to the demographic, economic and training needs of countries, with better settlement support for migrants. Co-development policies with countries outside the region, from which most migrants originate, limit these flows but are unable to significantly contain them.

Due to increasing risks and ecological pressure, where populations live is becoming a key issue. In southern countries, the continuing urban transition remains a strong trend. Urbanisation rates gradually approach those of northern countries. Faced with the risks of highly concentrated populations in coastal areas and large cities, land-use planning is now a fundamental public policy issue.
Despite the precariousness of living conditions in large cities, the difficulties of access to housing, and the opportunities opened up by remote working, it is impossible to make metropolises less attractive without very active policies in favour of medium-sized towns and rural areas. There are strong constraints on coastal urbanisation and urban sprawl. Conversely, every effort is made to stabilise the population within countries and in rural areas. To achieve this, local powers are reinforced and aid is provided for agriculture and employment. Rural development and local development support programmes are launched. Rural towns become small cities well-equipped with basic services (health, education, agricultural services, etc.). New economies emerge, based on agriculture, tourism and crafts and their interrelationships with the environment. New towns and cities, service centres, and infrastructure for transport and water access are built.

There is decentralised energy, a reduced digital divide and an increase in short supply chains. In the North and South, opening up isolated areas requires mass investment in the construction or renovation of railways and digital facilities, which are sine qua non conditions for revitalising these areas. At the same time, the Mediterranean becomes a local space, with investment in passenger and freight transport by cabotage.
All this goes hand in hand with a paradigm shift in land-use planning. It is now a matter of working with nature rather than against it. In addition to policies to protect species and ecosystems, agricultural and planning policies place nature-based solutions at the heart of their strategies. This requires the implementation of ecological planning in all countries, taking into account environmental targets and climate risks alongside the more traditional objectives of spatial balance, quality of life and regional attractiveness. Local authorities and rural communities play a key role in the resulting transition.

In the countryside, new political priority is given to the agro-ecological transition and disadvantaged rural areas, whether agricultural, pastoral or agro-silvo-pastoral. Traditional know-how is recognised and promoted, after being supplemented or realigned in the light of modern agronomic knowledge. Solutions are negotiated with the local stakeholders directly impacted and accompanied, if necessary, by payments for ecosystem services. They are implemented to restore ecosystems that have been severely degraded by overgrazing or the artificialisation of wetlands in order to restore their functions and the production of ecosystem services. Supported by funding from the MBCSD, vast soil ecological restoration plans are launched to stop soil erosion. Farming practices are changing, and ploughing and other soil-aggressive practices are gradually abandoned, along with the mass use of pesticides and nitrogen fertilisers. Agroforestry, the restoration of degraded pastures or pastures converted to unsustainable farming, and soil-preserving farming methods are promoted.

These measures encourage the infiltration and storage of water and carbon, and can help support baseflow and preserve seriously overexploited water tables. They are shaping cultural landscapes into "combined works of nature and of man", which become an international symbol of the Mediterranean. This agricultural model spreads across the 21 Mediterranean countries, and is recognised in the 2040s on the UNESCO Intangible Heritage List.

In towns and cities, urban planning strategies are also drawn up, designed to be implemented gradually and to establish a new urban development model over time. Once again, the search for resilience is the main objective of this new model. To achieve this, everything possible is done to save increasingly scarce resources, particularly water and energy. The use of air conditioning systems in homes and the development of individual swimming pools are regulated.
These needs are met by pooling the use of resources, and by giving pride of place to public spaces. New neighbourhoods are therefore built around squares, markets, gardens and public baths. Elements of traditional Mediterranean architecture and urban planning are being adopted by architects and town planners. This includes compact cities that capitalise on shade and air circulation, the use of raw earth where possible, the widespread use of porticos around public spaces to provide shade and natural ventilation, patios in individual homes, and Mashrabiyas on windows, etc.
Finally, urban agriculture develops to meet some of the food needs of local residents. In order to cool cities that have become suffocating in summer, the ground is made porous again, which encourages water infiltration, and green spaces, tree planting, and irrigated vegetable and fruit belts are developed to reduce heat islands and the consequences of heat waves. In this context, Mediterranean islands become a testing ground for endogenous sustainable development strategies.

ECONOMY AND DEVELOPMENT POLICY

In a context still marked by the COVID crisis, the inflation of raw materials and food prices and, above all, growing awareness of the urgent need to tackle climate change and the increasing scarcity of resources, all political and economic players see the need to initiate decisive substantive and operational change in the economic system. Globalisation is also beginning to show signs of running out of steam, and the international economy is gradually reorganised around major regional hubs that are both geographical and geopolitical.

Although employment and development remain top priorities, views about the economy and the frameworks in which it develops are undergoing profound change. In this world of greater sobriety, where the need to reconcile economic development with care for people and their environment has become a crucial concern, GDP no longer appears to be a relevant indicator. **A new indicator gradually emerges at the international and national levels**, integrating improved well-being, domestic work, natural capital and human capital alongside traditional measures. Thanks to ambitious sustainable development policies, the Mediterranean moves up the international rankings.

The ecological emergency and challenges to globalisation lead people everywhere to seek more sober, self-reliant and resilient production and consumption patterns, resulting in a new geography of production and value chains, and economic relocation. International finance, which has adopted new accounting rules integrating ecology, withdraws from the financing of carbon energies and projects that are clearly unsustainable and destructive of nature. On the other hand, public and private green financing, especially for adaptation in the South, water and renewable energies has increased considerably, but with strict conditions attached. Some debt repayments or interest payments are abandoned or suspended, and the practice of central banks buying up non-sustainable assets becomes commonplace.

The Mediterranean region sees these changes as both challenges and opportunities for revitalising its economies, and tackling the associated risks of marginalisation. Driven by public opinion and eager to regain purchasing power and limit their carbon footprint, northern countries encourage companies to relocate to the region, relying on a young, educated workforce. This mobility of companies is facilitated by digital technology and remote working. However, the option is not to focus entirely on competitiveness through labour costs, but to ensure that these investments contribute to development centred on product quality, while showcasing specifically Mediterranean assets, and sustainability. The jobs and activities created primarily for young people in the South and East help ease social tensions and achieve political stability in the region. This trend is reinforced by investments from the Gulf States, or by a possible alliance of Arab or African countries established after the 2030s.

At a country level, less advanced countries continue to catch up economically, with growth significantly higher in the South and East (3 to 4 %) than in the North (1 to 2 %). However, the focus is no longer on "growth at any cost". **Each country has its own growth trajectory, and all converge towards more sober, qualitative, autonomous and diversified development models.** Mass investment is made in reducing dependency and waste (such as water), as well as diversifying economic structures in the "positive economy" (green and blue economy, food, health, clean energies, services, etc.), the circular economy (recycling, reuse) and the "functional economy" (replacing the sale of goods with the sale of services). Governments cease to subsidise fossil fuels and shift their investment to renewable energies, while bearing the cost of the transition, with the support of the MBCSD. There is mass support for the development of offshore wind and solar energy. It is a matter of implementing "win-win" strategies both for promoting the specific attributes of the Mediterranean area and transitioning

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to a sustainable and autonomous development model, in line with the SDGs and climate change challenges.
In the same perspective, there are increasing joint projects and trade between regions, countries and businesses within a more legally secure framework, thanks to border protections, common standards and quality certifications. This dynamic is made possible by a modernised banking and financing network, and significant North-South transfers, with diasporas playing a highly active role.

All these developments are supported by a major drive for innovation, including in digital technologies. But this innovation is also social and in low-tech technologies tailored to the specific characteristics of each region. In southern and eastern Mediterranean countries, experiments are launched to reduce youth unemployment and informal employment, particularly by creating a universal basic income, which would either ensure a minimum level of social protection or promote entrepreneurship and training.

Territories, but also more collaborative forms of entrepreneurship (cooperatives, social economy organisations, collective interest groups, business networks, etc.) play an essential role in the implementation of these experiments and diversified endogenous development policies. This is particularly true of southern countries, where the sharing economy continues, with the pooled use of some goods, an extension of cooperative forms of production or services, and an important role for neighbourhood communities.
This development is supported at a national level by a reform of access to credit, including credit tailored to the needs of agriculture and rural young people, and various forms of support to also encourage self-employment and training. Some countries also experiment with a transition from social assistance for basic commodities (bread or soft wheat flour, gas, oil, etc.), which often benefit the wealthiest first, to direct cash transfers with conditions attached.

To meet both ecological constraints and increasing consumer demand, **Mediterranean public authorities, supported by the MBCSD, back sustainable aquaculture and fisheries, which are essentially small-scale and local.** By 2050, total fish catches will amount to 1.5 million tonnes, compared with 4 million tonnes for aquaculture. A truly sustainable blue economy is developing, with shipping becoming less polluting and decarbonised[53], limited exploitation of the seabed and states not seizing

[53] Decarbonisation of maritime transport, which would go well beyond existing measures (SECA), by integrating other pollutants such as nitrogen (NECA) and carbon dioxide.

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ownership of the high seas.
In an international context where climate change is a source of numerous local tensions around the globe, the Mediterranean asserts its uniqueness, paradoxically becoming an exception. Supported by inter-Mediterranean programmes, especially via the MBCSD, the region's cultural industry grows exponentially, driven in particular by the multicultural countries on the eastern shore. The harmonious development of the region and the cultural revival that accompanies it fuel the production of many literary and cinematographic works.
In a world that is losing its bearings, these works experience huge success on the international cultural market. While this vision of the Mediterranean as a haven of peace and prosperity is to some extent a fantasy, it ultimately has a performative power, and contributes to the cohesion of Mediterranean people, who feel proud to belong to the same community with a shared destiny.
The growth of this cultural industry contributes to the region's economic growth, directly by creating jobs and contributing to the balance of trade, and indirectly by consolidating the Mediterranean's central position in international tourism.

THE INTEGRATION OF SUSTAINABLE DEVELOPMENT IN ALL SECTORS

In addition to the strategies already mentioned, all economic sectors essential to development, starting with the specific situations in each country or region, contribute to transitioning towards a reduction in dependencies, saving resources and fairer, more sober and sustainable growth models.

This results first and foremost in intentional policies to **reduce all types of waste** (food, energy, raw materials, packaging, etc.) based on a circular economy of recycling and recovery, with top priority given to waste and water treatment. In northern countries, this is gradually accompanied by economic and tax incentives or constraints that force sobriety, even including quotas, while taking into account inequalities. In all countries, dependence on carbon-based energies is reduced, even in gas and oil exporting countries, with the large-scale development of decentralised renewable energies, particularly solar energy.

With a view to ensuring the region's autonomy, the sustainability of water resources and quality of life, high priority is given to **integrating agricultural, rural development, commerce, food and health policies.** In addition to the measures already mentioned, this involves increased support for farms, secured land ownership, climate change adaptation for crops, and farming diversification (quality-oriented exports, subsistence farming, agro-ecology, agro-forestry). There is also a reorganisation of downstream activities (short supply chains, re-regionalisation of food industries, better value sharing with major retailers, shared labels, etc.), all based on the promotion of the Mediterranean diet and Mediterranean products.

In the field of urban planning, priority is generally given to improving living and housing conditions, both in urban and rural areas. This gradually integrates the longer-term objective of **evolving towards "post-carbon" cities** that encourage alternative modes of transport, climate-friendly housing, greening the living environment and land-use management.
The historic Mediterranean model of a "sustainable city" that is compact, inward-looking and adapted to climate change is exported around the world. On a regional scale, major investments are also made in public transport infrastructure, with the transition to a "local sea" allowing cabotage and intra-Mediterranean maritime trade on an unprecedented scale. The redirection of international funding towards these kinds of policies helps achieve this.

However, it is especially in tourism and leisure that the shift towards new, more sustainable models proves both necessary and difficult to achieve over time. The transitions underway incorporate all dimensions: diversified economies in regions that rely on one type of tourism, the development of rural or nature tourism, spreading out tourism in time and

space while taking into account the climate, regulating and re-scaling cruise tourism, regulated access to protected areas, taxation and reduction of externalities linked to unsustainable tourism. New, diversified economic models are gradually being invented.

SCIENCE AND TECHNOLOGY

These transitions are not possible without a radical overhaul of education, training, research and innovation support systems at all levels.
At the national and regional levels, a key milestone has been reached with the incorporation of sustainable development into school curricula, starting in the 2020s, and the adaptation of training systems aligned with the skills needed for the new economies under development. Although the emphasis is on practical aspects, the humanities are not forgotten. At the same time, major research investments are made in **"eco-technologies", "low-tech" technologies, or energy-saving technologies** that partially replace ones with very high energy or water consumption, thanks to appropriate standards, incentives or regulations.

Here again, local dynamics play a decisive role, with the goal of promoting the Mediterranean's assets in order to make territories more attractive and creative. A number of schemes are introduced, including support for new businesses, startups, FabLabs, small and medium-sized enterprises (SMEs) and artisans, clusters and hubs for positive innovation and sustainable and environmentally-friendly technologies.

At the Mediterranean level, a network is established for sharing best practices in both directions (North-South and South-North), along with systems for the management of patents and scientific publications as common-pool resources (open source). Research centres, observation systems, the media and civil society cooperate to develop environmental monitoring and awareness-raising. A networked Mediterranean University is established. Experts and students from all over the world come to the region to learn from Mediterranean agronomists, farmers, fishermen, architects, urban planners, businesses and researchers.

LAND AND MARINE ENVIRONMENT

The fundamental assumption of the scenario is a temperature increase in the Mediterranean of 2°C in 2050, which is largely independent of the mitigation policies carried out in the region. This explains **the fundamental focus on adaptation and resilience**, with an emphasis on the role of territories and spatial planning (location constraints for flood-prone areas, resilience strategies, local adaptation plans in several fields, including tourism, agriculture, and urban development). Absolute priority is given to preserving and improving water resources, in particular through changes to behaviour and to economic and agronomic models, through the promotion of "local projects" adapted to each context, and through the extension of common goods management methods. Soil improvement and the restoration of degraded land both make a contribution to mitigation targets.
In cities, this adaptation is also combined with mitigation policies, with a view to the transition to "resilient" or "post-carbon" towns and cities. The risk culture is also widely disseminated, prioritising the most vulnerable populations and territories. At the same time, the prevention of major risks has been significantly improved, as well as mechanisms for intra-Mediterranean solidarity in the event of a crisis or disaster.
Energy transition targets are obviously not abandoned, but efforts are essentially focused on solar power, decentralised renewable energy and, in northern countries, more sobriety in energy consumption.
While risk management and adaptation to new environmental conditions form a large proportion of ecological policy action, Mediterranean governments also focus on everyday nature protection. Waste treatment and the fight against various forms of pollution are therefore stepped up all around the basin. In a world where sobriety has become unavoidable, Mediterranean public authorities hunt down all forms of waste and promote the recycling and reuse of used resources.
This emphasis on adaptation contributes to biodiversity protection policies, which now have stronger targets. Responsibility for the protection of hotspots is generally borne by the region as a whole. This is accompanied locally by a shift from protection policies to policies for the regeneration of environments and resources and, more generally, the integration of nature-based solutions and biomimicry into development. These policies are linked to health policies, in line with the "One Health" approach.

As for the sea, the goal of strict protection of one third of the Mediterranean marine area is achieved, with protected areas where intensive fishing and other economic activities are prohibited. Efforts to regenerate marine biodiversity take into account climate change and the arrival of new species in the Mediterranean ecosystem. Monitoring is stepped up for enforcement of the Barcelona Convention. Spatial planning of marine areas is integrated with coastal spatial planning through joint environmental planning approaches[54].
Ecological solutions are identified to use saline soils for the development of aquaculture (see Box 22). A moratorium on deep-sea mining is introduced in line with developments in international law. Some expenditure, especially any linked to adaptation and the protection of biodiversity hotspots, is pooled at the Mediterranean level, thanks to the resources collected by the MBCSD.

[54] For example, Article 2 on land policy of the ICZM Protocol is applied, in particular Paragraph 2, which states: "in order to ensure the sustainable management of public and private land of the coastal zones, Parties may, inter alia, adopt mechanisms for the acquisition, cession, donation or transfer of land to the public domain and institute easements on properties."

Box 22.

TURNING A THREAT INTO AN OPPORTUNITY: SOIL SALINISATION AND AQUACULTURE IN EGYPT

Shérif Sadek – World Aquaculture Society (African Chapter), Denis Lacroix - Plan Bleu

The lower Nile delta is an area of great agricultural importance for Egypt. It has a large population (105 million in 2022) and fertile, irrigated arable land is concentrated on the Nile plain. Rice-growing is a major activity in the delta, particularly along the coast. However, since the 1990s, rising sea levels and a shortage of fresh water have slowed down or even prevented traditional farming in this wide coastal strip. The combination of these two phenomena has led to the gradual salinisation of coastal water tables, with an inevitable progression inland. Salinisation has caused the decline, and even the abandonment of agriculture over large areas, particularly rice-growing. A small group of Egyptian agricultural engineers, working together within the Egyptian Aquaculture Society (EgAS), have proposed adapting abandoned rice fields to extensive aquaculture of brackish water fish (sea bass, bream, mullet, etc.) and even shrimp. Gradually, techniques have been developed, including increasingly structured water distribution and drainage systems. The areas developed for aquaculture have increased, taking into account constraints. The result has been very positive. In 30 years, aquaculture production in Egypt has risen from 90,000 tonnes (1993) to 1.64 million tonnes (2023).

This increase has made it possible to take advantage of the threatened loss of agricultural land, increase the Egyptian population's intake of quality proteins, improve the country's food security and create a new agricultural sector with strong outlets on the domestic market and also for the export of premium products such as sea bream or the highly prized local shrimp. As part of this dynamic, new fish farming techniques have been developed for sites where water is more scarce, such as oases, on saltwater wells. As rising sea levels and the increasing scarcity of freshwater resources are major trends for this century, this sector still offers great potential for development. However, a number of obstacles became apparent as early as 2020: water pollution in the water supply canals, increasingly high temperatures (which favours the more resistant mullet and tilapia), and financial difficulties for small-scale producers. A new stage of adaptation therefore needs to be prepared. This remarkable example of transforming the threat of agricultural land loss into an opportunity for extensive aquaculture can be applied to many other coastal lowlands around the Mediterranean, particularly in large deltas.

SOCIETIES

Urban development, access to education, globalisation of digital information, and especially generational changes and the repeated impact of crises, change Mediterranean societies and their values, without affecting their diversity and specificity. Accelerated awareness makes them the driving force behind the transition to sustainable development. People in the Mediterranean become more politically engaged, particularly in social initiatives and the local management of some common goods such as water, health, and the restoration of natural areas and degraded agro-silvo-pastoral land, etc. Civil society becomes increasingly organised and involved in public policy, pushing for greater democracy. Awareness-raising efforts are bearing fruit, and people living in the Mediterranean are more aware of the benefits of more frugal lifestyles that respect nature. Symbolic proof of this return to simpler consumption methods is the Mediterranean diet, which is once again preferred by everyone in the basin.

Relationships within families or between social groups are also changing rapidly. The role of women is better recognised, with equal rights and access to education. The employment rate for women in southern and eastern countries exceeds 30 %. In addition to family solidarity, **new forms of intergenerational ties and transmission develop throughout society**. On the one hand, the growing challenges of ageing are better taken into account. On the other hand, the driving role played by young people in the transitions is recognised. Mediterranean governments bank on their dynamic young people and give them priority access to employment and housing.

All these developments are not without numerous reactions and resistance, both in the North and in the South. However, the perceived urgency of these changes and their positive consequences gradually mitigate the strength of resistance. At a Mediterranean level, a shared Mediterranean identity is rebuilt thanks to reduced inequalities between the three shores, the existence of a common political project, the development of cultural exchanges and more accepted migration management. The sea once again plays a central role.

GOVERNANCE

This scenario does not oppose civil society activism and public policy: the two complement each other. Under the pressure of the context and realities, all Mediterranean governments and territories gradually become aware of urgent socio-ecological issues and the need to change development models to avoid serious problems. **This involves incorporating the environment and sustainable development goals into all policies, giving top priority to avoiding unsustainable situations** (erosion, salinisation and ultimately loss of soils, expansion of deserts, collapse of marine or water resources, unliveable cities, poverty traps, etc.).

Initially, efforts are focused on implementing concrete projects at the territorial level. This requires active networks for sharing experience and a system for evaluating

two-way solutions. However, the decisive disruption in this scenario is the increase in more decentralised approaches and greater associative freedoms, giving territories and civil societies a major role in the implementation of sustainable development. Institutional innovations facilitate the management of certain resources or spaces, including maritime ones, as common-pool resources. Local adaptation and resilience plans based on a culture of risk are established, with national or regional incentives.

At the national level, the scenario is predicated on **greater security of the law and the mobilisation of resources to better enforce it internally and ensure the implementation of international law, particularly the Barcelona Convention, at all levels.** This law now clearly includes a certain number of general principles, such as transparency, responsibility, fairness, participation, precaution and meeting the SDGs. It includes the reforms needed to facilitate the integration of sustainable development, particularly in the area of land ownership and common-pool management of resources. The effectiveness of the law is strengthened, resulting in better law enforcement for everyone right across the basin, with no-one receiving special treatment.

With a view to both justice and effectiveness, public policies are gradually less siloed. The public authorities draw up strategies setting out precise priorities over the short, medium and long term, in consultation with the stakeholders affected. Tax reforms and redistribution mechanisms help reduce the inevitable social tensions associated with the various transitions. For example, fair tax mechanisms are implemented to help households and businesses change their energy consumption habits. Aid and compensation are granted to sectors affected by stricter environmental standards, such as for the fishing industry, whose activities are more restricted. At the same time, **environmentally harmful subsidies are gradually replaced by social security safety nets or a minimum income for the poorest in countries where they do not exist**. These fairness and social justice measures are an absolute prerequisite for the success of this transition to a sustainable development model.

At the international level, the principle of subsidiarity becomes central. While there is no integration in the Mediterranean based on the European model, nor any imposed normative development model, states in the region recognise their shared and differentiated responsibility for the management of common goods, in particular the sea and biodiversity. In the long term, an independent body will be established to provide common-pool management, by arbitrating conflicts and assessing and monitoring the commitments made by governments and companies.

All this is accompanied by intense diplomatic action highlighting the exemplary nature of the Mediterranean. On the international stage, countries in the region become advocates of the urgent need for action on a global scale, with appropriate funding, and shared positions in international negotiations.

5. Assessment

The scenario places significant emphasis on political voluntarism and corporate activism, particularly at the territorial level. Despite its normative nature, it is not limited to a sustainable development toolbox and a reminder of what has already been said, for example, in the Plan Bleu foresight exercise conducted in 2005. Its uniqueness lies in its attempt to show what can make these shifts feasible in the changing international context or national societies, but also to assess the extent to which they can truly form the basis of an alternative and viable development model that meets the challenges facing Mediterranean countries.

The effects on the marine or land environment are positive, but not limited to this. The scenario also focuses on the quality of day-to-day life, particularly in the SEMCs. **Nevertheless, it is important to remember that a significant proportion of the environmental changes will depend on what happens on a global scale**. Environmental conditions continue to deteriorate, despite a change in model. This is why adaptation, resilience and diplomatic action on an international level are so vitally important.

Despite efforts to make the dynamics of the scenario plausible, it lacks credibility in many areas. It relies on a voluntarism and activism on the part of societies that are not the most likely in the current Mediterranean context, despite the awareness of ecological and social problems and pressure from younger generations. It takes little account of the conflicts of interest that remain very strong between or within countries, as well as shrinking room for manoeuvre, especially in budgets, and the obstacles in the way of transition in some sectors, such as energy. It takes little account of the major differences between situations in the North and South, and the possible contradiction between reduced dependencies, and increased resource requirements as a result of the relocation of activities.
Finally, it is not completely convincing in terms of the viability of an alternative development model based on sustainable development. It lacks real economic drivers and sources of funding that quickly create jobs and wealth, especially since the scenario, in contrast with Scenario 4, does not rely totally on Europe, investment in mainstreaming industrial technologies, or a market-based approach to the green and blue economy. Although this is undoubtedly the preferred scenario, the conditions required for its implementation mean its positive effects may come too late. The issue of timing is therefore ultimately central.

SCENARIO

6

THE MEDITERRANEAN SEA: GLOBAL COMMONS

1. Abstract

The starting point is degradation of the Mediterranean Sea so rapid as to provoke a strong global reaction from societies, countries and international organisations. This powerful reaction begins in the 2030s, and leads to the conviction that the Mediterranean Sea can only be saved if it is treated as a global commons. This vision is part of a more general "One planet, one ocean, one humanity" approach, and sits within a dual context of mobilisation for the oceans and recognition of the rights of nature. The objective of exemplary restoration of the Mediterranean Sea becomes a priority for the international community, which decides to finance an ambitious programme to restore the quality of the sea, as a matter of urgency, in order to deal with the risk of irreversible degradation of this area, which is a global biodiversity hotspot visited by over 400 million tourists a year. This mobilisation supplements efforts already underway through the MAP and the Barcelona Convention.

As a microcosm of the challenges facing the entire planet, the Mediterranean, united around its sea, becomes a kind of test site for learning about the collective management of a global commons. The sea therefore becomes a vast laboratory for multi-scale observation and action, and gradually becomes a powerful tool for cooperation between societies, Mediterranean countries and the rest of the world. It opens the door for this dynamic to percolate through the water cycle, downstream to upstream. The good environmental status of the sea, which includes preservation of biodiversity, long-term management of productivity and cutting pollutants, requires sustainability to start from the sea and work its way up the rivers. To have a healthy sea, you need well-developed coastlines and clean rivers.

As a logical consequence, human activities that have an impact on the sea are better regulated and controlled, starting with coastal areas followed by the gradual extension to all catchment areas. The water cycle becomes a vector of good global governance, with the sea as the beneficiary and fruit of the efforts of Mediterranean countries. The Mediterranean Sea, a global commons, becomes the symbol of Mediterranean renewal, built collectively, together with nature.

2. Dynamics and actors

INITIAL CONDITIONS FOR THE SCENARIO

The first prerequisite for this scenario is strong global awareness of the importance of the seas and oceans in the functioning of the major ecological cycles, accompanied by changes to the law of the sea in order to extend protection. This falls within a more general context where nature is increasingly recognised as having rights. Driven by influential scientists and spokespeople, the challenge of protecting the oceans becomes a major issue in the media and on the international agenda, with the Mediterranean at the top of the agenda.

This development is justified by the very rapid degradation of this sea, its biodiversity and its services. Scientists increasingly document systems drawing closer to tipping points, which triggers a reaction from the international community and many Mediterranean countries. People realise that they will all lose out, on all levels (especially tourism) if they do not act quickly and work together.
A fairly rapid reaction is required, because a simple transitional approach would not provide enough impetus and justification for major efforts over at least three decades. The involvement of the international community is also a testament to the fact that the economic and geopolitical situation of Mediterranean countries means that they cannot tackle the challenges they face alone, and that they need support to reconcile protection of the sea with other political emergencies. The Mediterranean's difficulties in solving these problems on its own are therefore another condition for this scenario..

ACTORS AND ASSOCIATED STAKEHOLDERS

Scientists naturally play a fundamental role in sounding the alarm. However, in order for there to be an effective reaction to the observed trends, all actors need to gradually feel involved, on a global scale, and work together in a concerted manner, including international organisations, economic leaders, governments, influencers of all kinds, including artists, multiple civil society networks, religious authorities, etc.

As the levels of awareness and radical decisions will be varied at first, and as considerable funding needs to be implemented over the first decade, the process can only be taken on through collaboration with the United Nations, working with national governments and a body that represents all stakeholders involved in safeguarding this global public commons. The occurrence of this scenario depends on the possibility of inventing an original form of governance linking these two levels.

DIFFERENT PHASES

Although the 2020s saw a succession of conferences and scientific initiatives that gradually put the seas and oceans at the top of the international agenda, closely linked to climate issues, it was not until the end of the decade that the tragic situation of the Mediterranean received specific attention from a wider audience.

The first phase begins with a period of accelerating decline in the quality of the sea, leading to serious disruption in several economic sectors that depend on it. Some ecosystems collapse as a result of a combination of over-fishing, changes in the coastal marine environment, pollution, and overtourism. Massive eutrophication of coastal waters at many sites leads to toxic algal and jellyfish blooms at the height of the tourist season (in the Adriatic Sea, Aegean Sea, and the Gulfs of Gabes, Naples, Izmir, etc.). This situation is compounded by major bottlenecks in regional cooperation. These repeated crises lead to high levels of tension, and even local conflicts, between the countries affected, with each country blaming the other for the damage caused.

The second stage involves mobilising the entire international community in the face of these upheavals. The disruption that will "generate" an in-depth transition is recognition of the potentially catastrophic nature of these changes, which is amplified by social media and the publication of increasingly alarming scientific reports. This disruption is particularly dramatic because the Mediterranean has

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been excessively idealised in order to promote tourism. Added to this is the growing awareness of its irreplaceable ecological role and its potential for radical transformation by 2050. The disruption is therefore cognitive, cultural and linked to everyday experience, with the fear of seeing a world and regional heritage that had seemed to have been taken for granted disappear in the near future.

On the basis of these objective and subjective observations, momentum for active reactions is set in motion at both the global and regional levels. However, this is inconceivable without four initial conditions:

– First, worldwide mobilisation organised under the joint impetus of scientific communities and non-profits;

– Second, f**avourable legal changes to the law of the sea and environmental law, and the introduction of new legal instruments, based on the recognition of the rights of nature[55] and those of future generations.** The idea of recognising the Mediterranean as a legal entity in its own right was touted as early as the 2020s and accepted by the mid-2030s;

– Third, **the creation of an original governance structure combining the mobilisation of civil societies at an international level, the regional cooperation bodies set up by the United Nations, and the Mediterranean states or local societies.** There is no obvious structure for managing a global commons. However, as for infectious diseases with the Global Fund, for example, it is possible to imagine a two-headed approach to this governance. This original structure would bring together the United Nations (MAP and the Barcelona Convention, alongside other UN agencies) in cooperation with other institutions (UfM, States, international organisations such as IUCN) along with a foundation that would manage the global commons. This foundation, called the Foundation for the Mediterranean, would be tasked with collecting and managing different sources of funding (public, private, sponsorships, taxes, etc.), and would mobilise civil society (NGOs, associations, economic or professional groups, communities, etc.), international organisations, states and local authorities on a voluntary basis.

– Finally, the last condition, at the heart of all the others, is mass investment in scientific knowledge and dissemination, for a sea that is still poorly understood.

The third phase of the scenario is the implementation of a policy for managing the sea as a common-pool resource, linking the different levels of governance involved, from global to local. It is conceivable that this will involve a long and ambitious transition towards multiple improvements in all Mediterranean countries and for all sea-related activities. This will require trial and error, turbulence and opposition, as well as a public effort to cushion or offset the effects of initiatives taken at all levels.

Three major advances should support a gradual new balance in governance:

- First, stabilisation of the two-headed structure proposed in the previous phase, which involves negotiating institutional arrangements, structuring a binding agenda and mobilising substantial funding over at least the first decade. Due to the large number of actors involved at all levels, the scale of the financial flows required, and the innovations to be put in place to organise multi-scale management of a regional sea as a common-pool resource, it will undoubtedly take time for the governance structure to be put in place and to find its full legitimacy;
- Second, support from strong scientific momentum in the Mediterranean Basin. It is likely that substantial and growing investment in scientific observation, measurement and modelling systems will rapidly strengthen justification for the measures taken and, above all, for the continued extension of sustainability policies. In this scenario more than in the others, substantial resources will be allocated to knowledge in general, and to education, research and observation technologies, in particular through participatory observation, the creation of a Euro-Mediterranean fleet of mid-short and coastal oceanographic vessels, or the creation of an equivalent of IPBES for the study of Mediterranean biodiversity drawing on existing mechanisms. As restoration moves up rivers and then catchment areas increasingly further upstream, ground (fixed sensor stations), air (drones), and space (satellites) resources will be implemented and their information integrated into databases made available to the research community. Modelling will be mainstreamed to demonstrate the long-term economic value of restoring the services provided by nature, not only the sea but also wetlands, rivers, agro-ecosystems, soil and, by extension, all upstream ecosystems. All these results will be disseminated in order to boost support from all actors and encourage their engagement, including in everyday actions;
- Finally, neither global mobilisation, new funding, nor major scientific investment in the Mediterranean Sea will be enough to make the prospect of managing this sea as a common good a reality unless this management is integrated into national or local policies, and adopted and implemented by local populations. The key factor in the success of this third phase is the launch of programmes that take into account specific sub-regional features, such as in the Aegean or Adriatic Seas, or even on an even finer scale of sub-basins, estuaries or coastal cities. This includes extensive education, training and information programmes to mobilise institutions in all countries and territories involved

[55] A pioneering example is the Mar Menor saltwater lagoon, located on the Mediterranean coast in Murcia (Spain). It was the first European and Mediterranean ecosystem to be granted status as a legal person in September 2022.

along with the general public and visiting tourists. Significant financial assistance is also provided to offset any investments made or constraints imposed, such as the abandonment of industrial, tourism or infrastructure projects, etc.

Finally, there is a fourth phase of geographical extension, during which the **dynamics that began at sea spread upstream. The initial positive results obtained for the sea lead to a desire to extend sustainability policies to all catchment areas.** All economic activities present in these catchment areas are gradually affected, in particular agriculture, industry, urbanisation and infrastructure, with the introduction of common-pool management of these rivers, based on the model of river basin agencies. It is a matter of reversing how people perceive the place of humans in relation to a commons as vital as water. Consumers help support the natural water cycle, rather than "helping themselves" to water without worrying about the consequences. If all this momentum succeeds in achieving its objectives, it should be possible to extrapolate this model of sustainable development to other regional seas, with the necessary adaptations.

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3. Scenario description

EXTERNAL CONTEXT

The climate is changing at an alarming pace, with an average projected increase in land temperature of about 2.3°C in the Mediterranean by 2050. The dynamics at work mean that extreme weather events become increasingly frequent, with deadly heat waves, mega-fires, storms and cyclones. On land, the most worrying development is the deterioration in the water balance (rainfall-evapotranspiration) and a consequential aggravation of hydrological and agricultural drought problems. Sea warming and acidification are faster than expected.

In the Mediterranean Sea, biodiversity changes with an accelerated arrival of species from the South, especially in marine ecosystems: fish, crustaceans, molluscs, plankton and algae are often of subtropical origin (especially from the Red Sea and the North-East coast of Africa).

The global context remains tense but without any major open conflict. The major powers have gradually divided the world into zones of influence, avoiding armed confrontations. Territorial issues gradually become less influential compared to the soft powers of advanced technologies and associated standards, and cultural and linguistic influence, etc.
Inequalities between the North and South and within countries are maintained or exacerbated. This is reflected in an increase in migration which often starts outside the Mediterranean (Sub-Saharan and Central Africa). This migration destabilises the southern Mediterranean, and then northern Mediterranean countries. This phenomenon of increased migration is exacerbated by climate change, and can be observed on every continent.
It is a source of diplomatic and sometimes even military tension between countries that struggle to agree on joint policies through a co-development approach. This is also true in the Mediterranean region, where the dynamics of cooperation have been weakened.
This leads to poorly-prepared measures intended to avoid open conflicts and humanitarian tragedies. Then, in the face of these pressures, and a succession of tragedies at all stages of migration (famines and violence in the South, migrants drowning as they travel by sea, etc.), northern countries implement ambitious policies to reduce migration at source. These aid plans shift gradually from emergency humanitarian operations to structural policies for investment in vital areas (water, agriculture, education, training, housing, etc.).

One environmental crisis follows another around the basin. Degradation of the Mediterranean is increasingly alarming, to the point where it is in danger of becoming a dead sea. Faced with the risk of ecological collapse of the sea and the entire Mediterranean ecosystem, international public opinion stirs, and under pressure from the public and some scientific figures, a coalition of NGOs, international organisations, states and territories intervenes.

Although Mediterranean states had long begun to cooperate to save this priceless common heritage, it was missing an actor from outside the region capable of extending these initiatives, representing the responsibility of the entire world community. With the consent of Mediterranean States, the international community declares the Mediterranean as a "global commons".
Substantial funding from both public and private sources, and from fees for the use of marine heritage, is available to governments and local Mediterranean actors to help them make the transition and do everything possible to restore the good environmental status of the sea and land (catchment areas). At the same time, the Mediterranean becomes a testing ground for original legal arrangements for managing common property.

DEMOGRAPHICS AND LAND-USE PLANNING

Mediterranean demographics follow a low growth trend with the population increasing from 520 million (2020) to 582 million in 2050. However, a distinction must be drawn between the three sides of the Mediterranean. In the North, the population falls from 196 to 172 million, with twice as many seniors (35%) as young people (17%), and in some countries, there is demographic collapse. In the East, the population increases by 18% to 146 million, with seniors accounting for 20% of the population, and young people accounting for 26 %. In the South, growth is stronger at 30%, for a total of 264 million.

The dominant trend is for a growing concentration of populations and activities on the coast. The aridification of the hinterland and the continuing degradation of agro-ecosystems in the South and East accelerates the rural exodus towards cities. Urbanisation and the concentration of populations in cities, especially along the coast, initially lead to a general deterioration of living conditions outside of gated communities.
Local crises arise on the most fragile coastlines, and the most densely populated and therefore most artificial. In some areas, tensions linked to the over-concentration of tourism foster these crises.

However, from 2030, two factors help reverse this trend. The prospect of rising global sea levels, although relatively limited at the time, begins to have an impact and gradually encourages human activities to move inland. There is talk that cities around the Nile Delta, such as Alexandria, could be directly threatened as early as 2050.
Above all, there is much more widespread awareness of the limits, risks and costs associated with population over-concentration, whether permanent or seasonal. Concerns about land-use planning (including on the coastline), time planning (particularly for tourism) and land ownership have moved from marginal or relatively ineffective to central. Despite many difficulties, the need for some form of ecological and land-use planning in coastal areas, including the immediate sea, gradually becomes apparent, including in southern cities. Measures to protect the most fragile ecological areas are extended.

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At the same time, **civil society becomes increasingly involved in the common-pool management of some urban areas, housing estates, green spaces, heritage sites, dunes, beaches and urban wetlands, sea walls or fire-fighting systems.** Coastal zones therefore become an ideal testing ground for common-pool management by local residents or local authorities. Outside urban areas, the target of preserving at least a third of the coastline as protected areas, extended to coastal marine areas, becomes the rule.

ECONOMY AND DEVELOPMENT POLICY

After a period of global economic stagnation and juxtaposition of national policies with no minimum consultation or long-term vision, Mediterranean societies organise themselves from 2030 to integrate into their development policies the objective of protecting the sea, which has been collectively agreed upon. In some areas, this implies major transitions.
However, only part of the economic fabric is affected. In many sectors and regions, economies follow in the footsteps of the 2020s, with significant differences between countries. Managing the sea as a commons will naturally bring new constraints and opportunities, but will not necessarily change all economic dynamics.

Apart from activities directly or indirectly linked to the sea and catchment areas, the main trend is towards more moderate growth than in the two decades between 2000 and 2020, although the environment and climate are taken into account to some extent in the expectations of private players in both the North and South. The need to decarbonise the economy and recarbonise the biosphere is established as a global target from the 2030s onwards, forcing the economic world to make changes in every economic sector and reduce dependence on fossil fuels. In the South, faced with the realisation that oil, gas and tourism income are threatened in the medium and short terms, governments decide to diversify their economies to reduce their vulnerability.

Southern Mediterranean states gradually engage in economic cooperation in order to build dynamic and strong economic sectors capable of integrating into the global market. Competitive companies are springing up in the South, particularly in the chemicals sector, which benefits from local fossil resources that continue to be used for this type of application. This increasingly important economic cooperation, requiring ongoing sustained dialogue, leads to a détente in relations between states previously trapped in long-standing latent conflicts. These conflicts are sometimes settled diplomatically, which reassures international investors and enables major infrastructure projects to be launched. A continuous railway line eventually connects Rabat to Riyadh, which boosts economic cooperation and South-South trade.
After repeated scandals linked to corruption and tax evasion by the economic elites, and strong social protest against the ever-increasing inequalities, the early 2030s see the increasing taxation of very high incomes.
Finance transitions much more clearly away from greenwashing towards more sustainable investments, for communication reasons, but this conversion to the green economy remains partial. It also changes because of pressure from insurance companies which have calculated that the neoliberal model of the 2000s was leading to increasingly costly disasters. Finance is therefore becoming partially "greener", more out of self-interest than out of virtue, and gains a form of social recognition.

Despite controversies, increasingly strict standards also start to be applied globally with NGOs specialised in control. Various monitoring and surveillance tools, in the digital world as well as in the field, facilitate this kind of service. However, these changes do not occur at the same speed across all sectors. While the energy sector continues to lag behind in decarbonisation due to the large volume of stranded oil and gas assets, some other sectors (chemicals, construction, road and rail transport, etc.) are making progress in reducing their carbon footprint, recycling materials, and repairing machines.
In the South and East, new agricultural and rural strategies are implemented to boost investment and encourage entrepreneurship in the agricultural fabric and rural areas. Despite these efforts, there is a trend of increasing food insecurity in many Mediterranean countries, particularly in the Maghreb and Mashreq, due to a lack of sufficient water and/or land resources. However, regional food security remains partly assured by the development of trade with water-rich countries.

A RADICAL TRANSITION IN ACTIVITIES LINKED TO THE SEA AND ITS CATCHMENT AREAS

In the 2020s and 2030s, activities linked to the sea and its catchment areas are already part of this general trend towards progressively greener economies. However, due to the sea's status as a global commons, and under pressure from increasingly stringent sea protection policies, they are going to have to make a more radical transition.

This transition takes place in two stages, starting with the water cycle:

- In the first stage, all technologies applicable to the blue economy and water cycle management are mobilised to reduce pressures on Mediterranean ecosystems. Like bluefish tuna in the 2000s, many fish stocks are saved from overfishing through surveillance, measuring and control systems that use fleets of drones managed by AI. While fishing remains below 1 million tonnes, aquaculture continues to grow in more environmentally-friendly forms, reaching 4 million tonnes. Monitoring, measurement and control systems are also used to restore sustainable management of renewable groundwater resources.
- At the same time, and wherever possible under the right conditions, water resources are protected, purified and recycled, and agricultural and industrial production systems are modified to help farming adapt to the new climate and reduce flows of pollution into the sea. Protecting the sea means not only cleaning up rivers and coastal effluents, but also making better use of available water and irrigating the land.

The shipping sector changes with the mainstreaming of decarbonised motorisation technologies such as renewable electric power, hydrogen, sailing, Magnus effect rotor ships, etc. These innovations are used to promote "green" cruise tourism, even though overcrowding at some sites remains problematic. In order to maintain its position as the world's leading tourist destination, the most popular sites set up a sustainability charter and offer virtual tours in HD Metavision to alleviate tourist numbers (e.g. Venice: 28 million visitors in 2022; entrance fee and quotas from 2025[56], which could be followed by other Mediterranean cities).

In the off-season, when the weather is cooler, national and international tourist flows are encouraged by developing new holiday types: eco-agritourism, sharing local life and activities (crafts, fishing, seasonal harvests, etc.). This alleviates pressure on coasts and islands, spreads tourist flows over the whole year, and finally, promotes cultural and relational exchanges beyond commercial services. The development of this "green" tourism also boosts rural areas and helps reduce the gap between these areas and towns and cities on the coastline, which are now better integrated into globalisation.

From the end of the 2030s, the objective of strict preservation of the sea and restoration of its biological capacity will have a much more structural influence on all the activities that directly impact it. This is not just the blue economy, which now has a strong sustainability component, but all activities linked to water quality management, waste treatment and recycling, plastics substitution, pollution treatment, and ecosystem regeneration, etc.

Standards are made significantly stringent, not only in coastal regions and catchment areas, but also for all activities with a significant impact on the sea, including the exploitation of hydrocarbons and deep-sea mining, commercial fisheries, non-environmentally-friendly maritime transport, large cruise ships, but also aquaculture, desalination plants and certain forms of tourism, etc. Activities allowed in Marine Protected Areas are strictly limited.
As a result, the Mediterranean gradually becomes an essential economic hub in all these areas of ecological excellence under transition, as they benefit from funding raised by the Foundation for the Protection of the Mediterranean. **At the same time, islands and some coastal regions become laboratories for a circular and symbiotic economy** that serves as a global example. The social co-benefits gradually appear, including in southern countries.

SCIENCE AND TECHNOLOGY

Science and technology linked to the good environmental status of the sea benefit from a vast "Marshall Plan" across the Mediterranean, where they are systematically developed. Aware that only strong cooperation can enable the region's R&D to find solutions to save the sea, the three shores of the Mediterranean launch scientific cooperation programmes in marine ecology. This cooperation in science falls under the creation of a regional equivalent of IPBES drawing on existing institutions, with a focus on knowledge of Mediterranean marine ecosystems.

At a more technical level, this cooperation focuses on the most sensitive areas of pollution reduction and ecological restoration of the sea and catchment areas, such as:

- Degradable bioplastics to eventually replace all plastics;
- Some marine technologies: multi-purpose renewable energies that can be integrated into the marine environment, low-carbon vessels for both fishing and maritime transport, electric or hydrogen-powered engines;
- Sea surveillance and information systems: fleets of drones, deep-sea exploration and mapping, autonomous or fixed sensors for automatic species recognition, algorithms for developing new dashboards of indicators on the quality of marine environments, widespread tagging and monitoring of large cetaceans, AI applications;
- Techniques for improving water quality and management throughout the water cycle: leak detectors, filtration systems, ecological and energy-efficient desalination systems, smart networked systems, wastewater recycling, sensors, grey water management, etc. de fuites, système de filtration, de désalinisation écologique et à basse consommation d'énergie, systèmes intelligents en réseau, recyclage des eaux usées, capteurs, gestion des eaux grises, etc.

These R&D capacities require a high level of regional cooperation, which justifies the funding of research centres focusing on key issues, such as digital technologies, blue technologies, the energy transition, the circular economy, water-efficient agricultural production methods, closed-circuit industrial processes, etc. With a view to managing coastal, maritime and river areas as a commons, the development of citizen science is widely encouraged, involving local residents and associations in the observation and even management of certain environments.

This local dynamic does face some issues in terms of standards, languages and data processing, but the benefits far outweigh any dysfunctions. The governance put in place to ensure progress in marine conservation guarantees the transparency, integration, synthesis and quality of all the information produced.

[56] With the introduction of a 20-day test period in 2024 and a €5 access fee.

SOCIETIES

At first, in all the countries around the Mediterranean Sea, societies are disoriented as the increase in threats to their ways of life and economic status generates anxiety: acceleration of climate change, loss of resources and heritage, destruction of social groups despite the Internet, difficulty in discerning reliable information, job insecurity, exacerbated international competition, crises in public services in many countries, including in the EU, degradation of ecosystems, increasing pollution, growing economic and financial vulnerability of southern countries, which are still overly dependent on rentier economies (phosphates, oil, gas, etc.).

However, during the 2030s, aggravated climate and ecological tensions, particularly with regard to water and the sea, and more training, education and awareness-raising campaigns on these issues at all levels, make societies acknowledge the scale of current threats. They respond by **developing community values around care and the collective management of common goods.**
This change is the result of maturity and ownership of both global and local environmental issues, in particular issues linked to the sea, by the majority of Mediterranean societies, although they are struggling to express themselves in the political sphere. **A culture of the sea and oceans gradually spreads to an ever-increasing number of people in the Mediterranean.**
As part of a global movement to save the Mediterranean, local civil societies become aware of the urgent need to act on vital common issues without relying on traditional political mechanisms.

This call to action is obviously not uniform across the Mediterranean, and the timeframe varies. It begins in the southern Mediterranean, where global change and the activities of large multinationals threaten common resources, in particular water and coastlines of interest for the tourism sector. Reviving a long tradition of common-pool management of resources, particularly water, a vast socio-cultural movement re-emerges to promote the preservation and sustainable management of the commons by local communities, who are the first affected by these crises (see Box 23).
Responsibility for common resources is extended to the sea, the circular economy, the protection of coastal areas and Marine Protected Areas. This movement develops quite quickly in the East of the basin, as well as in the Balkans. In the North, where individualistic values are more deeply rooted, societies are more fragmented and crises are less severe, these new forms of organisation take longer to become established. This takes various forms, depending on the region and the different cultural contexts of the basin. There is an increase in local assemblies, community councils, neighbourhood authorities, community gardens, associations and NGOs working with local authorities.

Young people play a key role in this because they have understood that they have to get directly involved for action to be effective. Increased representation of women at all levels of decision-making helps facilitate dialogue and increase pressure on decision-makers. Ultimately, the success or failure of this transition towards management of Mediterranean marine heritage as a commons depends on the involvement of everyone, including the economic actors most affected, such as fishermen, shipping companies, developers and farmers.

Box 23.

COMMON-POOL MANAGEMENT OF RESOURCES IN THE MEDITERRANEAN: TWO EXAMPLES OF SUCCESSFUL COOPERATION FOR GROUNDWATER USE

Guillaume Benoit - Plan Bleu

The Junta Central De Regantes De La Mancha Oriental (JCRMO) is a territorial management association created in 1994 with compulsory membership for all groundwater users (1088 members over 112,100 ha). Its action has succeeded in reducing water extraction by a quarter in seven years, by "setting extractable volumes for each water management unit, adjusted annually according to hydrological conditions", and the implementation of a "system of controls and sanctions managed automatically via the tool for evaluating irrigated areas and volumes extracted". In the event of fraud, violators are penalised and may have to appear before a jury of JCRMO farmers, with penalties adjusted according to the seriousness of the offence. Below 30,000 m3, the penalty consists of an obligation to reduce water use during the following period and a fine of less than €600. In the event of a repeat offence, the fine can range from €10,000 to €1 million, or even lead to a permanent loss of permit.

For the consortium for agricultural development (GDA - groupement de développement agricole) of Bsissi, Tunisia, the regional commissariat for agricultural development (CRDA) and an agricultural leader have been critical to the initiative's success. Aware of the risk of salt intrusion, the CRDA first took a very firm stance (banning new pumping operations, withholding subsidies, taking legal action) and then carried out major communication efforts to find solutions to resolve the conflicts between farmers and the government. With the participation of a majority of farmers led by the local leader, the GDA's articles of association were drawn up and approved at a general meeting, along with quotas and penalties to be imposed on "any non-member or non-compliant farmer, who shall not be eligible for subsidies". Compliant farmers, on the other hand, have been able to access aid for conversion to local irrigation, as well as bank loans, by legalising their status as landowners. All the farmers who irrigate in the area eventually joined the GDA. Irrigated areas have been stabilised as quotas and the gradual adoption of less water-intensive crop rotations have helped to save water.

GOVERNANCE

To protect the Mediterranean, funding is secured through low taxes, but on broad bases, essentially based on uses of the sea, and international tourist flows (over 400 million visitors each year - excluding the pandemic), particularly via air transport, site visits, and maritime transport, etc. To this is added a share of pollution-related fees levied on catchment areas (and any fines imposed), which are collected by basin agencies or equivalent bodies.

These considerable flows are managed by a hybrid organisation similar to a "Global Fund", working in close collaboration with the MAP and the countries participating in the Barcelona Convention, with tax agreements between Mediterranean states. These resources strengthen existing and active regional organisations in the long term, including the Mediterranean Action Plan, its Protocols and activity centres, along with networks of universities and professionals specialising in marine sciences in the Mediterranean.

They also enable new actions, such as financing irrefutable baseline assessments of the state of the environment, monitoring networks, and, above all, support for the necessary structural actions and transition programmes, with long-term and well-equipped resources for monitoring activities.

These monitoring and control systems are financed on a global basis, but are mainly managed by regional bodies. What's new is that their results are partially validated by an international scientific body and are generally open, with total transparency, for consultation by businesses, associations, states and the general public, with full enforcement in the European Union of the principles of the Aarhus Convention.

In addition to these financial changes in governance, there are three other factors that will determine the success of this scenario:

- First, **international changes to the law of the sea and the oceans, leading to greater protection of marine biodiversity and the deep seabed, along with gradual recognition by the law of the legal status of certain remarkable elements of nature.** Eventually, the Mediterranean and some rivers will be given this status, increasing the scope for action by the international community, and Mediterranean regions and societies. In addition to these new rights of nature, will be the rights of future generations, which will be recognised and sanctioned by an international court, similar to the International Criminal Tribunals. The sea is considered the first commons to protect and promote, within the framework of a policy of shared sovereignty and involvement of all actors and societies, with the financial support of large international donors and private benefactors. It is declared an inalienable resource in space and time, requiring the revision of the concept of exclusive economic zones (EEZ). Existing international protocols are strengthened and appropriate enforcement resources are put in place;
- This change to the law is reinforced by a strong alliance between civil societies inside and outside the Mediterranean, and scientific communities. Across all Mediterranean countries, there is an emergence

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of multi-purpose observation systems, structured in networks, relying on NGOs and local scientific networks. The quality and credibility of these citizen-based networks remain variable, but they provide great services for monitoring environmental changes and alerts;

– Finally, a decisive factor is the implementation of governance that articulates, even more closely than has been the case for the past half-century, the objective of protecting the sea with all upstream developments and policies for maritime activities, coastlines, islands and catchment areas. This requires the active involvement of states and local authorities for strict enforcement, extension and integration of policies for protection of the sea. Regulations, standards, economic incentives and land-use planning policies are therefore gradually extended, with the support of funding from the Foundation for the Mediterranean, stronger monitoring systems and the active participation of civil society and local populations.

The synergy of these actions, with the sea as a collective issue suggests that there could be a virtuous dynamic, but it is not enough. Within a decade, the positive results of this policy, which can be measured at sea and along the coasts, warrant the widespread adoption of this model by including the coastal strip and then the catchment areas based on the vital importance of preserving a healthy water cycle. After the first phase of the Mediterranean "rescue plan", which focused on the sea itself, stakeholders involved in the project quickly decide on a second phase, focused on the catchment areas of all Mediterranean rivers. It becomes clear that restoring the good ecological status of the sea will only be achieved by improving the soil and land in catchment areas, and the quality of the water that flows into them[57]. To achieve this, rural people and farmers are paid to restore agro-ecosystems and the associated ecosystem services. Heavy fines are imposed on polluters and substantial funding is made available to change polluting activities along rivers and their tributaries. Common-pool management bodies for these rivers, such as basin agencies, become widespread and are associated with sea management bodies.

In a context marked by global warming and the widespread scarcity of water resources, the overall management of the water cycle in terms of quantity and quality becomes a key concern, with the systematic recycling of wastewater, good management of grey water and improved distribution

[57] See maps in Annex 10. The discharge of freshwater from rivers into the Mediterranean, and Annex 11. The Mediterranean eco-region with its hydrographic boundaries and drainage basins

systems to reduce leakage losses from 30 % to 10 %.
On the eastern shore of the basin, tensions over control of the region's major rivers make this work more complicated. Nevertheless, over time, and thanks to the mediation of countries outside the conflict, tensions are eased and environmental negotiations see the advent of more peaceful management of water resources. The ecological dimension is not forgotten, with policies for the "ecological regeneration of watercourses", ecosystem restoration and the reintroduction of species.

LAND AND MARINE ENVIRONMENT

Global climate change is accelerating, with a continued rise in land temperature, reaching 2.5°C by 2050 in the Mediterranean, along with sea temperatures. This change had been predicted for a long time, and states and businesses respond in many ways: investments by states and major corporations in decarbonising the economy, radical changes through legislation (e.g. EU ban on the sale of new combustion engine cars starting in 2035).

In southern and eastern Mediterranean countries, and Sub-Saharan Africa, cooperation plans aim to reduce dependence on fossil fuels, ensure investment in renewable energies (solar, wind, hydrogen), and train the entire skills chain in new technologies.
However, the mediocre economic situation and political and social constraints delay the implementation of these actions, and continue to marginalise climate priorities until the late 2030s.

However, the situation changes from the 2030s for two reasons: first, aggravation of the ecological situation and second, international mobilisation around the sea. Major disturbances affecting both marine and land ecosystems (drying out, soil erosion and salinisation, high tides, flooding, mega-fires, coastal erosion, water shortages, etc.) prompt the public authorities to take drastic measures.
There are a large number of programmes aimed at the sustainable management of ecosystems and resources, including the promotion of natural ecosystem services, agro-ecology and ecosystem restoration/regeneration, and careful water management. These developments align with the objective of protecting the sea and are gradually integrated within short supply chains and the circular economy, with waste recycling and the multiple re-use of water.

Southern countries are often ahead when it comes to the common-pool management of water resources and the use of suitable species in agriculture. European experts come to get training in the South, with widespread exchanges of practices and experiences between farmers on different shores of the Mediterranean, thanks, in particular, to the Internet.

The biggest change is that the production of ecosystem services from the sea and its coastline (46,000 km of Mediterranean coastline) **up to the headwaters of catchment areas, has become a collective priority for all Mediterranean countries.**
A coherent set of rules is adopted, starting from the achievements of the Barcelona Convention and its Protocols, supplemented by more ambitious measures such as the expansion of Marine Protected Areas to more than 30%, then 50% of the maritime area and, above all, by providing the means to enforce these rules (surveillance, monitoring, legal proceedings, sanctions). Flotillas of patrol boats and drones are used in accordance with common intervention rules for all countries. Standardised measurement systems are installed on a wide range of infrastructure, such as buoys, offshore wind turbine mounts and ships of all sizes, with the call for participatory science at sea, particularly through amateur fishermen, pleasure boaters and offshore racers. A global data processing centre is set up in Malta in collaboration with REMPEC, a regional organisation that already monitors maritime pollution.
This centralised management provides a full view of the state of the sea, and improve awareness about urgent issues that need to be dealt with, and the fundamental policies to be implemented. Soon enough, these efforts lead to regeneration of biodiversity and even enrichment of some ecosystems with the arrival of subtropical species via the Suez Canal, the Strait of Gibraltar and de-ballasting.

Not all of these new species are invasive, i.e. they do not all have damaging effects on existing species. Some of them can even be exploited commercially. However, improved management of fisheries and the virtual eradication of illegal and unreported fishing are what keep fishing stable.

A similar effort is made on land, particularly related to ecological management of catchment areas and massive clean-up programmes targeting human and industrial activities and the associated discharges into rivers and coastal areas. Gradually, policies and forms of common-pool management tried-and-tested around or for the sea are extended within the various countries or regions. The success of this process sets an example for all regional seas and, by extension, for the world ocean in the long term.

4. Assessment

This scenario starts with the worst before getting better. A simplified image would be “hitting rock bottom before bouncing back to the surface”. There are two advantages in terms of likelihood: first, it follows a more-or-less business-as-usual scenario in the first decade, making the situation leading to the reaction plausible for 2030. Secondly, it aligns with certain current change dynamics (pressure from numerous NGOs for protection of the seas and oceans, gradual recognition of the rights of nature and of future generations), with a logical extension to a global scale.

However, despite these favourable factors, the scenario remains largely unlikely because it requires the mobilisation of a very large number of actors at different levels, from the global to local levels (states, corporations, civil society, NGOs, public opinion), to make this a unifying global project that is economically viable and socially rewarding. Moreover, **it would require sea quality to become a driver for change in all countries, which is far from the case today.**

The resulting virtuous circle and its cascading effects are difficult to implement, and this complexity makes it unlikely. The same is true of the institutional, legal and financial framework that needs to be implemented. Recent agreements on the restriction of sulphur and nitrogen compounds in ship fuel in the Mediterranean may pave the way for other major advances, within a truly sustainable blue economy. Despite this, all the transformations needed to move towards common-pool management in the Mediterranean would require the constant support of all stakeholders, not to mention colossal funding, which is by no means a given.

The scenario will also result in constraints that are difficult to overcome (e.g. standards, strong restrictions on resource extraction, etc.) and will inevitably come up against multiple interests hostile to any structural change.

It does, however, represent a possible way out of the current difficulties and obstacles, and a utopia that mobilises actors and offers a touch of wishful thinking, which is an essential ingredient in triggering a desire for action and solidarity. Moreover, it is important not to overlook the significant co-benefits for key issues such as democratic systems, global management of the water cycle, waste reduction and the circular economy, and the emergence of a regenerative or symbiotic economy that puts life and biodiversity back at the heart of sustainability policies.

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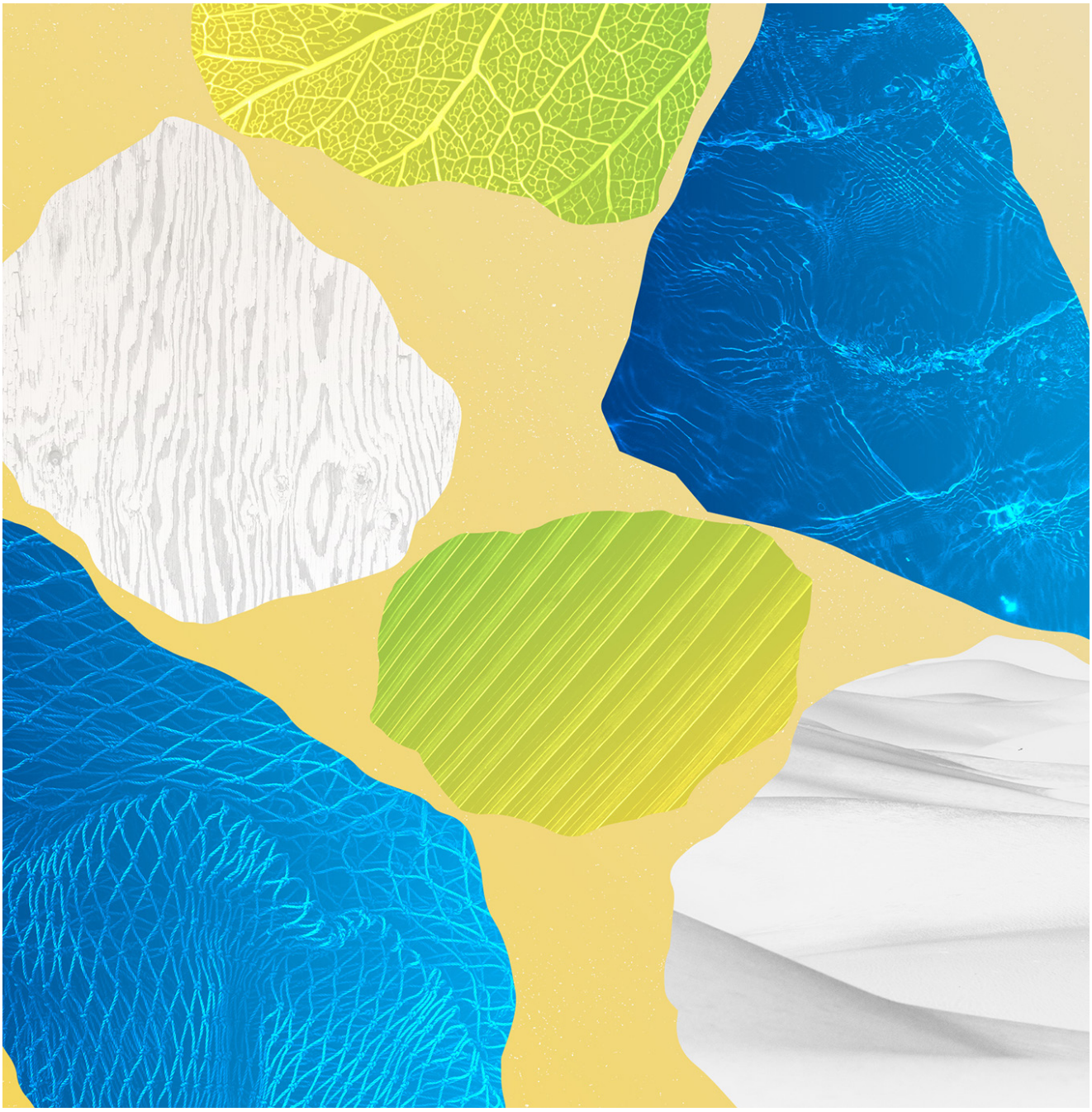
PART 5

SUMMARY AND RECOMMENDATIONS



I. ASSESSMENT OF SCENARIOS

The above scenarios anticipate six possible change trajectories for the Mediterranean, both as a sea and a region, by 2050. They are unique in that they combine different contextual assumptions with specific configurations of public and private stakeholders. Although one of these scenarios can be considered a business-as-usual scenario (no. 1), their main purpose is not to say with certainty what the situation in the Mediterranean will be in thirty years' time, but to open up possibilities in the face of the likely prospect of significant aggravation of current problems and even potential exposure of the whole region to serious crises.

1. Analysis grid

These six narratives can be summarised and assessed in two ways: either as a whole, or by emphasising their differences.

With these two considerations in mind, an assessment table has been created for all the scenarios, based on a grid of ten criteria:

- Initial global contexts,
- Triggers,
- Drivers of change,
- Main actors,
- Levers for action,
- Ways of understanding the sea,
- Opportunities and benefits,
- Risks and weaknesses,
- Preferred analysis principles,
- Plausibility of the scenarios.

The results of this analysis are presented in the table 8:

Table 8.
SCENARIO ASSESSMENT TABLE BASED ON 10 CRITERIA

Scenario title / Evaluation criteria	S1 - Inertia, marginalisation of the Mediterranean, and pragmatism	S2 - Colliding crises and forced adaptations	S3 - Growth at all costs in a fragmented Mediterranean	S4 - Euro-Mediterranean partnership for a blue-green transition	S5 - Another sustainable development model specific to the Mediterranean	S6 - The Mediterranean Sea, global commons
Initial global context	Economic or geopolitical difficulties, and climate and ecological policy inertia.	Global crises, crossing of tipping points.	Poorly regulated globalisation, decline of international institutions - Economic liberalism.	Global digital economy (4.0) and global competition on green and blue technologies.	Economic deglobalisation but sustainable development is a global priority.	Alarming evolution of the climate and the state of ecosystems, especially oceans.
Triggers	Progressive degradation in all sectors.	Crises and conflicts over resources (especially water).	Desire to solve unemployment in SEMCs, economic deregulation.	Public pressure and EU initiative, success of the Green Deal.	Awareness of the dead-ends of maldevelopment, and mobilisation of all stakeholders.	Rapid degradation of the sea, mobilisation of global civil society.
Drivers	*Status quo* and pragmatism.	Strategies for survival and resilience in the face of crises.	Economic development and competition - Southern countries catching up and wanting power.	Blue-green transition based on digital technologies, new energies and ecological modernisation.	Ecological emergencies and international pressures - Refusal to be dependent - Value changes and civil society activism.	Care for a common good, start of a virtuous spiral.

Scenario title / Evaluation criteria	S1 - Inertia, marginalisation of the Mediterranean, and pragmatism	S2 - Colliding crises and forced adaptations	S3 - Growth at all costs in a fragmented Mediterranean	S4 - Euro-Mediterranean partnership for a blue-green transition	S5 - Another sustainable development model specific to the Mediterranean	S6 - The Mediterranean Sea, global commons
Actors	States, transnational corporations, lobbies, socio-economic elites.	Failed states, violent groups, self-organised communities, local actors, insurance and risk management.	States, BRICS, multinational corporations, national "champions".	European Community and Mediterranean Alliance, businesses (digital, energy).	Civil societies and territories - Sub-regional alliances - New multi-scale governance organisations.	International opinion and community, then all Mediterranean actors.
Levers (themes and tools merged)	National support policies, business adaptation, institutional makeshift policies and social adaptation measures.	National emergency measures, local resilience strategies, risk management.	High growth policies, foreign direct investment - Increasing rentier revenues and comparative advantages.	Technical progress, Euro-Mediterranean cooperation on digital technologies and energy - Economic incentives.	North/South cooperation, intercultural dialogue and resource pooling - Long-term transition strategies and land-use planning.	Protection measures to preserve the good ecological status of the sea, catchment areas, international taxes, new rights.
Sea	Protection of emblematic species, general degradation of the marine ecosystem.	A lawless space, ecosystem disruption.	Area for economic trade, with no environmental protection.	Intensive but sustainable economic exploitation, which is monitored.	Local sea, a protected area for sharing between Mediterranean peoples.	Global commons, the focus of all care.
Opportunities and benefits	Development of the green economy, some successful adaptations (e.g. energy).	Local resiliencies, invention of new models - Opportunities for new political groupings.	Economic development in the SEMCs, North/South rebalancing, jobs, investment possibilities.	Green growth and Mediterranean leadership in the blue economy - Low sustainability.	Cultural and economic renewal - Invention of an exemplary model of sustainable development.	Laboratory and model for protecting regional seas, a common unifying objective.
Risks and weaknesses	Political and social risks, irreversible environmental degradation - Marginalisation of the region - Growing gaps between promises and results.	Decay of Mediterranean governance, failure of some states - Partial collapses.	Unsustainability, growing inequalities.	Inequalities produced by the transition, social protests, interference by the European Union and the risk of a persisting North/South divide.	Vulnerability of the Mediterranean to climate change that it cannot control - Lack of consensus on conservation and resources for endogenous development (e.g. water).	Action focused mainly on the sea - External intervention seen as interference, resistance from lobbies, discrepancies between national policies, irreversibility of degradation.
Analysis principles	Test the inertia of the system to its limits and those of a wait-and-see attitude, and room for manoeuvre for pragmatic policies.	Consider resilience capacities after collapses.	Test the limits of the market economy and economic voluntarism. Further explore growth-environment interactions.	Explore the benefits (and weaknesses) of an eco-technological transition and possibilities for closer ties between the European Union and the Mediterranean.	Imagine a new sustainable development narrative for the region, and assess its strengths and limitations.	Test a "radical" assumption to "save the sea" without imposing sustainable development on the entire region.
Plausibility	High (business-as-usual).	Medium.	Medium.	Medium.	Low.	Low.

2. Overview

The first question raised by this set of scenarios is how representative they are. Starting with over thirty variables and multiple assumptions about their development, representing a very large number of possible combinations, no foresight method can guarantee that all possible scenarios that are the most representative of future developments will actually materialise. By combining two complementary approaches, both based on the same table of variables, **the scenario building method was designed to guarantee good representativeness from the outset.**

In hindsight, and on reading the summary table, it is clear that the six scenarios adequately meet the initial specifications. They cover most possible choices in key areas such as the international context and its impacts on the region, the place of the environment in development, whether or not there is cooperation between Mediterranean countries, technical choices or intervention tools, and modes of governance. A desire to represent the main possible trajectories between now and 2050 also explains the number of scenarios.

The first three scenarios can be considered “pessimistic” and the last three “optimistic”. This is not for the sake of balance. There is no such thing as an entirely “bleak” or entirely “rose-tinted” scenario.

First, we already know that whatever scenario occurs or is favoured, the region’s environment and sea will be exposed to very strong pressures linked to climate change (with a minimum of 2°C warming by 2050) and major demographic changes (very different in the North and South).

Secondly, the scenarios are not only designed to highlight risks or opportunities, but also to draw lessons from them for public policy adaptation.

As the second-to-last line of the table shows, each scenario is linked to a question associated with public policy:

- What room for manoeuvre is there for pragmatic policies in a future context of widespread obstacles - and to what extent can a wait-and-see approach be a solution? (Scenario 1);
- How can we prepare for serious crises and build resilience capacity? And to what extent will the impact of these crises trigger major changes between now and 2050? (Scenario 2);
- What environmental aspects can be preserved in the long term or financed through proactive strategies for strong growth? (Scenario 3)
- Can we envision a green and blue technological transition in the Mediterranean, driven by the European Union, and what are its limits? (Scenario 4)
- Is there a possible pathway towards a specific Mediterranean model of sustainable development, and under what conditions could successful local or extra-local experiences and innovations be mainstreamed with this in mind? (Scenario 5)
- Can the Mediterranean Sea be saved in the long term without imposing a high level of sustainability on the entire region and thanks to the mobilisation of the global community? (Scenario 6)

All these questions, which are only raised in the scenarios, will have to be addressed again, at the level of the Mediterranean sub-regions, in the final phase of MED 2050, which is dedicated to transition strategies.

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II. SUMMARY AND LESSONS FOR ACTIONS

To account for major uncertainties up to 2050, and by methodological design, the six scenarios are highly contrasting, with contexts, triggers, drivers of change, actors and levers that differ profoundly from one another. This does not rule out certain similarities (climate and demographic pressures, the omnipresence of water-related issues, the growing dependence of the Mediterranean on the global context, the digital transition, etc.), but it does show that there may be a number of possible futures over the next 30 years - with very different consequences for the environment and the sea.

In terms of plausibility, Scenario 1 ("Inertia, marginalisation of the Mediterranean, and pragmatism") is the most likely and can be considered the business-as-usual scenario. The other two scenarios showing a degraded situation ("Colliding crises forced adaptations" and "Growth at all costs in a fragmented Mediterranean") have a medium level of plausibility. Of the "positive" scenarios that lead to an improvement, only Scenario 4 of a "Euro-Mediterranean partnership for a green and blue transition" also has a medium level of plausibility, as the final two are considered fairly unlikely.

In conclusion, several lessons for action can be drawn from these different scenarios:

- **A wait-and-see attitude and a policy of taking small steps is not a stable or sustainable solution in the long term,** as Scenario 1 risks a rapid transition into Scenario 2 ("Colliding crises") or Scenario 3 ("Growth at all costs") for opposing reasons;
- After the turbulence already seen in recent years (COVID, international tensions, climate events, etc.), **the priority now more than ever is to prepare for unforeseen situations and to initiate policies for climate change adaptation and the prevention of major risks;**
- **The Mediterranean region will increasingly be unable to rely solely on its own strength to overcome the challenges it faces.** Virtually all the scenarios show that the region is highly dependent on the outside world, in a wide variety of forms (climate change, standards, technologies, financial contributions, etc.), which highlights the importance of the region's active involvement in international policies, both at a global level and in neighbouring regions, such as Europe, Africa or the Middle East;
- **All the sustainable development scenarios require new forms of cooperation to be established, whether North-South** (Scenario 4, and partially Scenario 5), **South-South** (Scenario 5) **or between the Mediterranean and the global community** (Scenario 6). **More broadly, innovations in governance are one of the keys to future transitions;**
- Finally, although the obstacles currently preventing rapid progress towards sustainable development of the Mediterranean and preservation of the sea appear to be significant (see Scenario 1), **there is still plenty of room for manoeuvre to make progress** - innovations in governance and cooperation, technologies (particularly in renewable energies and marine-related activities), diversification of development models, economic incentives, law enforcement or changes to laws, mobilisation of international funding, involvement of territories and civil society, changes in values and lifestyles, etc.
- There is no choice but to be proactive and to define transition pathways in order to organise the mobilisation of these different resources in a way that is fair and adapted to each territory.

The room for manoeuvre and transition pathways will obviously differ according to the scenario. The choice of scenario or impact suffered will largely determine the types of action that can be envisaged in the short, medium and long term. Among the very large number of actions ultimately proposed by MED 2050, **it is possible to identify a set of urgent and relatively inexpensive measures, which could seemingly be implemented whatever the scenario, referred to here as "no-regrets measures".** A list of these measures, presented in Box 24, could form part of the pragmatic initiatives launched in a difficult context, as depicted in Scenario 1.

Box 24.

A FEW NO-REGRETS MEASURES

I) DEVELOP COLLECTIVE INTELLIGENCE, EXPERIENCE SHARING AND A FORESIGHT CULTURE WITH A VIEW TO THE SUSTAINABLE DEVELOPMENT TRANSITION

- Based on MED 2050, organise a collective debate on transition pathways.
- Connect up Mediterranean think tanks by integrating social, economic and environmental approaches.
- Build a Mediterranean foresight network and encourage its development.
- As part of intra-Mediterranean sharing of best practice, promote experiences in the South, particularly in terms of climate change adaptation.
- Promote and fund networks of local authorities to encourage experience sharing in specific areas (coastal protection, sustainable tourism, water, towns, etc.).
- Launch a project to map the biodiversity of the Mediterranean Sea and an IPBES equivalent for the Mediterranean.
- Reinvest much more heavily in information and modelling systems and their dissemination. As an extension of the MCSD, create a Mediterranean Commission on welfare indicators and natural capital accounting.
- Introduce ocean literacy in schools, establish a “Mediterranean Erasmus” and institutionalise a Youth Commission for the Future.

II) PRIORITISE THE EXTENSION AND ENFORCEMENT OF LAWS AND REGULATORY OR ACCOUNTING FRAMEWORKS, AND ADOPT SHARED STRATEGIES IN INTERNATIONAL NEGOTIATIONS ON THE ENVIRONMENT AND CLIMATE

- At least double the resources for enforcement of the Law of the Sea and the Barcelona Convention.
- Involve Mediterranean countries in negotiations on the extension of the international law of the oceans, and link this with discussions on the protection of common goods.
- Establish a Mediterranean intergroup within the COPs (climate, biodiversity).
- Adopt a strong concept (in the sense of strong sustainability) for the blue economy, and establish the corresponding standards and labels.
- Move towards extending CSR and the new accounting frameworks introduced in the North to the countries of the South, and strengthen resources for certification control.

III) TAKE CONSERVATION MEASURES TO AVOID IRREVERSIBLE DEGRADATION OF THE SEA

- Consider a moratorium on deep-sea mining and oil and gas production in the Mediterranean Sea.
- Provide absolute protection of Posidonia and biodiversity hotspots (lagoons, etc.).

IV) ESTABLISH SOLIDARITY MECHANISMS IN THE EVENT OF NATURAL OR CLIMATE DISASTERS

- Develop existing cooperation methods and invest in new joint resources for prevention, warning and intervention in the event of extreme events.

V) CREATE NEW FUNDING FOR A NUMBER OF COMMON PRIORITIES

- With a view to setting a Mediterranean-wide target of 30% strong protection for both the sea and the coastline, create a common fund through a tax on tourism, sea and air transport, etc.
- Adopt a proactive stance at international level on the transfer of resources to southern countries, to finance climate change adaptation, and create a common regional structure for funding, studies and experience sharing.
- Establish an investment fund for the development of intra-Mediterranean infrastructure in the field of solar energy (and possibly water transfers).

FACED WITH THE SHOCKS AHEAD, THERE IS AN URGENT NEED FOR DISRUPTIVE INNOVATIONS*

Faced with the shocks ahead, the Mediterranean needs to adapt quickly, taking full measure of the challenges it is facing. The effects of climate change are a central issue in the Mediterranean, as this change will be more pronounced than in the rest of the world.
Reducing greenhouse gas emissions also remains a major global challenge, which needs to be reflected locally, particularly through the regulated and sustainable development of renewable energies, but with the clear understanding that the effects of any measures will only be visible in the long term.
Alongside local action, closer cooperation between northern and southern Mediterranean countries will undoubtedly be one of the keys to adaptation, based on financial and technological transfers from the North to the South and on feedback from southern countries to northern countries, as the South is more exposed to heat.

The Mediterranean is a laboratory for climate change adaptation on a global scale, and a key space for South/North, South/South and North/South cooperation. In the North, the European Union is a tool for sharing best practice at its level.
The urgency of current and future crises means that we need to take a gamble on disruptive innovation in the Mediterranean Basin, in all fields.

In terms of governance, there is a need to move beyond the diversity of public and private, national and local institutions and actors to build effective political intervention frameworks. When it comes to funding, new, long-term and sufficient resources need to be secured for local adaptation and the ecological transition. The ecosystem services provided by natural environments should be better integrated into socio-economic dynamics and green budgets.
At the heart of this disruption to adaptation dynamics lies Mediterranean “collective intelligence”, which is needed to support the emergence of a common vision in all fields, particularly through shared research, training and the pooling of skills around major development programmes.

One major point of improvement and a shared priority is the proper management of water resources, which are vital in the Mediterranean region. Other priorities include the adaptation and even restructuring of cities to increase resilience, and tourism, to help it evolve towards sustainability rather than mass tourism.
This requires a thorough overhaul of land-use planning and the behaviour of all actors. Mediterranean land, coastlines and marine areas are threatened with irreversible degradation. The responses are geared towards integrated, long-term management of their functions in support of populations that expect coherent, practical solutions in their everyday lives.

Should we react quickly or face inexorable decline? The scenarios help us make informed choices, but a wait-and-see attitude is no longer an option.

* Robin Degron, Director of Plan Bleu

CONCLUSION AND NEXT STEPS

Barring any major shifts, by 2050, the Mediterranean Sea and Region will be in a far more alarming situation than today, with the risk of having to manage a combination of serious crises.

In addition to the internal causes of this situation (demographic, socio-economic, geopolitical or governance-related), the region's vulnerability and dependence on external factors over which it has insufficient control also need to be taken into account, such as the climate. To help Mediterranean stakeholders avoid this foreseeable path and guide long-term policies for the protection of the marine ecosystem and the transition to sustainable development in the region, MED 2050 has explored futures of the Mediterranean Basin as openly and systemically as possible.

The purpose of this exercise was not limited to providing a few (essentially qualitative) insights into what the Mediterranean will look like in 2050. It also has the purpose of proposing various pathways for overcoming the obstacles and crises (which are foreseeable today) and for initiating the medium- and long-term transitions and action plans needed for sustainable development in all parts of the Mediterranean, and for achieving the SDGs.

With this in mind, MED 2050 used a tried-and-tested methodology to assess the key issues for the future, rank and quantify certain trends, identify possible disruptions, collect the visions of Mediterranean stakeholders and, finally, map out potential alternative trajectories.

Taken together, all these intermediate outputs, along with the detailed analyses carried out on 37 variables, constitute a useful resource for Mediterranean actors in their future policies.

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The six scenarios that have emerged from the foresight approach at the heart of this report already provide an initial response to the question of the transitions that need to be made for the long term. They propose possible trajectories and the essential conditions for their successful implementation. They also show that there is plenty of room for manoeuvre and levers for action that can be mobilised to avoid the worrying situation predicted for 2050. But this is still expert work that needs to be discussed and continued with the actors involved. The operational resources required to achieve their objectives or avoid their consequences need to be addressed in greater depth, and more specifically in each sub-region, involving all diverse actors at different levels. This additional stage will also make it possible to overcome the limitations encountered during the implementation of the exercise, particularly with regard to the stakeholder consultations planned in the initial methodology.

Therefore, starting in 2024, a complementary phase is envisaged to promote and deepen MED 2050, with the aim of mobilising various actors and stakeholders from around the Mediterranean, both to debate the scenarios developed as part of MED 2050 and, based on current situations, to reflect on the short, medium and long-term actions needed to pursue the desired scenarios, and to avoid or anticipate those considered unacceptable.
With this in mind, two approaches are proposed. First, active consultation with stakeholders in the various sub-regions: North, South and East, through workshops involving actors including decision-makers, institutional representatives from international organisations, and international and regional cooperation institutions, along with members of the foresight group and the steering committee.
Second, the involvement of Mediterranean actors at a national level or local authorities, such as entrepreneurs, representatives of government administrations and/or institutions, national cooperation organisations, local authorities, associations and/or civil society, etc., through local or national workshops organised by category of actors.

In this final phase of consultation, priority will be given to developing and comparing different transition pathways, taking into account specific sub-regional, national or local characteristics, and realistically identifying the means, opportunities and obstacles to achieving them.
Viewed in this light, MED 2050 has an eminently strategic purpose and should be able to help decision-makers build and evaluate the pathways or strategies needed to achieve shared objectives in a context of uncertainty. In the same way, the MED 2050 foresight exercise could make a significant contribution to the future edition of the Mediterranean Strategy for Sustainable Development, with the substantial involvement of the MCSD in this last chapter of the MED 2050 programme dedicated to building transition pathways for sustainable development in the Mediterranean.

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ANNEXES TO PART 1

Annex 1.
List of experts supporting the Foresight Group for Module 1: building the foresight base

Annex 1. List of experts supporting the Foresight Group for Module 1: building the foresight base

Name et surname	Organisation
ABIS Sébastien	Club DEMETER, IRIS, Futuribles
APPRIOUAL Antoine	European Institute of the Mediterranean (IEMED)
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BEN CHARFI Khouloud	Water Youth Network
BEN JANNET ALLAL Houda	MEO (Mediterranean Energy Observatory)
BERTHOD Justine	LITTOCEAN
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BLANC Pierre	Sciences Po Bordeaux/Ecole Nationale des Sciences Agronomiques Bordeaux
BOCCI Martina	t-ELIKA
BOUT Céline	European Environment Agency (EEA)
BOUTRY Nolan	Tour du Valat
BRÉCHON Pierre	Sciences Po Grenoble
BRUNFAUT Victor	Université Libre de Bruxelles
BURDY Jean-Paul	Sciences Po Grenoble
CARIC Hrvoje	Tourism Institute, Zagreb
CASTILLO Paula	Eco-Union
CEBRIAN Daniel	UNEP/MAP-SPA/RAC
CHERKAOUI Hakim	ENA Rabat
COSTA SALAVEDRA Cristina	Eco-Union
CURY Philippe	IRD/Clora
DAGUZAN Jean-François	Stratégic Research Foundation
DE DINECHIN Frédéric	Banque de Développement du Conseil de l'Europe
DEL MAR OTERO Maria	IUCN Centre for Mediterranean Cooperation
DORANGRICCHIA Anna	Union for the Mediterranean
EL ASMI Souha	UNEP/MAP-SPA/RAC
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EL BARDAOUI	Tunis University
FABIAN Lorenzo	University IUAV of Venice

FATOUX François	Senior Consultant in Diversity and Corporate Social Responsibility
FERNANDEZ BAYO Ignacio	Spanish Association of Scientific Communication
FERROUKHI Sid Ahmed	ENSA/CREAD
FOUCHIER Vincent	Métropole Aix-Marseille-Provence
FRANCESCUTTI Pablo	Rey Juan Carlos University
GALEWSKI Thomas	Tour du Valat
GONTHIER Frédéric	Sciences Po Grenoble - Pacte
GONZALEZ Gabino	REMPEC
GUTERMAN Ofer	BDO Consulting Group
GUZZON Claudia	CRPM
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RANDONE Mauro	WWF MedPO

RODRIGUEZ Josep	Sustainable Tourism Community
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SCOULLOS Michael	Athens University, MAB/Unesco Greek National Committee
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SOOS Timotej	Ministry of Foreign Affairs of Slovenia
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TROYA Antonio	IUCN Centre for Mediterranean Cooperation
TSAKAS Constantin	World Bank
TURKI Yassin	Carthage University
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VOIRON Christine	Nice University
YAZIGI Serge	Yazigi Atelier
ZIMMER Daniel	Climate-KIC
ZOVIGHIAN Diane	World Bank

ANNEXES TO PART 2

Annex 2.
List of variables:
part of the foresight base

Annex 3.
List of assumptions by variable:
first morphological chart

Annex 2. List of variables: part of the foresight base

Title : **Major global trends (Megatrends) up to 2050 and their consequences for the Mediterranean**
- a) Major global trends by 2050
- b) The Mediterranean in the global context
- c) Global climate scenarios (IPCC) and in the Mediterranean (MedECC)

Coordinator and lead author : Jacques Theys
Co-authors : Marie de Lattre-Gasquet, Jean de Montgolfier, Antoine Dolez, Christophe Le Visage, Stella Tsani, Ronan Uhel

Title : **Mediterranean identities**
Coordinator and lead author : Bouchra Rahmouni
Co-authors : Omar Bessaoud, Jean de Montgolfier, Denis Lacroix

Title : **Geopolitics and security in the Mediterranean**
Coordinator and lead author : Nicolas Mazzucchi, Younes Slaoui
Co-authors : Ofer Guterman

Title : **The place of the Mediterranean in European policies and the Green Deal**
Coordinator and lead author : Stella Tsani
Co-authors : Cécile Roddier-Quefelec, Silvia Pariente-David

Title : **Public and private financing of development in the Mediterranean. What role for Green Finance?**
Coordinator and lead author : Jérémie Fosse
Co-authors : Cristina Costa, Antoine Apprioual

Title : **International governance of the marine environment in the Mediterranean between crisis, continuity and transformation**
Coordinator and lead author : Maria del Mar Otero, François Simard
Co-authors : Yves Henocque, Christophe Le Visage, Juan Luis Suarez de Vivero

Title : **Population growth in the Mediterranean**
Coordinator and lead author : Alain Parant
Co-authors : Arnaud Comolet

Title : **Migration dynamics in the Mediterranean**
Coordinator and lead author : Alain Parant
Co-authors : Jean De Montgolfier, Denis Lacroix, Jacques Theys

Title : **Urban transitions in the Mediterranean and their consequences on the environment: urbanisation, urban-rural balance, effects on waste, land ownership, pollution and resources**
Coordinator and lead author : Najet Aroua, Marie Baduel, Antoine Dolez
Co-authors : Joni Baboci, Amine Benaissa, Victor Brunfaut, Alberto Cappato, Hakim Cherkaoui, Ouissame El Asri, Israe El Bardaoui, Lorenzo Fabian, Vincent Fouchier, Laurent Hodebert, Sihem Lamine, Xavier Lours, Bruno Marot, Marianne Martin, Emmanuel Matteudi, Philippe Meunier, Konstantia Nikopoulou, Alain Parant, Christiane Sfeir, Stella Tsani, Yassin Turki, Serge Yazigi

Title : **Concentration of human activities in coastal and sea areas: competition, cumulative effects and risks**
Coordinator and lead author : Antoine Lafitte
Co-authors : Antoine Dolez, Samir Grimes, Yves Henocque, Christophe Le Visage, Ioannis Spilanis

Title : **Climate change and its impacts on land and sea**
Coordinator and lead author : Joël Guiot
Co-authors : Jean de Montgolfier

Title : **Adaptation issues and policies, between vulnerability and resilience**
Coordinator and lead author : Katarzyna Marini
Co-authors : Maya Negev, Cécile Roddier-Quefelec, Ronan Uhel

Title : **Changes to greenhouse gas emissions and mitigation policies**
Coordinator and lead author : Emanuela Menichetti
Co-authors : Silvia Pariente-David, Constantinos Taliotis, Lina Tode

Title : **Transformations of the Mediterranean ecosystem and its impact on marine and coastal biodiversity**
Coordinator and lead author : Samir Grimes, Ferdinando Boero
Co-authors : Khalil Attia, Daniel Cebrian, Maria Del Mar Otero, Souha El Asmi, Atef Liman, Atef Ouerghi, Mauro Randone

Title : **Exploitation and ownership of Mediterranean marine mineral and energy resources (gas exploitation, deep sea mineral resources, renewable energies, etc.) - The consequences of offshore expansion**
Coordinator and lead author : Stella Tsani
Co-authors : Christophe Le Visage

Title : **The future of fisheries and aquaculture in the Mediterranean and its impacts (ecological and social impacts, etc.)**
Coordinator and lead author : Denis Lacroix, Sébastien Abis

Title : **The evolution of "living" resources and natural biodiversity on land**
Coordinator and lead author : Catherine Numa
Co-authors : Khouloud Ben Charfi, Jean de Montgolfier, Nolan Boutry, Thomas Galewski, Jacques Theys

Title : **The water-soil-agriculture-environment nexus**
Coordinator and lead author : Omar Bessaoud, Pascal Bergeret
Co-authors : Sébastien Abis, Guillaume Benoit, Marie de Lattre-Gasquet, Jean de Montgolfier, Cécile Roddier-Quefelec, Antonio Troya, Ronan Uhel, Jacques Theys

Title : **Energy transition in the Mediterranean region - towards climate neutrality**
Coordinator and lead author : Houda Ben Jannet
Co-authors : Jérémie Fosse, Silvia Pariente-David

Title : **Growth dynamics**
Coordinator and lead author : Constantin Tsakas

Title : **Innovation policies in the Mediterranean**
Coordinator and lead author : Bouchra Rahmouni
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Title : **The blue economy: opportunities, obstacles and risks**
Coordinator and lead author : Denis Lacroix , Christophe Le Visage
Co-authors : Christian Averous, Arnaud Comolet, Andreas Kraemer, Mauro Randone Stella Tsani

Title : **Maritime transport, port infrastructure in the Mediterranean, international trade and pollution related to these activities**
Coordinator and lead author : Martina Bocci
Co-authors : Sébastien Abis, Gabino Gonzalez, Franck Lauwers, Emiliano Ramieri, Malek Smaoui, Lina Tode

Title : **Tourism and tourist mobility: future prospects and impacts of these activities on the environment and coastal and regional economies**
Coordinator and lead author : Ioannis Spilanis
Co-authors : Jean de Montgolfier, Antoine Dolez, Claudia Guzzon, Thierry Lavoux, Gloria Lazaro, Josep Rodriguez, Christoph Schröder, Arnau Teixidor-Costa, Antonio Troya, Hrvoje Carić

Title : **Inequalities, poverty, changes to social mobility, informal economy and solidarity system**
Coordinator and lead author : Sébastien Vauzelle

Title : **Changes to the value system and religiosities**
Coordinator and lead author : Pierre Bréchon
Co-authors : Omar Bessaoud, Jean-Paul Burdy, Jean de Montgolfier, Frédéric Gonthier

Title : **The place of young people in society and intergenerational relationship, youth employment and care for the elderly**
Coordinator and lead author : Khouloud Ben Charfi
Co-authors : Michael Karner, Anna Goubert

Title : **The situation of women in the Mediterranean**
Coordinator and lead author : Yasmine Seghirate El Guerrab
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Title : **Modifications in production and consumption patterns**
Coordinator and lead author : Magali Outters, Ioannis Spilanis
Co-authors : Antoine Dolez

Title : **Role and development of civil society in public policies**
Coordinator and lead author : Emmanuel Matteudi
Co-authors : Saïd Belguidoum

Title : **Risk and crisis prevention: anticipation, public action and collective resilience**
Coordinator and lead author : Antoine Dolez, Maya Negev
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Title : **Environmental awareness: the role of the media and civil society organisations**
Coordinator and lead author : Lourdes Lázaro
Co-authors : Ignacio Fernández Bayo, Pablo Francescutti, Thomais Vlachogianni

Title : **Policy coherence and regional cooperation for sustainable development**
Coordinator and lead author : Jérémie Fosse, Andreas Kraemer
Co-authors : Paula Castillo, Arnaud Comolet, Samir Grimes, Anaïs Picart, Stella Tsani, Ronan Uhel

Title : **Water resource management**
Coordinator and lead author : Céline Dubreuil
Co-authors : Eloïse Faure, Daniel Zimmer

Title : **Observation, monitoring and warning systems in the Mediterranean**
Coordinator and lead author : Antoine Lafitte, Rachid Mellak
Co-authors : Justine Berthod, Anne Gaëlle Beurrier, Antoine Dolez, Yves Henocque, Cécile Roddier-Quefelec

Titre : **Arbitrage of values between economy and ecology**
Coordinator and lead author : Lina Tode
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Annex 3. List of assumptions by variable: first morphological chart

Component: Context – Disruptions	Assumption 1	Assumption 2	Assumption 3	Assumption 4	Assumption 5
Major global trends for 2050	Sino-American diarchy and the division of the world into two.	"Open World 4.0".	A world of fortresses.	A multi-polar world.	Global mobilisation for sustainable development.
The Mediterranean in the global context	Status quo and "Battlefield": National isolationism and stagnation.	Crises, profound destabilisation and resilience.	Recomposition of the Mediterranean space into large "centrifugal" sub-regions.	Successful adaptation to globalisation (technological and ecological).	Co-construction of a (sustainable) development model specific to the diversity of the Mediterranean.
Global climate scenarios (IPCC) and in the Mediterranean (MedECC)	Target rise of 1.5°C by 2100 (2°C by 2050 in the Mediterranean).	Carbon neutrality in 2050 (+2°C by 2100) (2°C by 2050 in the Mediterranean).	Business-as-usual: +3°C to +3.5°C by 2100 (2.3°C by 2050 in the Mediterranean).	Climate chaos: tipping points exceeded (2.8°C by 2050 in the Mediterranean).	Successful climate engineering and maximum efficiency of carbon sinks.
Component: Demographics	**Assumption 1**	**Assumption 2**	**Assumption 3**	**Assumption 4**	**Assumption 5**
Population growth	Business-as-usual. + 130M in the South & East, - 10M in the North and general ageing.	High assumption: higher-than-expected fertility in the South & East (+165M) and faster decline in the North (-25M).	Low assumption: faster-than-expected demographic transition in the South (+85M).		
Migration dynamics in the Mediterranean	Reduction of migration needs at source. North-South co-development.	Chaos: exponential increase in climate flows and refugees.	High population mobility (economic needs).	Closure of countries and quota policies.	Ambiguities, illegal migration and make-shift policy.
Component: Environment	**Assumption 1**	**Assumption 2**	**Assumption 3**	**Assumption 4**	**Assumption 5**
Concentration of human activity in coastal areas and at sea	Effective spatial planning, protection and land-use planning at national and local levels.	Coordinated withdrawal to the hinterland and coastal protection.	Uncontrolled coastal development with protected enclaves for the elites. Increasing reclaimed land from the sea.	Uninhabitable and deterrent coastline (urbanisation, climate, etc.).	Coastline at the service of the sustainable blue economy.
Climate change and its impacts on land and at sea	Strong mitigation and adaptation policies: Green Deal in the North and strong investment in the South.	Carbon neutrality not achieved by 2050, mitigation and adaptation uneven depending on countries.	Poor mitigation in the Mediterranean and worldwide, but local adaptations based on vulnerabilities.	Poor adaptation and mitigation, and risks of local disengagement or collapse.	Diplomatic action by Mediterranean countries to strengthen global policies.
Transformations of the Mediterranean ecosystem and impact on marine and coastal biodiversity	Marine ecosystems undergo structural transformation (massive disruptions linked to climate change, tropicalisation, etc.).	Biodiversity and marine ecosystems under pressure. Protection limited to Marine Protected Areas and emblematic species.	Species replacement and new ecosystems (very contrasting trends: depending on the species and sub-regions).	Successful ecological transition, strong protection of marine biodiversity and control of catchment areas.	Diversification and enrichment of ecosystems, resulting in increased overall productivity.
Changes in land resources and biodiversity	National or local "mining" policies: the economy and local security take precedence over environmental protection.	Globalisation of trade and exploitation of export-related resources (timber, rare species, nature tourism, pharmaceuticals, etc.).	Priority to local sustainability, from a utilitarian, social and cultural perspective. Managing nature as a commons.	Global sustainable development: international regulations and pressure from NGOs to protect hotspots and emblematic species.	"Ecosystem services", economic valuation and regulation of biodiversity: carbon or emissions markets, offsetting.

Soil-water-agriculture-environment system	Major food, agricultural and environmental crisis, particularly in the South.	Successful adaptation thanks to strong territorial specialisation of agriculture. Consideration of local ecological and competitive conditions.	Successful adaptation thanks to widespread technological advances, particularly in digital technologies, and investment in water.	Coexistence of different agricultural and food systems (subsistence, industrial, agro-ecological, etc.).	Proactive policies to reduce food dependency.
Water resource management	Innovation, efficiency and control, but without changing behaviour thanks to technology and the reduction of waste.	Increasingly sustainable behaviour in the North and South, and policies for equal access to water or common-pool management of resources.	Business as usual: poor control of demand, pressure from economic uses, privatisation, technical solutions (desalination, etc.) leading to conflicts and degradation of resources.	Management based on necessity or survival, with little cooperation or investment. Retreat to local subsistence farming and resilience.	Chronic water crises with permanent water stress and "super-droughts" leading to migration and conflicts.
Component: Governance	**Assumption 1**	**Assumption 2**	**Assumption 3**	**Assumption 4**	**Assumption 5**
Geopolitics and security in the Mediterranean	Cooperation and alliances of various shapes and sizes, and structural instability between states.	Mediterranean renewal with Europe or the SEMCs as major geopolitical players, and North-South cooperation.	Anarchic breakdown of the Mediterranean political system and marginalisation of the Mediterranean on the international stage.	The Mediterranean is the backdrop for secondary conflict by the major powers via local conflicts.	Pax Americana.
Place of the Mediterranean in European policies and the Green Deal	A happy marriage between Europe and the SEMCs: global technological and political cooperation around the Green Deal.	Sluggish duo: continuation of neighbourhood policies based on economic cooperation.	Stronger but fluctuating cooperation on some themes (energy, etc.) and between certain countries.	Isolationism of Northern Europe and marginalisation of the Mediterranean in European policies.	Extension of the Europe of 27 to include some Southern and Eastern Mediterranean countries, or a Euro-Mediterranean market.
Governance of the marine environment, between crises, continuity and transformations	Barcelona Convention and national, European or global regulations called into question or not enforced.	*Status quo:* positive but slow change in the current situation.	Sustainable development and multilateral governance under the aegis of international organisations, new law of the oceans and the sea.	The Mediterranean Sea as a commons protected by mobilising civil society, the public and scientists.	Governance based on sub-regional or national institutions.
Urban transitions in the Mediterranean and their impact on the environment: urbanisation, urban-rural balance, effects on waste, land-use, pollution and resources	Three-tier commodified (or neoliberal) metropolis in a fragmented Mediterranean.	Cities in ecological and post-carbon transition and collaborative territories on a Mediterranean scale. Networks of transitional and resilient cities.	Urban collapse, resilience and protected enclaves. Failure of public action leading to informal modes of self-organisation.	Acceleration of the urban transition in Southern countries, with populations concentrated in metropolitan areas. Convergence of urbanisation and metropolisation rates between North and South.	Revival of medium-sized towns and "urban exodus", thanks to remote working.
Adaptation issues and policies, between vulnerability and resilience	Public awareness raising and development of a risk culture.	Economic regulation through insurance and international aid (from North to South). Public compensation for damage.	Decentralised management of adaptation by territories and land-use planning and resilience policies.	Investment policies (dykes, etc.) targeting the most vulnerable areas, populations and infrastructure.	Anticipating the impacts of climate change on activities and ecosystems, and active transition strategies.
Changes to GHG emissions and mitigation policies	Very little investment from national policies, marginally offset by local and private efforts.	Mitigation policies conditioned by their economic and technological benefits.	Successful energy transition in national policies (North and South) beyond the Paris Agreement. Carbon neutrality almost everywhere by 2050.	Rapid mitigation in the North and slow in the South.	North-South cooperative strategy: mass financial transfers, joint investments, Mediterranean Green Deal.

Energy transition: towards carbon neutrality in Mediterranean countries	Rapid energy transition, but differentiated according to each country's strengths (solar, carbon sinks, etc.), with priority given to technology (renewable/nuclear/ hydrogen mix).	A wait-and-see attitude, opportunism and scattered efforts. Slow progress, with empty promises.	Continued priority for fossil fuels and the exploitation of gas and oil resources in the Mediterranean, including offshore.	A coordinated strategy in the Mediterranean for a comprehensive transition. Technological cooperation, joint financing, network interconnection.	Disruptive strategy: priority given to sobriety and a fair transition. Changing lifestyles and consumption patterns, controlling prices for the most vulnerable, energy planning.
Role and development of civil society in public policy	Minor role: low political recognition and inability to mobilise public opinion or take effective action.	Influential role. Civil society plays its part in many bodies and makes its voice heard in a growing number of decision-making processes.	Major role. Civil society replaces public authorities in the management of many problems, and becomes a permanent actor in political life and international action.	Controversial and heterogeneous role depending on the country: civil society makes its voice heard, but in a confused manner, with many pressure groups with disputed objectives and representativeness.	Role of opposition: growing conflicts opposing civil societies with local or national institutions.
Risk prevention (natural, agricultural, industrial, digital) and crisis situations	Ambitious multilateral and territorial risk reduction and resilience policies based on shared resources and a democratic risk culture.	Technocratic and private risk management: failure of public preventive measures and security entrusted to corporations and insurance companies.	No anticipation of risks, just emergency management of crises and accidents. The most vulnerable territories are abandoned.	Risks as geopolitical weapons. The rule of every man for himself, even at the cost of disaster for everyone.	Maximum pooling of risks on a Mediterranean scale in order to reduce costs, including prevention. North-South solidarity.
Multi-scale and multi-stakeholder governance	Status quo. Large diversity of institutional situations, but shared problems associated with state authority, international law enforcement and sharing of roles with local authorities.	Major and general crisis of governance. The weakening of states, decline in budgetary resources, and influence of lobbies lead to international conventions and ecological standards being called into question.	Priority to law enforcement: international law is integrated at all levels.	Institutional innovations move towards greater decentralisation and common-pool management, with priority given to capacity building.	Networks of territories, associations and public or private actors reinforcing multi-scale governance. Experience sharing and a shared culture of sustainable development.
Policy coherence and regional cooperation for sustainable development	Status quo: silo policies and moderate coordination of national policies. Project rationale and a functional approach to coordinating international policies.	General or partial collapse of governance : Absence or serious decline in policy coordination within and between countries.	Growing political conflict over priorities. Strong focus on cooperation and coordination in a few "vital" areas (energy, transport, water, fisheries or food security).	Competition and nationalist isolationism: high levels of internal policy coordination but little cooperation even at EU level.	A comprehensive and effective Mediterranean policy for sustainable development (SDGs), with planning, strong cooperation and evaluation of results. Strengthening of the MCSD.
Component: Economy	**Assumption 1**	**Assumption 2**	**Assumption 3**	**Assumption 4**	**Assumption 5**
Public and private financing for development in the Mediterranean. What role for Green Finance?	Financing limited to profitable projects or offsetting markets, and greenwashing.	Financial and budgetary crises, and refocus on short-term emergencies. Community solidarity.	Strong green conditions tied to public and private funding. Removal of subsidies for unsustainable activities.	Abundance and diversity of green financing, with priority given to vulnerable countries and populations and small-scale projects. Acceptance by Northern countries to pay for the South.	Strong greening of finance and aid, but focus on attractive countries and projects.
Exploitation and ownership of marine mineral and energy resources in the Mediterranean	Slow transition to sustainability: active Euro-Mediterranean cooperation for a sustainable blue economy, but with co-existence of traditional polluting sectors.	Incentives or cooperation for profitable "blue" investments (new technologies, marine energy, etc.).	North-South divide: differentiated policies in the North (move towards sustainability) and South (development of oil and gas industries).	"Mining" of available resources and competition for access to new resources through international investment.	Strong sustainability policies and tighter constraints on all marine activities under international law.

Futures of fisheries and aquaculture and their impacts	Business-as-usual scenario: slight decline in fisheries, slowly replaced by aquaculture Fisheries: 1 M t. Aquaculture: 2.5 M t.	Disruption of ecosystems and rapid decline in fisheries, which is replaced by aquaculture, and conflicts of use Fisheries: 0.5 Mt. Aquaculture: 3 Mt.	Climate change co-adaptation without disrupting ecosystems, stable fisheries and rapid development of aqua-culture Fisheries: 1.5 M t Aquaculture: 4 M t.	Slight improvement in both fisheries and aquaculture Fisheries: 1.2 M t. Aquaculture: 3 M t.	Disruption with a rapid decline in fisheries and severe restrictions on aquaculture: Fisheries: 0.5 M t. Aquaculture: 1.5 M t.
Economic growth dynamics	Continuation of 2010-2020 trends, with moderate growth in the North and stronger growth in the South and East, but without them catching up. Dual economies with high levels of informal work in the South and East.	Rentier exploitation and comparative advantages (labour costs, resources, specialisations, etc.) with a view to strong growth and job crea-tion. International investments.	Structural slowdown linked to the region's economic marginalisation, debt and a succession of crises, including the climate crisis.	Green and blue tran-sition and coope-rative development between Europe and the SEMCs, focused on technological innovation, digital technology, the blue economy and the energy transition.	A specific and autonomous Mediterranean economic model for sustainable development. Diversity of trajectories with reduced dependencies.
The sustainable blue economy: opportunities, obstacles and risks	Strong development with a clear definition of the ecological conditions for a "blue economy". EU-MED co-develop-ment.	Weak economic dynamism due to a lack of capital and tensions or crises in the Mediterranean.	Heterogeneity of progress linked to national or economic interests and a competition rationale.	The blue economy is a soft power issue for the major powers. The environment takes a back seat.	Sluggish economy and lack of innovation in the region, leading to the protection of traditional sectors.
Maritime transport, port facilities in the Mediterranean, international trade and pollution linked to these activities	Exemplary Mediterranean: carbon-free transport, resizing of cruise ships.	Congested motorway: transport expands despite growing security and pollution problems.	A marginalised sea: fall in transport, especially linked to competition, new routes through the Arctic, and a decline in cruises and oil transport.	The sea as an instrument: strong North-South differences. Foreign-controlled mega-ports in the South with no local benefits. Minimalist legislation.	A local sea: priority given to local trans-port and cabotage. Maritime transport offsets a lack of land-based infrastructure and develops for reasons of regional cooperation.
Tourism and tourist mobility: future prospects and impacts of these activities on the environment and coastal and regio-nal economies	Covid forgotten: restoration of past dynamics with almost no progress on sustainability.	Sustainable development and strong diversification of activities and areas dedicated to tourism. Shift away from tourism as the sole economic activity.	Two-speed tourism: the rich in preserved areas and the poor in low-cost destinations.	"MED Disney": artificial recreation of historic sites, hyper-managed concentration of large flows, and museum-based or virtual nature.	Tourism in decline due to climate change. Low-season tourism.
Inequalities, poverty, changes in social mobility, the informal economy and the solidarity system	The 1% and no trickle-down effects: exacerbation of inequalities and policies with minimal redistribution. Development of informal solidarity networks.	"Tax the rich!" and tax evasion. Introduction of disruptive tax systems on capital and strong redistribution, which is hampered by tax evasion.	Attractive policies based on fiscal and social dumping that increase poverty and inequality. Further decline in public services.	Social collapse and revolt in some countries. Popular movements of tax refusal or protest leading to "populist" social measures.	Structural reforms of tax and social security systems to guarantee a minimum income and transfer taxes on labour to the environment.
Changes to production and consumption patterns	The economy at the expense of sustainability. Inertia in behaviour and reuse of waste.	Regulation by the market, costs and technical innovation.	Public constraints and incentives hindered by inequalities in social and geographical situations.	Sobriety rather than growth (coordinated transitions at national and international levels).	Changes in values and local, community or individual initiatives. Territorial transitions.

Component: Societies	Assumption 1	Assumption 2	Assumption 3	Assumption 4	Assumption 5
Mediterranean identities	The Mediterranean as a uniting force, a common identity based on culture and the sea.	The Mediterranean, as a link between Europe and Africa.	Fragmentation and isolationism around sub-regional and national identities.	The Mediterranean divide: growing distance between North and South.	Diluted identities in a "globish" culture.
Trade-off of values between economics and ecology	Greed, priority to the economy and indifference to the environment.	Growing awareness of risks and cost/ benefit trade-offs.	Growing North-South contrasts in an unfavourable environment.	Ecological values as the norm and a shift towards post-growth. New indicators of well-being and wealth.	Slow adoption of sustainability in line with socio-economic or generational change.
Changes in the secular and religious value system	Individualism, slow liberalisation of morals: decline in the role of religions and acceptance of cultural diversity.	Reinforcement of North-South cultural divides: strong religiosity in SEMCs contrasting with growing atheism in the North.	The rise of populism, the instrumentalisation of religions and the weakening of democratic values.	Positive community values around common goods (autonomous management collectives).	Growing individualism and retreat into the private sphere. Mainstreaming of liberal values.
The place of young people in society and inter-generational relations. Employment for young people and care for the elderly	Revolution and secession among young people and a growing generational gap.	The economic imperative takes precedence: high mobility and migration for jobs.	"No Future": Perception of young people as the first victims of climate change and socio-economic changes.	Youth left to their own devices: civic withdrawal and self-organisation.	Renewal from young people: A driving force behind societal change and the fight against climate change.
Women in the Mediterranean	Growing tensions in relations between women and men despite partial progress: continuing inequalities and failure of public intervention.	Ambitious policies to reduce gender inequality and the differences between North and South.	False parity between men and women: quotas and gender bashing.	U-turn: backward steps for women's rights in certain countries against a backdrop of radicalism.	Over 25% employment rate for women in SEMCs.
Greater environmental awareness: the role of the media, governments and civil society organisations	Strong North-South differences: more media involvement in the environment in the North, intermittent in the South.	Significant progress in awareness-raising: everyone involved in environmental information and policy of transparency.	Scrambled messages: controversy and misinformation hamper progress in awareness-raising.	Denial and censorship of ecological information: NGOs controlled, journalists monitored, scientists criticised.	Pressure and influence of international news.
Component: Technology & Science	**Assumption 1**	**Assumption 2**	**Assumption 3**	**Assumption 4**	**Assumption 5**
Innovation policies in the Mediterranean	Marginalisation and dependency of the Mediterranean. Region falls further behind in digital technology, research and training.	Intentional and national (or regional) specialisations. National champions.	Digital and knowledge-based societies.	Mediterranean innovation space focused on digital technologies, the blue economy and the energy transition.	Creative and attractive territories. Hubs for positive and low-tech innovation.
Observation, monitoring, warning systems	Fragmentation of observation, monitoring and warning systems, except in European countries.	Citizen science and strong involvement of civil society in environmental and information issues.	The era of Big Data 2.0, shared, standardised and connected under the control of public state agencies, research centres or international commissions.	High-performance private observation and monitoring systems (GAFAMs and Asian operators), but developed for economic rather than ecological reasons.	Collection and publication of information for political needs (SDGs, etc.). Role of international institutions (UN, EU, etc.).

ANNEXES TO PART 3

Annex 4.
List of key figures interviewed (and their geographical distribution), and respondents to the online questionnaire

Annex 5.
Geographical origins and profiles of young participants in the Youth Commission for the Future of the Mediterranean

Annex 6.
Three Pecha-Kucha fictions for the Youth Commission for the Future of the Mediterranean

Annex 7.
Action issues as seen by the experts

Annex 8.
Type of action issues cited by the key figures and stakeholders interviewed

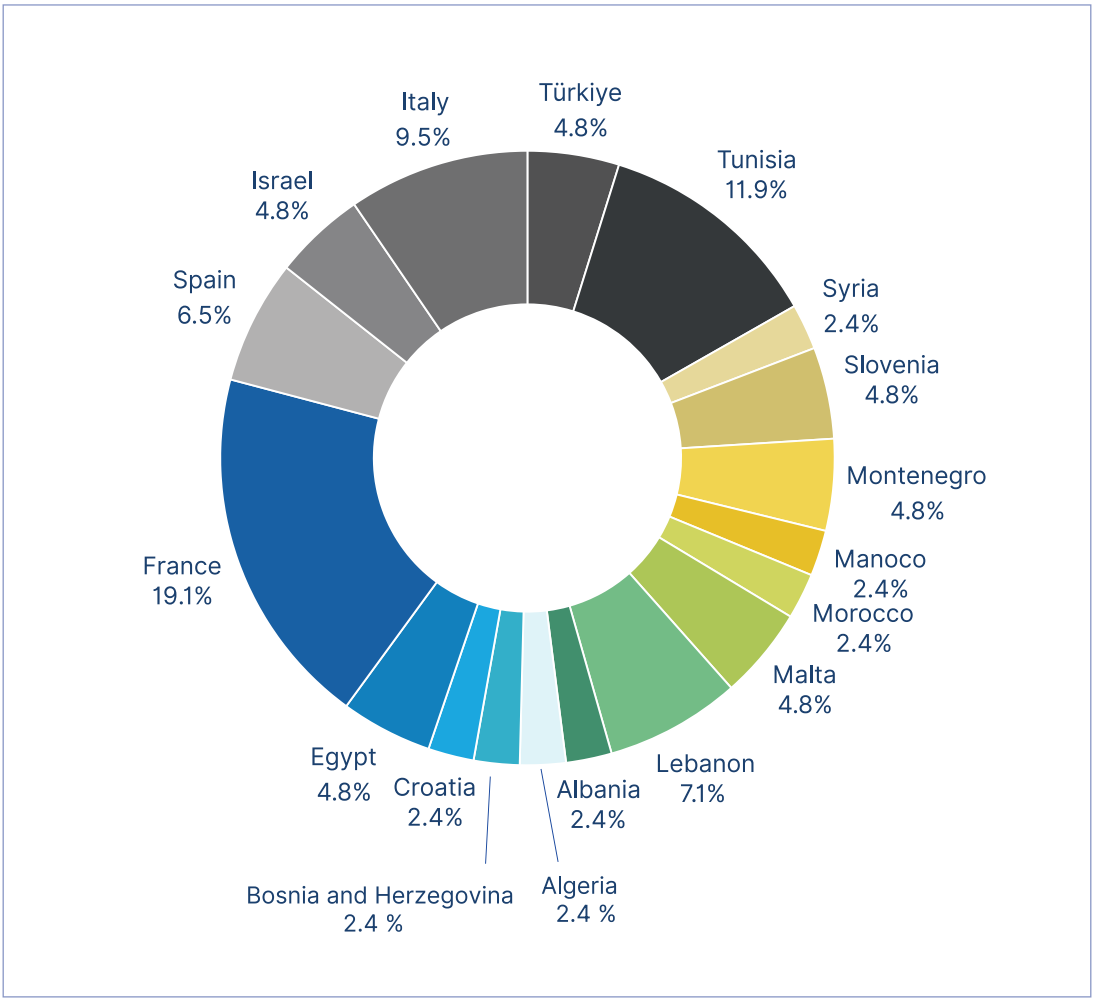
Annex 4. List of key figures interviewed (and their geographical distribution), and respondents to the online questionnaire

A) LIST OF MEDITERRANEAN PERSONALITIES INTERVIEWED

Nom et prénom	Institution	Pays
SAS Albert II de Monaco	Prince of Monaco	Monaco
AMELLAL Karim	Ministry of Foreign Affairs and Europe	France
ARAPAKIS Lefteris	Enaleia	Greece
ATALLAH Hatem	Fondation Anna Lindh)	Tunisia
AYADI Rym	Euro – Mediterranean Economists Association (EMEA)	Tunisia
BAHRI Akissa	International Water Management Institute (IWMI)	Tunisia
BALLERINI Tosca	Thalassa	Italy
BEN TAHAR GALAÏ Ahmed	Nobel Peace Prize and member of the League of Human Rights	Tunisia
BENZINA BOURGUIBA Rym	Association La Saison Bleue	Tunisia
BOU DAGHER KHARRAT Magda	European Forest Institute (EFI)	Lebanon
BRECHIGNAC Catherine	French National Centre for Scientific Research	France
BRULHET Jacques	Groupe interacadémique pour le Développement (GID)	France
CATALDI Guiseppe	University of Naples - l'Orientale	Italy
CHAMBOLLE Damien	ArcelorMittal Méditerranée	France
COMAIR Fadi Georges	Académie des Sciences d'Outre-mer	Lebanon
COMPÉS Raùl	CIHEAM Zaragoza	Spain
CORM Georges	Former Minister of Finance - Historian and Economist	Lebanon
DJUROVIC Gordana	University of Montenegro, Podgorica	Montenegro
DUKIC Vesna	Olive Grower Association Boka	Montenegro
DŽALIĆ VALJEVAC Melina	Institute of the Faculty of Civil Engineering (HEIS)	Bosnia and Herzegovina
EL DIBANY Farrah	Artist	Egypt
FERROUKHI Sid Ahmed	Former Minister of Fisheries	Algeria
FRIEDLER Eran	Institute of Technology	Israel
GHANDI Leila	Media TV	France/Morocco
GENDREAU-MASSALOUX Michèle	Groupe interacadémique pour le Développement (GID)	France
GUINOT François	NCC Industries	France
GŰTTLER Ivan	Croatian Meteorological and Hydrological Service (DHMZ)	Croatia
HEMA Tatjana	Action Plan for the Mediterranean (PNUE/PAM)	Albania
HASSAN Mohamad	University of Tichrine	Syria

IBRAHIM Maysoun	Palestinian Information Sciences and Technology Syndicat	Palestine
JARNI Klara	Institute for Water of the Republic of Slovenia	Slovenia
KAMEL Nasser	Union for the Mediterranean	Egypt
LEONE Gaetano	Intergovernmental Panel on Climate Change (IPCC)	Italy
MEBAREK Nora	European Parliament	France
MOULINE Mohammed Tawfik	Royal Institute for Strategic Studies (IRES)	Morocco
PIANTE Catherine	WWF	France
PIAZZI Sergio Israel	Parliamentary Assembly of the Mediterranean	Italy
POTOCNIK Janez	European Commission	Slovenia
SAPIANO Manuel	Energy and Water Agency	Malta
SHEVEL Yossie Joseph	Galilee Institute	Israël
SOYER Tunç	Mayor of Izmir	Türkiye
VELLA Karmenu	Minister of Transport	Malta

B) GEOGRAPHICAL DISTRIBUTION OF THE INTERVIEWED PERSONALITIES



C) LIST OF RESPONDENTS TO THE ONLINE QUESTIONNAIRE

Nom et prénom	Institution	Pays
BRETON Françoise	UAB Arctic Research Centre	Spain
BONTOUX Laurent	European Commission	France
CAPROS Pantelis	National Technical University of Athens	Greece
DUBEUF Jean-Paul	National Institute of Agronomic Research (INRA)	France
GMIR Nadoua	Ministry of Agriculture, Fisheries Resources, and Aquaculture	Tunisia
GRIMIDA Samia	Environment General Authority	Libya
HAMIDI Samira	Ministry of the Environment and Renewable Energies	Algeria
HUBERT Bernard	Agropolis International	France
LANQUAR Robert	Cordoba Horizontes (Spain)	France
LARGEMAIN Manh	Ministry of the Armed Forces	France
MILLA Toufik	Département des Études Prospectives et Expertises (CNRDPA)	Algeria
RASTOIN Jean-Louis	Institut Agro Montpellier	France
SABELLA Epiphan	Bethlehem University	Palestine
SAGAMA Alaya	National Agency for Environmental Protection (ANPE)	Tunisia
TABBOUCHE Mohammed	Bariq 21	Algeria

Annex 5. Geographical origins and profiles of young participants in the Youth Commission for the Future of the Mediterranean

FIGURE A. COUNTRIES OF ORIGIN

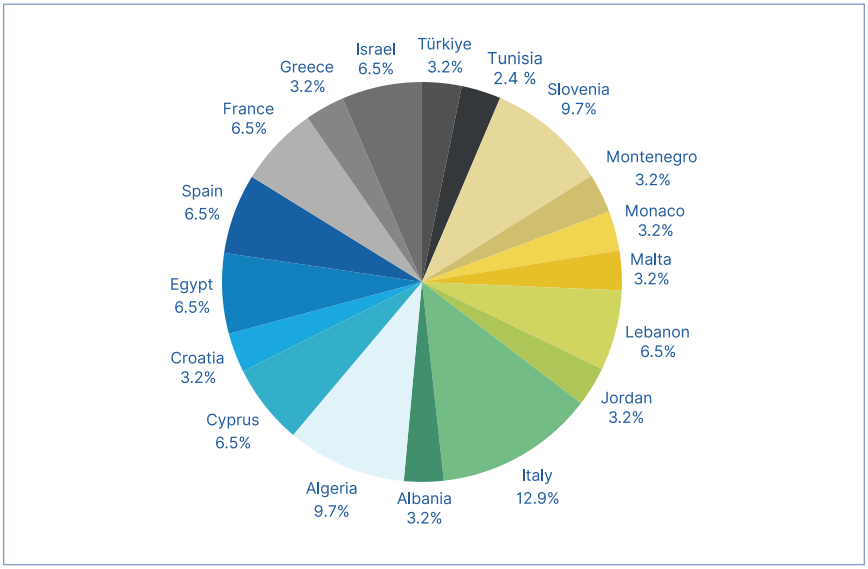


FIGURE B. AGE

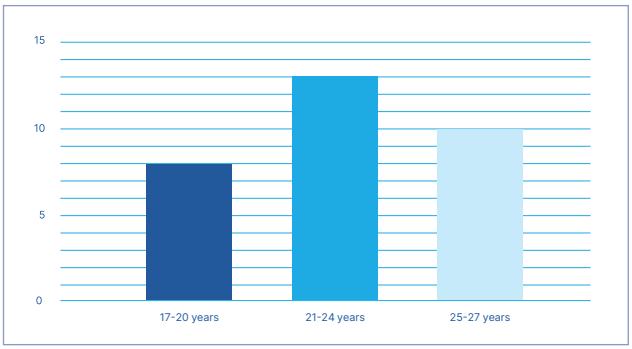


FIGURE C. GENDER

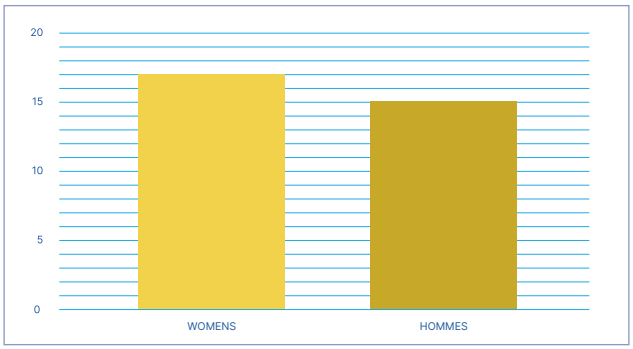


FIGURE D. EMPLOYMENT STATUS

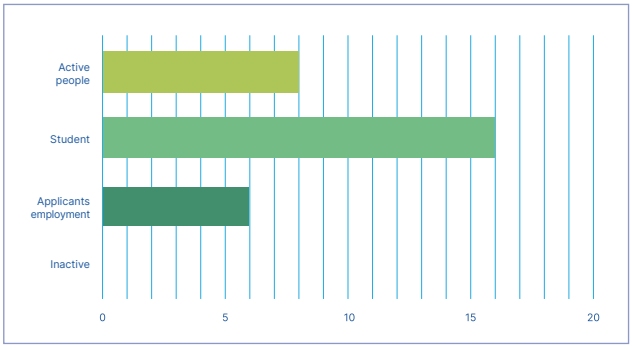
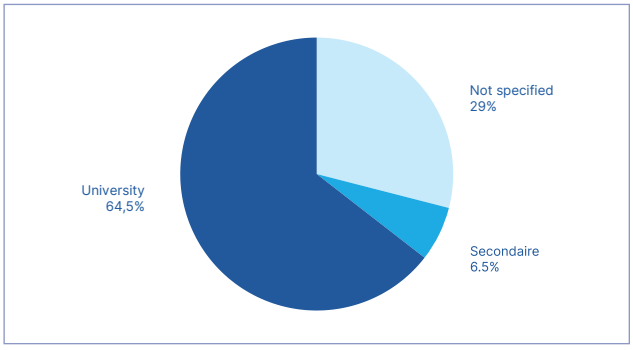


FIGURE E. LEVEL OF EDUCATION



Annex 6. Three Pecha-Kucha fictions for the Youth Commission for the Future of the Mediterranean

FICTION 1 - 2,2°
CONNECTED MEDITERRANEAN: THE TECHNOLOGICAL SHORELINE

1 Welcome to the year 2050. For the past 30 years, the Earth has not stopped warming up. Temperatures have increased by an average of 2.2 degrees around the Mediterranean. In summer, heat waves last two months, causing droughts, forest fires and loss of agricultural production.

2 In winter, floods and landslides are more numerous: this is what triggered the « Atlantis» phenomenon in the 2030s: a succession of villages submerged under water and wiped off the map overnight.

3 The Mediterranean Sea has experienced a significant extinction of marine species: 35% of fish species have disappeared, as well as 30% of plant species. The rising sea level is beginning to dangerously salinate the fertile lands of the coastline and to nibble away at natural spaces.

4 The sea is not the only thing eating away at the coast. The population has exploded all around the Mediterranean. 700 million people now live there. Buildings are getting taller and taller, and rents are getting higher and higher.

5 New metropolises are springing up like mushrooms on former rural lands, where the «slower» pace of life has almost disappeared.

6 In this world, technology has allowed humans to adapt to their new living conditions with unprecedented speed, and still achieve carbon neutrality. This technological momentum was born thanks to the international treaty signed in 2029...

7 by all the Mediterranean countries, which had then acted that their cause was common, and that following border logics in the face of the climate threat no longer made sense

8 From then on, all funding and research projects were carried out without distinction of country of residence and wealth, in the manner of the European Union, in the same way as infrastructure installations. 3 years later, by pooling forces, patent applications had exploded.

9 Among the greatest technological advances of the 2030s: these large factories called carbon vacuums that suck up all the excess carbon created by human activity,

10 and the connected objects that now make up 100% of homes, even social housing, and that allow for the fine measurement of household carbon consumption.

11 If your fridge measures that you consume too much food that is bad for the planet, or that you consume too much energy for heating, it will send you a bill at the end of the month.

12 To cope with the heat, cool islands are developed in all metropolises, with large-scale air conditioning in spaces protected from the sun, and artificial rain.

13 The increasingly futuristic fashion shows have imposed the fashion of close-fitting suits, also connected, which regulate the body temperature according to the ambient air.

14 On the sea side, the old fishing ports have almost disappeared. The economy is now based on aquaculture, marine biotechnology that transforms algae and other marine organisms into food supplements, cosmetics or green fuel

15 and of course the production of energy at sea via tidal turbines. Renewable energies now make up 6096 of the energy mix around the Mediterranean...

16 which has been able to grow considerably by exporting it, thanks in particular to a significant transfer of knowledge on renewable energies to countries still relying on fossil fuels.

17 The rest of the essential rare materials are taken from space and no longer from the center of the earth, by a company competing with Space X, which had raised all hopes in 2028 by saying that it wanted to «find ways to save the planet before seeking refuge in space"

18 On earth, the inhabitants are more aware than before of ecological imperatives, and move around mainly by bicycle, on foot,or in electric cars ...

19 thanks to large-scale networks of recharging stations deployed all along the coast, and measures to ban gasoline-powered cars at the entrance of cities.

20 As for food, the wealthiest people consume local products with a high nutritional value, while the middle and poor classes consume ultra-processed globalized products,

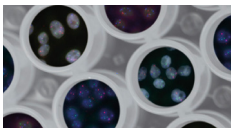
21 or fake fish, fake cereals and fake vegetables made with the help of cellular techniques and vegetable substitutes.

22 Nutritional deficiencies are at their highest and health problems linked to the consumption of recycled wastewater-a system not yet fully developed - threaten the health of the inhabitants.

23 The Mediterranean, a tourist region par excellence, continues to shine. People come by electric boat or train, which have tripled their speed since 2020. Tourists are now sunbathing on artificial beaches «under glass» and air-conditioned.

24 Those who can't afford to travel find the Mediterranean landscapes thanks to virtual reality helmets that allow them to meet their friends in a kind of metaverse reproducing the smell of the sea and the sound of the waves, and this from their homes.

25 On the other hand, restaurateurs, merchants and other tourism machines instead your people are tani or promising digital jobs ...



26 in biotechnology or nanotechnology, which are the best promise of a livable and pleasant future by 2070, despite the still worrying climate change.

FICTION 2 - 3,3°
ISLANDS OF RESISTANCE IN THE FACE OF THE CRISIS

1 Welcome to 2050. The predicted worst-case climate scenarios have become reality. Temperatures have risen by 3.3°, and many ecosystems have collapsed: between burned forests and acidified sea making 7096 of fish and plant biomass disappear in the Mediterranean.

2 The coastline has become almost uninhabitable in some places, with thousands of people dying prematurely each summer due to over-pollution of the air and tropical diseases. The countries of the South are particularly affected.

3 Climate refugees are at an all-time high, and 15,000 migrants die each year on the coasts trying to reach the saturated and struggling countries of the North. However, those who arrive safely are welcomed by dozens of solidarity movements.

4 and by companies that are looking for cheap labor that can be worked at will, while they are facing an aging population. They then find an employer in the construction sector, in permanent demand of renewal to adapt to climatic events.

5 But the rest of the sectors are still suffering the consequences of several economic crises in the 2030s, and the unemployment rate is 3196 on average in all countries around the Mediterranean.

6 Decision-makers, overwhelmed by the exponential speed at which the environment is deteriorating, are unable to act in prevention, but only in reaction to events. Unsustainable infrastructures continue to develop, and social movements are multiplying,demanding the preservation of the environment, and the respect of public health,

7 following the example of the « Last movement before the end of the world». Started on social networks, it has been creating a place for itself as a political movement in important elections in several countries since 2046.

8 It has to be said that the increase of heat has already greatly changed the daily life of the coastal inhabitants, who are not ready to support any new measure: after a year 2039 with a worrying mortality rate, most of the countries have indeed decided to reverse the official opening hours of schools and shops, and to impose to their inhabitants to live at night during a good part of the summer.

9 Another significant change is that due to drought and the collapse of fisheries and agriculture, all coastal residents are facing systemic food and water shortages.

10 In response, more people have found sustainable solutions in almost totally resilient consumption patterns, producing their own crops.

11 Globally, inequalities between countries around the Mediterranean have increased in record time. Not only do the countries producing fossil fuels continue to exploit them to keep the economy going, but conflicts over the sharing of the sea are also growing: everyone wants to be able to exploit the offshore resources, including fossil fuels.

12 In the face of these impasses, here too, small islands of resistance have emerged everywhere. Individuals are now developing their own solutions at home to be autonomous in energy, between wood heating, individual wind turbines or even creating electricity by pedaling. In the city, they move around by bike or on foot.

13 The Mediterranean also sees its tourist activity decrease considerably. The increase in temperature in high season approaches 45 degrees on average, which makes tourist activities almost impossible.

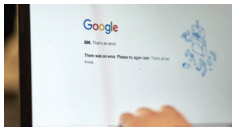
14 Not to mention the measures to limit the use of water for consumption only and not for leisure, and the historic frictions of summer 28 between locals and tourists in Venice and Djerba since when tourism has dropped for security reasons.

15 On these crisis-ridden coasts, only the wealthiest can still enjoy the last private beaches and islands, and only in the low season. Winter is now one of the best periods to go to the seaside. The rest of the population takes advantage of the ecosystems preserved by the citizen initiatives around them.

FICTION 3 - 1,5°
THE RESILIENT MEDITERRANEAN: OSMOSIS IN SOBRIETY

1 Welcome to 2050. If the struggle remains continuous, the efforts placed collectively in the preservation of the environment and biodiversity have allowed to limit the temperature rise to 1.5 degrees.

2 17 years earlier, In 2033, the Californian coast had suddenly disappeared under water in a few hours, while no warning had been given, causing tens of millions of deaths



3 and making disappear a major part of the servers that were running some of the biggest landmarks of the XXI century: Google, Facebook ... it was a complete blackout.

4 Following this episode, the whole planet agreed to try to build a new era based on respect for the planet and sobriety. First by constraint, then by choice. Starting with the Mediterranean coastline, which is also close to the sea.

5 The first big change took place in the big cities, losing their population little by little due to vast emergency measures to move the population a few dozen kilometers inland, further from the coast.

6 Seduced by the return to a healthier and less stressful lifestyle, by more space, the urban exodus finally crystallized in a few years, to become a major phenomenon of this second quarter of the

7 In each newly formed medium-sized city, instead of large air-conditioning units, the municipalities have gradually developed intensive and cooling vegetation, both horizontally and vertically.

8 Residents now live in shared housing with several families, between their private spaces, and common spaces: dining rooms, kitchens, and especially gardens and rooftops set up for urban agriculture.

9 In smaller cities, residents are organizing themselves into neighborhoods, or eco-villages, and eating what is produced locally has become the norm. Mediterranean people have returned to a diet that follows the rhythm of the seasons,

10 organic, and consume less meat and fish, which has helped reduce intensive livestock farming, which accounted for more greenhouse gas emissions than the transportation sector in the 2020s.

11 Most citizens have therefore adopted the principle of sobriety, embodied by low tech and sharing. Residents make or repair their own objects in repair cafés that have multiplied along the coast. Since 2020, world trade has been divided by 5, and tourism by 2.

12 However, if mass tourism has strongly decreased, the human exchanges that continue, become particularly qualitative: they become long stays abroad, leaving time to exchange know-how and skills all around the Mediterranean.

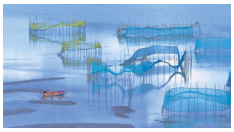
13 People no longer come to the sea to sunbathe or enjoy its entertainment, but to immerse themselves in culture and nature, by train or by bike.

14 A large part of the tourist jobs, which had the upper hand 30 years earlier in the era of mass tourism, have therefore been replaced by jobs in the crafts, local agriculture or home help.The vocations of the youngest are no longer rooted in digital technology or space conquest, but in the needs of the collective: eating, taking care of natural ecosystems and the people around us, etc.

15 On the education side, however, the disappearance of the big search engines, which had futed seema ream oreling knowledge within everyone's reach, the decrease in computer equipment,

16 and the valorization of school dropouts to take care of the community as a priority, have led to a blatant return to inequalities in access to training and a strong rise in illiteracy, on both sides of the Mediterranean.

17 In terms of energy, the logic of living in community, forgotten during the last centuries, has made it possible to considerably abandon private cars and air travel for buses, bicycles and walking, and thus to reduce the use of fossil fuels by



18 To reach carbon neutrality, we have chosen to return to the most purified and natural methods possible, very low tech. For example, by absorbing and storing carbon naturally, by protecting biodiversity simply by limiting the use of pesticides, or by practicing sustainable fishing and aquaculture.

19 Energy is now produced on the scale of the neighborhoods where people actually live, according to the energy flows available: solar panels in places with sunshine, panels in places with sunshine, geothermal energy near hot soils, wind turbines in windy places, hydroelectricity near rivers ...

20 And all the parks are connected to ensure the functioning of the network in case of failure, always in this logic of sharing, which goes beyond the intramural to spread from city to city

21 Nevertheless, in contrast to these great movements of solidarity, some traditionalist movements, advocating a return to individual property and mass consumption, frequently cause trouble in the cities or plunder the community gardens. And the consumer impulses that remain, nowadays, most often find their echo in black markets and mafias that make fortunes.

22 In this world, exchanges between countries, whether migratory, tourist or commercial, have diminished, but so have social problems, to a large extent, as everyone gives all their energy to improve local life.

Annex 7. Action issues as seen by the experts

Themes	Action issues as seen by the experts
The Mediterranean and the world: **- external influences on the Mediterranean system** **- the Mediterranean's place in the world system**	• Joint «offensive» position of Mediterranean countries in international negotiations on climate and biodiversity. • Reduce the region's dependence and vulnerability in the areas of energy, food and tourism. • Position the Mediterranean as a specific region with its own particularities and shared characteristics in a globalised world.
Mediterranean identities	• At the Mediterranean level, overcome identity-based differences and embrace the multiple heritages of the Mediterranean civilisation. • Reinvest in traditional common-pool management models.
Geopolitics and security	• Consolidate common foreign policy positions aimed at neutrality vis-à-vis the major powers. • Implement alliance strategies to obtain win-win agreements and build balanced relations with China in its commercial investments (BRI project). • Invent new social models adapted to southern and eastern Mediterranean countries, with corrective measures to avoid economic and social marginalisation. • Adopt common positions to influence international climate negotiations and implement regional adaptation strategies. • Set up a body to regulate conflicts, particularly those relating to water and the prevention of major risks. • Promote access to new sources of funding for education, training, etc.: investment in human capital to foster internal stability. • Shift from security-based management of migration as a major link between the northern and south-eastern Mediterranean to a concerted, ambitious development policy. • Implement energy transition policies in oil and gas producing countries to avoid Dutch disease, with the international players who support these countries: banks, energy companies, etc.
Europe, Green Deal and the Mediterranean	• Beyond bilateral trade agreements and the Green Deal, initiate economic and political integration of southern and eastern Mediterranean countries? • Make the energy transition the focus of partnership policies, especially for countries that rely heavily on hydrocarbons, with support policies for countries that are heavily dependent on hydrocarbons. • Support the energy transition with a transition in the labour market and training system (jobs, skills). • Set up joint environmental policies or experience-sharing on specific themes (blue economy, solar energy, aquaculture, desalination, etc.)
Public and private development funding in the Mediterranean. What is the role for green finance?	• Agree on a common taxonomy to define what constitutes a «green fund». • Increase the level of green funds to initiate a green transition in the Mediterranean as quickly as possible (climate finance, environmental protection). • Mobilise private finance, particularly in the SEMCs. • Set up funding organisations adapted to small projects. • Rebalance existing green funds - a dozen or so (voluntary or mandatory - these funds are massively earmarked for mitigation - few are earmarked for biodiversity and adaptation) for adaptation.

International marine environment governance	• Redefine / clarify the boundaries of exclusive zones. • Enforce international law of the sea (new regulations, in particular the moratorium on seabed mining). • The EU's role in governance of the sea. • Involve civil society and NGOs in the governance of the sea at all levels. • Improve enforcement of the Barcelona Convention with legal indicators, a monitoring system and sanctions. • Improve the ecosystem approach and make it more operational.
Population growth	• Stagnation and population decline in some countries in the North. • Ageing population: caring for the elderly, skills mismatch and innovation slowdown. • Population pressure on the environment and coastal areas in SEMCs
Migration dynamics	• Reduce migration pressures linked to North-South differential demographics, economic inequalities, climate change, water shortages, etc. • Better organise migration policies and facilitate the acceptance and arrival of migrants made necessary by the population decline and ageing in the North.
Urban transitions in the Mediterranean and their impact on the environment	• Anticipate the effects of CC on infrastructure and housing. • Organise experience-sharing on climatic habitat (urban greening, heat islands, architecture, etc.). • Anticipate the population explosion in the major coastal cities of the South. • Contain urban sprawl (protection of farmland and natural areas, pollutant and CO2 emissions). • Empower cities through greater decentralisation. • Prioritise the sanitation of coastal cities. • Aim for net zero emissions for cities by 2050 (post-carbon cities).
Human activities and coastal zones	• Reverse the trend towards concentration of populations and activities in coastal areas. • Anticipate the coastal risks of sea level rise and extreme hazards. • Ensure that integrated coastal zone management tools really do make it possible to link spatial planning of cities and protection of the seas. • Encourage the relocation of certain coastal activities (e.g. tourism, urbanisation, industry, etc.) to the hinterland. • Absolute protection for coastal biodiversity hotspots (the natural third).
Climate change and impacts on land and sea	• Prioritise adaptation policies. • Anticipate the effects of global warming (e.g. changes in ocean currents, tropicalisation of the Mediterranean, etc.). • 55% reduction in greenhouse gas emissions by 2050 in northern Mediterranean countries and compliance with international conventions in the southern and eastern Mediterranean (around 30%). • Achieve carbon neutrality in the northern Mediterranean countries and comply with international conventions in the southern and eastern Mediterranean countries (Paris Agreement and COPs).
Adaptation to climate change (vulnerability and resilience)	• Set up financial aid in northern countries for adaptation in the southern countries. • Develop protection policies for the most vulnerable populations and areas. • Draw up transition plans for activities most threatened by climate change (agriculture, fishing, tourism, etc.). • Participation of residents and civil society in local and national resilience policies. • Incorporate legal and social aspects into adaptation policies: human rights, social justice, poverty reduction, etc. • Develop nature-based solutions (greening of urban spaces, architecture, etc.).

Mitigation policies	• Organise synergies between northern and southern countries in terms of networks, research, North-South and South-North experience-sharing, energy complementarity, etc.
Marine ecosystems and marine and coastal biodiversity	• Establish an alliance between research organisations and foundations to inventory and map the full biodiversity of the Mediterranean marine ecosystem. • Extend the Barcelona Convention to cover the impact of new marine activities (offshore wind farms, deepwater mining). • Accelerate the reduction of pollution from catchment areas. • Shift from individual management of MPAs to network management of MPAs and OECMs (Other Effective area-based Conservation Measures) ⇒ protection of ecosystem structure (specific habitats) as well as ecosystem functioning.
Exploitation and appropriation of marine resources (gas, minerals, renewable energies)	• Apply the high-carbon energy phase-out objectives to offshore fossil fuel production.
Fishing and aquaculture: ecological, social and other impacts.	• Innovate in aquaculture technology and management to make production more environmentally friendly. • Anticipate the effects of climate change on the future of fisheries (disruption of trophic chains). • Achieve sustainable management of all fishing practices by 2050. • Stop using plastic in fishing nets. • Reduce fish harvesting by using food tech.
Natural resources and terrestrial biodiversity	• Strict protection of Mediterranean biodiversity hotspots, especially on the coast. • Move quickly to mass action for adaptation. • Limit infrastructure-related habitat fracturing. • Rapidly initiate massive action to foster the adaptation of terrestrial ecosystems.
Water-soil-agriculture-environment nexus	• Make the «water-soil-agriculture-environment-rural world» nexus a major priority over the next ten years. • Reduce the obstacles to the common-pool management of water resources. • Accelerate the transition to more environmentally-friendly agricultural production methods (agroecology, agroforestry, etc.). • Reduce food dependency in a context of shrinking arable land. • Integrate social sustainability into climate change mitigation and adaptation policies.
Energy transition in the Mediterranean region - towards climate neutrality	• Energy transition in major oil- and gas-producing countries. • Develop Mediterranean cooperation on decarbonation technologies. • Accelerate the transition to renewable energies. • Promote solar energy as a major economic development tool. • Develop alternative energy transfer networks. • Organise a common Mediterranean market for alternative energies by developing storage and interconnections. • Regulate both demand and supply by pursuing energy sobriety. • Gradually extend the ban on the sale of cars with internal combustion engines to SEMCs.
Growth dynamics	• Reduce unemployment, especially among women and young people. • Integrate the social dimension and reduce inequalities in transition policies. • Prioritise growth by replacing imports to secure sovereignty over food, energy and basic consumer products. • Specialise in specifically Mediterranean high added-value products/activities. • Promote economic complementarity between the northern and southern Mediterranean. • Invest in digital autonomy.

Knowledge society	• Give a place in research to social and ecological innovation useful to common-pool resource management. • Reposition the Mediterranean in the global digital economy to meet its specific sustainable development needs. • Organise collective Mediterranean intelligence: strengthen cooperation networks for action research (universities, think-tanks, etc.). • The loss of traditional knowledge.
The blue economy: opportunities, obstacles and risks	• Affirm the role of the sea in economic and environmental security (food, energy, ecosystem services). • Shift from a traditional maritime economy to a blue economy with strong sustainability. • Resolve conflicts between uses, particularly those involving hydrocarbon extraction. • Ensure jobs and a fair redistribution of products and services from the sea. • Fair terms for appropriating maritime space. • Regulate blue economy activities. • "Net zero" targets, particularly in the transport sector. • Take the social dimension fully into account in the shift towards a blue economy.
Maritime transport, port facilities in the Mediterranean, international trade and the pollution linked to these activities	• Control and reduce pollution from ships (marine waste, chemical and hydrocarbon pollution, air pollution, noise pollution, etc.). • Accelerate the energy transition of ships to renewable energies (solar, wind, hydrogen, etc.). • Anticipate possible long-term changes in trade routes through the Mediterranean (security, melting Arctic ice, energy or food supply / deglobalisation, crises, etc.).
Tourism and tourist mobility: future prospects and impacts of these activities on the environment and coastal and regional economies	• Diversify economies exclusively dependent on tourism. • Promote sustainable tourism practices. • Regulate tourist access to protected areas, including MPAs. • Develop inland tourism. • Limit «overtourism» on the coast (excessive visitor numbers, spreading activities over time and space, etc.) • Regulate cruise tourism (ship size, etc.). • Manage conflicts between residents and/or local populations and tourists (e.g. over access to housing, water, food prices, etc.). • Anticipate the effects of virtual tourism on real tourism.
Inequalities, poverty, changes in social mobility, informal economy and the solidarity system: towards an increase in social divisions?	• Give priority to vulnerable or at-risk populations in climate change adaptation and mitigation policies. • Prioritise activities that create lots of jobs in the ecological transition over technological solutions, including digital technologies. • Ensure a minimum social safety net in SEMCs. • Develop the social and solidarity economy and the circular economy to reduce informal work. • Encourage women to enter the workforce above the 25% threshold. • Respond to the massive growth in the number of seniors in the southern Mediterranean in terms of care provision.
The place of young people in society and relations between generations. Youth employment and care for seniors	• Employment is the top priority for young people in the South. • Adapt the education and training system to support transitions. • North-South coordination of economic migration. • Intergenerational relations and care for seniors.

The situation of women in the Mediterranean	• Improve equal access for women to work in Mediterranean societies and economies. • Take women's voices into account in the prevention and management of crises that are on the increase (related to health, food, climate, conflicts, etc.). • Review governance models to ensure the effective participation and representation of women in decision-making spheres.
Changes in production and consumption patterns	• Inform the public and raise awareness. • Define and apply simple criteria to measure product sustainability. • Regulation: extension, enforcement and harmonisation at Mediterranean level. • Encourage lifestyle changes through a good balance between individual behaviour and public policies (infrastructure, development of public services, etc.). • Sobriety: link individual preferences, financial and tax incentives, and pricing systems. • Role of trade in SCP: raise awareness of the global value chain, pricing and advertising policy. • Steer the financial sector towards sustainable modes of production and consumption (consumer credit, operation of the financial market, loans subject to ecological and sustainable consumption conditions, etc.). • Internalise environmental and climate costs in production systems. • Develop short supply chains.
The role and development of civil society in public policy	• Develop the role of civil society in all its aspects: representativeness, awareness-raising, political participation, power to act, particularly on environmental issues.
Risk and crisis prevention: anticipation and action	• Manage emerging risks. • Adapt to changes in the scale of natural hazards: megafires, floods, cyclones, tsunamis, drought, heatwaves, etc. • Intra-Mediterranean cooperation in the event of major disasters. • Implement comprehensive, coordinated resilience policies. • Develop a risk culture at all levels. • Implement active prevention policies that take into account the most vulnerable areas and populations.
Raising environmental awareness: the role of the media and civil society organisations	• Bring the question of the oceans into the cultural mainstream and public debate. • Provide widespread environmental education and awareness-raising. • Improve the way the science-policy-society interface is organised in order to produce effective societal responses. • Promote the creation of specialised media / social media / digital platforms for the environment. • Break down the barriers between environmental information and social, economic and other issues (demystify highly technical information about the environment by integrating it into everyday life and economics, etc.).
Policy coherence and regional cooperation for sustainable development	• Integrate environmental policies more effectively into planning and other public policies. • Integrate different levels of public action into multi-scale governance, from a global to local level. • Directly involve local authorities in national and international environmental policies, recognising them as major players.

Water resources management	• Develop unconventional water resources (desalination, reuse of treated wastewater or brackish water). • Give greater prominence to policies for regulating water demand - manage water conflicts through policy that prioritises vital needs. • Promote virtual water resources. • Foster international diplomacy on transboundary rivers. • Develop nature-based solutions for water resources and pollution. • Accelerate water purification and sanitation policies in SEMCs. • Avoid overexploitation of underground sources. • Manage the water cycle by integrating catchment areas and the sea. • Extend common-pool management of water to the basin or local level (basin agency, «melk», etc.).
Observation, monitoring and warning systems in the Mediterranean	• Mobilise international funding to develop statistical information on the Mediterranean marine and terrestrial environment. • Remove barriers to access to data collected nationally and locally. • Include monitoring and implementation indicators in the definition of public policies (e.g. MSSD). • Adapt information systems to new digital technologies.
Trade-offs between economy and ecology	• Invest (experiment, encourage, prioritise, develop research, etc.) in new, viable and more. environmentally-friendly business models in a few key sectors in the Mediterranean (e.g. tourism, housing, maritime transport, fishing, agriculture, etc.). • Strongly integrate SDGs into public policies and planning. • Redefine development, wealth and well-being indicators and integrate them into corporate and national accounting systems. • Gradually extend CSR (corporate social and environmental responsibility) to all Mediterranean countries • Make ecology and climate a priority in Mediterranean education systems.

Annex 8. Type of action issues for the Mediterranean identified during the MED 2050 project

During the second phase of MED 2050, some 50 key figures from across the Mediterranean were interviewed about the challenges or issues for future action in the Mediterranean - both as a sea and as a region. The following list, drawn from the interviews, breaks these issues down into nine main priorities for 2050. The length of the list reflects the diversity of those interviewed. Some issues are mentioned several times because they overlap several priority categories.

1) PRIORITISE ADAPTATION.

- The Mediterranean, 2nd region in the world most impacted by climate change. There is a need to prepare for a critical situation.
- Initiate the cultural revolution needed to cope with the effects of climate change, including effects on the sea.
- Develop national and local resilience capacities and reduce major vulnerabilities, with priority given to adaptation.
- Establish a common Mediterranean position on funding and the use of green funds for adaptation, and on the financial responsibility of northern countries.
- Set up regional organisations for cooperation and solidarity in the face of major risks (floods, heatwaves, major fires, sea level rise, etc.).
- Cooperate on climate change adaptation and water crises.
- The South is better adapted to heatwaves. Draw on the experience of southern countries to help northern countries adapt to global warming.
- Establish systematic greening and “acclimatisation” policies for cities.
- Anticipate rising water levels in deltas (e.g. Alexandria to be submerged by 2050).
- Develop climate-adapted crops using traditional native species.

2) SUCCESSFULLY MANAGE THE WATER - AGRICULTURE/FOOD - ENERGY - ENVIRONMENT NEXUS.

- Make water, agriculture, food and rural development major priorities, and coordinate them more effectively.
- Develop professions associated with water and the «water, energy, land-use planning» nexus.
- Make food safety a central issue (reduce waste, increase productivity, etc.)
- Implement strong, active food security policies that encourage local production, backed up by participatory policies at local level.
- Target food and energy subsidies more effectively to the poorest and most dependent.
- Make the Mediterranean diet the norm in the region and a tool for promoting the Mediterranean.
- Control intensive agriculture and its effects on the sea (nitrate and pesticide discharges).
- Make a qualitative leap forward in the South for water quality monitoring.
- Develop alternatives to intensive agriculture: agroforestry, agroecology, etc.
- Preserve pastoralism with local breeds adapted to the climate.
- Modify inheritance law to prevent land fragmentation and the division of agricultural properties and plots of land.
- Secure energy for agriculture - decentralised solar power (photovoltaics, wind turbines).
- Manage the continuum between water in catchment areas and seawater.
- Make better use of legal and diplomatic tools to avoid or manage transboundary water conflicts: set up water diplomacy and institutional organisations to regulate conflicts and crises at Mediterranean level.
- Improve management of groundwater pumping and distribution of constraints to save water.
- Make massive use of technology and digital technologies to reduce water requirements and optimise the match between supply and demand.
- Ensure more concerted management of water demand by setting up basin agencies in the South. Coordinate river basin and sea management.
- Promote associations for farmers who irrigate and systems for common-pool management of water.
- In the South, switch to 2nd and 3rd degree urban wastewater treatment systems.
- Make water reuse systematic using dual networks (drinking and non-drinking water).
- Assess the risks and benefits of a global water market and long-distance water transfers.
- Reduce the ecological and energy impacts of desalination.

3) AVOID THE IRREVERSIBLE - SEA - CLIMATE - RESOURCES

- Integrate the dimension of time into public action in the face of accelerating climate change and other ecological upheavals.
- Take into account the temporal dimensions of change (different temporalities of nature / public and private policies and societies - potential inertia and dynamics).
- Climate change, a major challenge: avoid 4°C by 2100 by taking coordinated action on an international scale, following the example of the group of islands.
- Rising water levels: for example, Alexandria and Cairo could be threatened by 2050.
- Make net zero emissions in 2050 a common goal for the North and South
- Stop offshore oil and gas projects in the eastern Mediterranean.
- A moratorium on the exploitation of deep-sea marine resources and a common Mediterranean position in international negotiations on the Law of the Sea.
- Faced with the acidification of the sea, the risk of irreversible damage to Posidonia meadows and future climate upheaval, aim to protect 30% of the sea (including 10% under strong protection), with strict enforcement of regulations, and change the scale of awareness-raising and the development of a culture of the sea (awareness-raising actions to be multiplied by 10).
- Avoid irreversible development of invasive species.
- Implement a more proactive policy for controlling plastic waste: filter waste discharged into the sea and manage or replace plastic nets used for fishing.
- Target zero plastic in the sea by 2050 and cut production at source.
- Over and above marine protected areas, set up large marine areas to be protected.
- Provide training in pollution control and responsible fishing and aquaculture (concepts, practices, measurement criteria).
- Introduce stricter fishing regulations - with more frequent checks, including small boats, and set precise quotas.
- Ban drift nets in deep waters.
- Reduce industrial fishing over the next five years.
- Keep the ecological and energy impacts of desalination and aquaculture within ecologically sustainable limits.
- Share data and knowledge and launch major research programmes throughout the Mediterranean Sea, involving organisations from across the region.
- Set up bodies for consultation and common-pool management involving scientists, fishermen, consumers, the media, decision-makers, etc.
- Strictly protect the remaining natural areas in coastal areas or marine areas of remarkable significance (e.g. wetlands in estuaries) and strictly safeguard agricultural land along the coast.
- Avoid the irreversible consequences of excessive urban sprawl or infrastructure development along the coast.
- Combine the protection of natural areas with that of existing cultural heritage.

4) ADDRESS DEMOGRAPHIC AND TERRITORIAL IMBALANCES

- Anticipate the 50% population increase in the South and population decline or local demographic collapses in the North.
- Promote demographic transition in the South and East through women's employment and education.
- Develop intergenerational solidarity in the face of general ageing (more than 30% of the population over 60 in the North and a 3-fold increase in the proportion of elderly people in the South).
- Prevent the brain drain.
- Promote the idea of "mutually positive mobility" between the South and North.
- Fully integrate tourism and its change over time in the assessment of demographic pressures on the coast (1/3 of the world's tourists visit the Mediterranean every year).
- Anticipate the massive influx of climate migrants into major cities by 2050.
- Give high priority to national land-use planning policies to curb the rural exodus and concentration of populations in large coastal cities.
- Develop medium-sized towns to slow down the explosion of large cities on the coast.
- Start to develop the Mediterranean as a "garden", ensuring the continuity of natural spaces.
- Give priority to active policies for sustainable coastal development, taking into account sea and land, with strong protection for natural areas of remarkable significance.
- Improve management of trade-offs between tourism and local access to housing, and reduce the potential for conflict between tourism activities and local living and housing conditions.
- Make towns more self-sufficient and organise synergies between town and country.
- Recognise the major role of cities in current transitions - decentralise powers.
- Organise networks of cities in the Mediterranean region to exchange experiences ("circular culture") and carry out joint projects.
- Implement real urban planning policies that take into account the ecological dimension (ecological planning).
- Make up the huge lag in urban waste collection and treatment in southern Mediterranean countries, using international funding. Shift to a circular economy. Improve control of waste discharges at sea, especially for plastic waste.
- Support cities in their efforts to combat poverty (safety nets).
- Organise Mediterranean-wide networks of cities to exchange experiences.
- Equip cities with the means to anticipate crises, and the capacity to respond to them.

5) PROMOTE THE COMMON MEDITERRANEAN AREA

- Make international institutions more aware of the specific nature of the Mediterranean area (statistics, administrative bodies, international negotiations, etc.).
- Promote development through relevant geographic clusters.
- Affirm the status of the Mediterranean as a common good.
- Highlight the complementarities between the three shores and enhance them through exchanges and joint projects (e.g. infrastructure projects).
- Make the most of North-South complementarities in terms of demographics, the economy, the marine environment and energy, and commit to a global political partnership.
- Establish a common Mediterranean policy in international negotiations on climate or biodiversity, recognising the Mediterranean as the world's most vulnerable area.
- Popularise the idea of the Mediterranean as a "laboratory for sustainable solutions".
- Promote the specific nature of the Mediterranean model - which has the potential to become a global example of integrated, cooperative management.
- Make net zero emissions in 2050 a common goal for the North and South.
- Promote the benefits of cultural diversity through experience-sharing, identifying the complementary nature of cultures and developing international relations networks, cultural openness and dialogue.
- Develop all opportunities for cultural exchange, especially exchanges between young people (extended Mediterranean Erasmus).
- Create specific Mediterranean platforms, media and networks. Develop Mediterranean cooperation through culture.
- Make culture the 4th pillar of sustainable development in the Mediterranean.
- Symbolically appoint a "President of the Mediterranean".
- Facilitate North-South mobility, taking into account the risk of a brain drain.
- Pursue Mediterranean neutrality.
- A peace and security pact guaranteeing the neutrality of the Mediterranean region and organising the regulation of conflicts (including Palestine) and migratory flows.
- In a world that will see the end of globalisation, integrate Europe and the southern part of the region to form a single economic and political bloc.
- Accept the geopolitical disruption represented by an Africa-Mediterranean-Europe partnership.
- Identify and leverage development potential in the South through more South-South cooperation, co-productions, homogenisation of standards, and a partnership with Africa.
- Make continuity and solidarity with Africa an essential policy.
- Empower Arab countries to define their own path to sustainability.
- Cancel the debt of the poorest countries in the South by 2030.
- Finance reconstruction plans in war-stricken countries.
- Rely on Europe and the New Deal to relaunch Mediterranean cooperation and the Union for the Mediterranean.
- Reduce the risk of the Balkans and other Mediterranean countries being marginalised as a result of the strengthening of European policies in the East - Europe has a decision to make.

6) MODERNISE GOVERNANCE IN COUNTRIES AND MAKE IT MORE INCLUSIVE

- Operate a paradigm shift in governance with four pillars: transparency, accountability, inclusion and sustainability.
- Integrate the dimension of time into all public policies (taking irreversibilities into account, anticipating risks, setting short-, medium- and long-term priorities).
- Take advantage of crises or disasters to change political agendas, mobilise populations or bring about structural or institutional change.
- Take the environment out of its "technical" or purely scientific confines, by showing how it relates to living conditions, housing, health, employment, etc.
- Set a small number of clear political objectives and make them known: climate, plastics, overfishing, with the resources (including shared resources) to enforce them.
- Don't present utopias about the future, but start from concrete situations at regional, local and plot level.
- Accelerate decentralisation and develop common-pool management.
- Coordinate a vertical political approach alongside local stakeholders carrying out concrete actions and operating as a network (horizontal action): top-down and bottom-up initiatives.
- Make local areas the "building blocks" of transition policies and extend the powers of local authorities at the right scale.
- Prioritise respecting commitments and common rules over applying the law and conventions. Develop human and technical enforcement resources accordingly.
- Reduce the massive law enforcement deficit - including international law.
- Make all decision-making systems transparent.
- Facilitate the plurality of information and transparency, particularly with regard to the environment.
- To prevent people turning to individualistic approaches, develop and propose viable collective projects that people can easily take ownership of.
- Pursue extended producer responsibility (double materiality, CSR), including in southern Mediterranean countries.
- Encourage action outside institutions and the development of civil society.
- Make room for young people: rejuvenate the political class and entrepreneurship.
- Mobilise young people, particularly around the sea and climate, but more broadly around changing the economic model and modernising institutions.
- Break away from silo-based policies, and focus on systemic approaches (e.g. the water - agriculture - food - energy - ecosystems nexus).
- Rationalise public action, particularly in the use of development aid.
- Replace fishing subsidies with more general welfare schemes, or make them conditional on compliance with sustainability constraints.
- Target food and energy subsidies more effectively to the poorest and most dependent.
- Reduce environmentally-harmful subsidies.

7) DEVELOP A DIFFERENT KIND OF REGIONAL GOVERNANCE IN THE MEDITERRANEAN

- Reject the inertia of the business-as-usual scenario.
- To shift from a static to a dynamic system, identify and mobilise the players who operate collectively.
- Use crises to change political agendas and mobilise populations.
- Move away from communication about the future of the Mediterranean that is overly institutional or aimed at experts, by making messages accessible to all (TikTokable) and targeting different social groups.
- Coordinate a vertical political approach alongside local stakeholders carrying out concrete actions and operating as a network (horizontal action): top-down and bottom-up initiatives.
- Develop clear international relations and active regional cooperation in a cooperative research area - endogenous, frugal and localised innovations.
- Identify and focus on subjects where there is consensus at Mediterranean level (e.g. plastics).
- Set a small number of clear political objectives and make them known: climate, plastics, overfishing, etc. with the resources (including shared resources) to enforce them.
- Develop clear strategies and strategic planning for Mediterranean monitoring actions and impact studies. Invest in ex-post evaluation.
- Strengthen international cooperation as a condition for the emergence or development of national policies.
- Set up long-term cooperative ventures by sector or theme in the form of alliances (port alliances or twinning, waste and energy recovery on islands, around forests, etc.).
- Promote new regional accounting and corporate responsibility rules (corporate social and environmental responsibility).
- Apply the international law of the sea on a regional scale in an exemplary manner / No exploitation of the seabed / Resolve the confusion surrounding the boundaries of EEZs.
- Lack of application, control and coordination of the Barcelona Convention and weak cooperation between States: protocols not implemented (e.g. Protocol no.7 on specially protected areas in the Mediterranean).
- The Barcelona process must be relaunched to prevent the situation from getting much worse.
- Prioritise respecting commitments and common rules over applying the law and conventions. Develop human and technical enforcement resources, and inspection means, accordingly.
- Improve control of illegal trafficking and law enforcement.
- Develop legal and diplomatic tools to avoid or manage transboundary water conflicts. Set up water diplomacy and institutional organisations to regulate conflicts and crises at Mediterranean level.
- Set up regional organisations for cooperation and solidarity in the face of the risks.
- Make United Nations agencies more operational with concrete grassroots projects (UNEP, FAO, World Bank, etc.).
- Set up a regional bank to fund the blue economy.
- Use part of the income from tourism to finance the protection of the Mediterranean.
- Implement coordinated fossil-fuel exit strategies between Mediterranean countries.
- Launch integrated maritime strategies and promote the blue economy across the Mediterranean (clusters, investments, regulations).

8) BEGIN JUST TRANSITIONS / CHANGE BUSINESS MODELS.

- Convince people of the need for disruptive innovations, e.g. in meat and fish consumption, energy, mobility, plastics or tourism models.
- Commit to long-term transitions beyond 2050 and plan their progress.
- Diversify exports to the South by initiating a transition to knowledge-based economies and digital services.
- Promote regional specificities, including the sea.
- Make the use of digital technology a factor in sustainable economic diversification, rather than a reason for job losses (RMI + videos).
- Implement regional protectionist policies to industrialise Mediterranean countries through import substitution.
- Cooperate to reduce foreign debt and set up social safety nets and unemployment protection schemes to cushion the effects.
- Prepare for possible peaks in oil + plastics + fishing + tourism in 2030 - 2040.
- Support the transition away from existing industries and the gas/oil sector, and conversely implement an active policy of supporting emerging job-creating activities.
- Use financial incentives and trade policies to make the environment and the climate and energy transition a new driver for development in the countries of the region.
- Improve identification of emerging sectors of the blue economy and ensure that they are compatible with ecological objectives. Examples include aquaculture, desalination and offshore wind power.
- Implement integrated maritime strategies and promote the blue economy across the Mediterranean (clusters, investments, trade promotion).
- Avoid devaluing existing economic assets in southern Mediterranean countries.
- Maintain traditional cultures and lifestyles, as well as forms of conviviality and solidarity that are specific to the Mediterranean.
- End mass tourism by developing the hinterland.
- Change business models, starting with changes to assessment criteria and accounting rules.
- Pursue extended producer responsibility (double materiality, CSR, etc.)
- Use the leverage of consumption and purchasing to put pressure on the production system and imports (e.g. nutrition) - «consumers are influencers».
- Control advertising to reduce consumption of products that are harmful to the environment or the sea, and pursue greater sobriety.
- Develop regional infrastructure for roads, rail, energy and the internet.
- Help young people set up their own businesses. Create business incubators for new technologies.
- Create new banking and financing organisations in the South to take advantage of the portfolio of potential projects.
- Set up local currencies, including carbon currencies, and funding structures for small-scale projects.
- Substitute services for goods and rental for ownership by developing the functionality economy.
- Make the transition to new energies (renewables, green hydrogen, etc.), targeting carbon neutrality by 2050, including in the South. A “big shift” in renewable energies.
- Invest 7% of Mediterranean GNP in energy infrastructure, with enormous potential in North Africa and the Middle East.
- Accelerate the energy transition (electricity and network interconnections) with a mix that makes the most of the South’s considerable renewable energy potential (solar energy, hydrogen).
- Organise North/South/East energy complementarity with interconnections. Set up a region-wide energy union.

9) DEVELOP A MEDITERRANEAN OF KNOWLEDGE (TECHNOLOGY, EDUCATION, RESEARCH), A GLOBAL CENTRE OF EXCELLENCE IN SUSTAINABLE MARINE TECHNOLOGY AND SCIENCE.

- Make investment in knowledge a priority at national and regional level.
- Make education and training the top priority.
- Scientists, local authorities and civil society should play a major role in disseminating technological knowledge and organising the networking of experience.
- Transform the Mediterranean into a “laboratory for sustainable solutions”. Promote the transfer of southern solutions to the North, particularly for adaptation to global warming. The Mediterranean as a world centre of excellence in marine science and technology.
- Anticipate the irreversible risk of a North/South technological divide. Facilitate technology transfers and patent sharing, and avoid the prospect of a massive brain drain from the South/East to the North or out of the region.
- Improve intra-Mediterranean cooperation on research (particularly for digital technology and the blue economy). Create networks of universities.
- Create a digital union in the Mediterranean.
- Build technology incubators in the South and East and create networks of clusters, particularly in the blue economy.
- Mobilise the financial resources of wealthy Arab countries to finance new marine and climate technologies.
- Ensure investment in low-tech technologies and Mediterranean know-how.
- Institutional disruptions to trigger technological change.
- Implement large-scale environmental education - and acceptance of the consequences (democracy, etc.)
- Popularise the environment and protection of the sea by taking them out of the specialists’ “ghetto” and showing how they are connected to everyday life. Use social media such as TikTok to communicate these messages.
- Develop ocean literacy in every country through culture and education.
- Create a specific Mediterranean fund to develop data collection (including digital data) and organise the collection of statistics in all fields.
- Implement a major scientific cooperation project for mapping and foresight for marine biodiversity across the Mediterranean.

ANNEXES TO PART 4

Annex 9.
Assumptions for the main variables, retained for the six scenarios: second morphological table

Annex 10.
Map showing the discharge of freshwater from rivers into the Mediterranean Sea

Annex 11.
The Mediterranean eco-region with its hydrographic boundaries and drainage basins

Annex 9. Assumptions for the main variables, retained for the six scenarios: second morphological table

Component: Context – Disruptions	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6
Major global trends for 2050	Sino-American diarchy and the division of the world into two.	A world of fortresses.	A multi-polar world.	"Open World 4.0" + Global mobilisation for sustainable development.	A multi-polar world + Global mobilisation for sustainable development.	Global mobilisation for sustainable development.
The Mediterranean in the global context	Status quo and "Battlefield": National isolationism and stagnation.	Crises, profound destabilisation and resilience.	Recomposition of the Mediterranean space into large "centrifugal" sub-regions.	Successful adaptation to globalisation (technological and ecological).	Co-construction of a (sustainable) development model specific to the diversity of the Mediterranean.	Co-construction of a (sustainable) development model specific to the diversity of the Mediterranean.
Global climate scenarios (IPCC) and in the Mediterranean (MedECC)	Business-as-usual: +3°C to +3.5°C by 2100 (2.3°C by 2050 in the Mediterranean).	Climate chaos: tipping points exceeded (2.8°C by 2050 in the Mediterranean).	Business-as-usual: +3°C to +3.5°C by 2100 (2.3°C by 2050 in the Mediterranean).	Carbon neutrality in 2050 (+2°C by 2100) (2°C by 2050 in the Mediterranean) + Successful climate engineering and maximum efficiency of carbon sinks.	Target rise of 1.5°C by 2100 (2°C by 2050 in the Mediterranean).	Carbon neutrality in 2050 (+2°C by 2100) (2°C by 2050 in the Mediterranean).
Component: Demographics	**Scenario 1**	**Scenario 2**	**Scenario 3**	**Scenario 4**	**Scenario 5**	**Scenario 6**
Population growth	Business-as-usual. + 130M in the South & East, - 10M in the North and general ageing.	Assumption 2 (higher than expected fertility in the South & East and a faster decline in the North) corrected for excess mortality at the end of the period.	High assumption: higher-than-expected fertility in the South & East (+165M) and faster decline in the North (-25M).	Business-as-usual. + 130M in the South & East, - 10M in the North and general ageing.	Low assumption: faster-than-expected demographic transition in the South (+85M).	Business-as-usual. + 130M in the South & East, - 10M in the North and general ageing.
Migration dynamics in the Mediterranean	Ambiguities, illegal migration and make-shift policy.	Chaos: exponential increase in climate flows and refugees.	Closure of countries and quota policies based on economic needs.	High population mobility (economic needs).	Reduction of migration needs at source. North-South co-development.	Ambiguities, illegal migration and make-shift policy + High population mobility (economic needs).
Component: Environment	**Scenario 1**	**Scenario 2**	**Scenario 3**	**Scenario 4**	**Scenario 5**	**Scenario 6**
Concentration of human activity in coastal areas and at sea	Uncontrolled coastal development with protected enclaves for the elites. Increasing reclaimed land from the sea.	Uninhabitable and deterrent coastline (urbanisation, climate, etc.).	Uncontrolled coastal development with protected enclaves for the elites. Increasing reclaimed land from the sea.	Coastline at the service of the sustainable blue economy.	Effective spatial planning, protection and land-use planning at national and local levels.	Coordinated withdrawal to the hinterland and coastal protection.

Transformations of the Mediterranean ecosystem and impact on marine and coastal biodiversity	Biodiversity and marine ecosystems under pressure. Protection limited to Marine Protected Areas and emblematic species.	Marine ecosystems undergo structural transformation (massive disruptions linked to climate change, tropicalisation, etc.).	Marine ecosystems undergo structural transformation (massive disruptions linked to climate change, tropicalisation, etc.).	Species replacement and new ecosystems (very contrasting trends: depending on the species and sub-regions).	Successful ecological transition, strong protection of marine biodiversity and control of catchment areas.	Successful ecological transition, strong protection of marine biodiversity and control of catchment areas + Diversification and enrichment of ecosystems, resulting in increased overall productivity.
Soil-water-agriculture-environment system	In the North, proactive policies to reduce food dependency. In the South and East, a major food, agricultural, and environmental crisis, in particular.	Major food, agricultural and environmental crisis, particularly in the South.	Coexistence of different agricultural and food systems (subsistence, industrial, agro-ecological, etc.) + Major food, agricultural and environmental crisis, particularly in the South (from 2040 onwards).	Proactive policies to reduce food dependency + Successful adaptation thanks to widespread technological advances, particularly in digital technologies, and investment in water.	Proactive policies to reduce food dependency.	Successful adaptation thanks to strong territorial specialisation of agriculture. Consideration of local ecological and competitive conditions.
Water resource management	Business as usual: poor control of demand, pressure from economic uses, privatisation, technical solutions (desalination, etc.) leading to conflicts and degradation of resources.	Chronic water crises with permanent water stress and "super-droughts" leading to migration and conflicts + Management based on necessity or survival, with little cooperation or investment. Retreat to local subsistence farming and resilience.	Business as usual: poor control of demand, pressure from economic uses, privatisation, technical solutions (desalination, etc.) leading to conflicts and degradation of resources + Chronic water crises with permanent water stress and "super-droughts" leading to migration and conflicts (from 2040 onwards).	Innovation, efficiency and control, but without changing behaviour thanks to technology and the reduction of waste.	Increasingly sustainable behaviour in the North and South, and policies for equal access to water or common-pool management of resources.	Increasingly sustainable behaviour in the North and South, and policies for equal access to water or common-pool management of resources.
Component: Governance	**Scenario 1**	**Scenario 2**	**Scenario 3**	**Scenario 4**	**Scenario 5**	**Scenario 6**
Geopolitics and security in the Mediterranean	The Mediterranean is the backdrop for secondary conflict by the major powers via local conflicts.	Anarchic breakdown of the Mediterranean political system and marginalisation of the Mediterranean on the international stage.	Cooperation and alliances of various shapes and sizes, and structural instability between states.	Mediterranean renewal with Europe or the SEMCs as major geopolitical players, and North-South cooperation.	Mediterranean renewal with Europe or the SEMCs as major geopolitical players, and North-South cooperation.	Pax Americana.
Place of the Mediterranean in European policies and the Green Deal	Sluggish duo: continuation of neighbourhood policies based on economic cooperation + Isolationism of Northern Europe and marginalisation of the Mediterranean in European policies.	Isolationism of Northern Europe and marginalisation of the Mediterranean in European policies.	Sluggish duo: continuation of neighbourhood policies based on economic cooperation.	A happy marriage between Europe and the SEMCs: global technological and political cooperation around the Green Deal.	Extension of the Europe of 27 to include some Southern and Eastern Mediterranean countries, or a Euro-Mediterranean market.	Stronger but fluctuating cooperation on some themes (energy, etc.) and between certain countries.

Governance of the marine environment, between crises, continuity and transformations	*Status quo:* positive but slow change in the current situation.	Barcelona Convention and national, European or global regulations called into question or not enforced.	Barcelona Convention and national, European or global regulations called into question or not enforced.	Governance based on sub-regional or national institutions + Sustainable development and multilateral governance under the aegis of international organisations, new law of the oceans and the sea.	Sustainable development and multilateral governance under the aegis of international organisations, new law of the oceans and the sea.	The Mediterranean Sea as a commons protected by mobilising civil society, the public and scientists + Sustainable development and multilateral governance under the aegis of international organisations, new law of the oceans and the sea.
Urban transitions in the Mediterranean and their impact on the environment: urbanisation, urban-rural balance, effects on waste, land-use, pollution and resources	Acceleration of the urban transition in Southern countries, with populations concentrated in metropolitan areas. Convergence of urbanisation and metropolisation rates between North and South.	Urban collapse, resilience and protected enclaves. Failure of public action leading to informal modes of self-organisation.	Acceleration of the urban transition in Southern countries, with populations concentrated in metropolitan areas. Convergence of urbanisation and metropolisation rates between North and South + Three-tier commodified (or neoliberal) metropolis in a fragmented Mediterranean.	Acceleration of the urban transition in Southern countries, with populations concentrated in metropolitan areas. Convergence of urbanisation and metropolisation rates between North and South.	Cities in ecological and post-carbon transition and collaborative territories on a Mediterranean scale. Networks of transitional and resilient cities.	Revival of medium-sized towns and "urban exodus", thanks to remote working.
Energy transition: towards carbon neutrality in Mediterranean countries	A wait-and-see attitude, opportunism and scattered efforts. Slow progress, with empty promises.	A wait-and-see attitude, opportunism and scattered efforts. Slow progress, with empty promises.	Continued priority for fossil fuels and the exploitation of gas and oil resources in the Mediterranean, including offshore.	Rapid energy transition, but differentiated according to each country's strengths (solar, carbon sinks, etc.), with priority given to technology (renewable/nuclear/hydrogen mix) + A coordinated strategy in the Mediterranean for a comprehensive transition. Technological cooperation, joint financing, network interconnection.	Disruptive strategy: priority given to sobriety and a fair transition. Changing lifestyles and consumption patterns, controlling prices for the most vulnerable, energy planning.	Rapid energy transition, but differentiated according to each country's strengths (solar, carbon sinks, etc.), with priority given to technology (renewable/nuclear/hydrogen mix).

Role and development of civil society in public policy	Minor role: low political recognition and inability to mobilise public opinion or take effective action + Controversial and heterogeneous role depending on the country: civil society makes its voice heard, but in a confused manner, with many pressure groups with disputed objectives and representativeness + Role of opposition: growing conflicts opposing civil societies with local or national institutions.	Role of opposition: growing conflicts opposing civil societies with local or national institutions + Major role. Civil society replaces public authorities in the management of many problems, and becomes a permanent actor in political life and international action.	Minor role: low political recognition and inability to mobilise public opinion or take effective action + Controversial and heterogeneous role depending on the country: civil society makes its voice heard, but in a confused manner, with many pressure groups with disputed objectives and representativeness.	Influential role. Civil society plays its part in many bodies and makes its voice heard in a growing number of decision-making processes.	Minor role: low political recognition and inability to mobilise public opinion or take effective action + Influential role. Civil society plays its part in many bodies and makes its voice heard in a growing number of decision-making processes.	Major role. Civil society replaces public authorities in the management of many problems, and becomes a permanent actor in political life and international action.
Risk prevention (natural, agricultural, industrial, digital) and crisis situations	Technocratic and private risk management: failure of public preventive measures and security entrusted to corporations and insurance companies.	No anticipation of risks, just emergency management of crises and accidents. The most vulnerable territories are abandoned.	Risks as geopolitical weapons. The rule of every man for himself, even at the cost of disaster for everyone.	Technocratic and private risk management: failure of public preventive measures and security entrusted to corporations and insurance companies + Maximum pooling of risks on a Mediterranean scale in order to reduce costs, including prevention. North-South solidarity.	Ambitious multilateral and territorial risk reduction and resilience policies based on shared resources and a democratic risk culture + Maximum pooling of risks on a Mediterranean scale in order to reduce costs, including prevention. North-South solidarity.	Maximum pooling of risks on a Mediterranean scale in order to reduce costs, including prevention. North-South solidarity.
Multi-scale and multi-stakeholder governance, particularly of the sea and coastline	*Status quo.* Large diversity of institutional situations, but shared problems associated with state authority, international law enforcement and sharing of roles with local authorities.	Major and general crisis of governance. The weakening of states, decline in budgetary resources, and influence of lobbies lead to international conventions and ecological standards being called into question.	*Status quo.* Large diversity of institutional situations, but shared problems associated with state authority, international law enforcement and sharing of roles with local authorities.	Priority to law enforcement: international law is integrated at all levels.	Priority to law enforcement: international law is integrated at all levels + Institutional innovations move towards greater decentralisation and common-pool management, with priority given to capacity building + Networks of territories, associations and public or private actors reinforcing multi-scale governance. Experience sharing and a shared culture of sustainable development.	Priority to law enforcement: international law is integrated at all levels + Institutional innovations move towards greater decentralisation and common-pool management, with priority given to capacity building.

Policy coherence and regional cooperation for sustainable development	*Status quo:* silo policies and moderate coordination of national policies. Project rationale and a functional approach to coordinating international policies + Growing political conflict over priorities. Strong focus on cooperation and coordination in a few "vital" areas (energy, transport, water, fisheries or food security).	General or partial collapse of governance : Absence or serious decline in policy coordination within and between countries.	Growing political conflict over priorities. Strong focus on cooperation and coordination in a few "vital" areas (energy, transport, water, fisheries or food security) + Competition and nationalist isolationism: high levels of internal policy coordination but little cooperation even at EU level.	A comprehensive and effective Mediterranean policy for sustainable development (SDGs), with planning, strong cooperation and evaluation of results. Strengthening of the MCSD.	A comprehensive and effective Mediterranean policy for sustainable development (SDGs), with planning, strong cooperation and evaluation of results. Strengthening of the MCSD.	A comprehensive and effective Mediterranean policy for sustainable development (SDGs), with planning, strong cooperation and evaluation of results. Strengthening of the MCSD.
Component: Economy	**Scenario 1**	**Scenario 2**	**Scenario 3**	**Scenario 4**	**Scenario 5**	**Scenario 6**
Public and private financing for development in the Mediterranean. What role for Green Finance?	Financing limited to profitable projects or offsetting markets, and greenwashing + Strong greening of finance and aid, but focus on attractive countries and projects.	Financial and budgetary crises, and refocus on short-term emergencies. Community solidarity.	Strong greening of finance and aid, but focus on attractive countries and projects.	Strong green conditions tied to public and private funding. Removal of subsidies for unsustainable activities.	Abundance and diversity of green financing, with priority given to vulnerable countries and populations and small-scale projects. Acceptance by Northern countries to pay for the South.	Strong green conditions tied to public and private funding. Removal of subsidies for unsustainable activities.
Exploitation and ownership of marine mineral and energy resources in the Mediterranean	North-South divide: differentiated policies in the North (move towards sustainability) and South (development of oil and gas industries) + "Mining" of available resources and competition for access to new resources through international investment.	Until 2030: North-South divide: differentiated policies in the North (move towards sustainability) and South (development of oil and gas industries).	"Mining" of available resources and competition for access to new resources through international investment.	Slow transition to sustainability: active Euro-Mediterranean cooperation for a sustainable blue economy, but with co-existence of traditional polluting sectors + Incentives or cooperation for profitable "blue" investments (new technologies, marine energy, etc.).	Strong sustainability policies and tighter constraints on all marine activities under international law.	Strong sustainability policies and tighter constraints on all marine activities under international law.
Futures of fisheries and aquaculture and their impacts	Business-as-usual scenario: slight decline in fisheries, slowly replaced by aquaculture Fisheries: 1 M t. Aquaculture: 2.5 M t.	Disruption with a rapid decline in fisheries and severe restrictions on aquaculture: Fisheries: 0.5 M t. Aquaculture: 1.5 M t.	Disruption of ecosystems and rapid decline in fisheries, which is replaced by aquaculture, and conflicts of use Fisheries: 0.5 Mt. Aquaculture: 3 Mt.	Climate change co-adaptation without disrupting ecosystems, stable fisheries and rapid development of aquaculture Fisheries: 1.5 M t Aquaculture: 4 M t.	Climate change co-adaptation without disrupting ecosystems, stable fisheries and rapid development of aquaculture Fisheries: 1.5 M t Aquaculture: 4 M t.	Slight improvement in both fisheries and aquaculture Fisheries: 1.2 M t. Aquaculture: 3 M t.

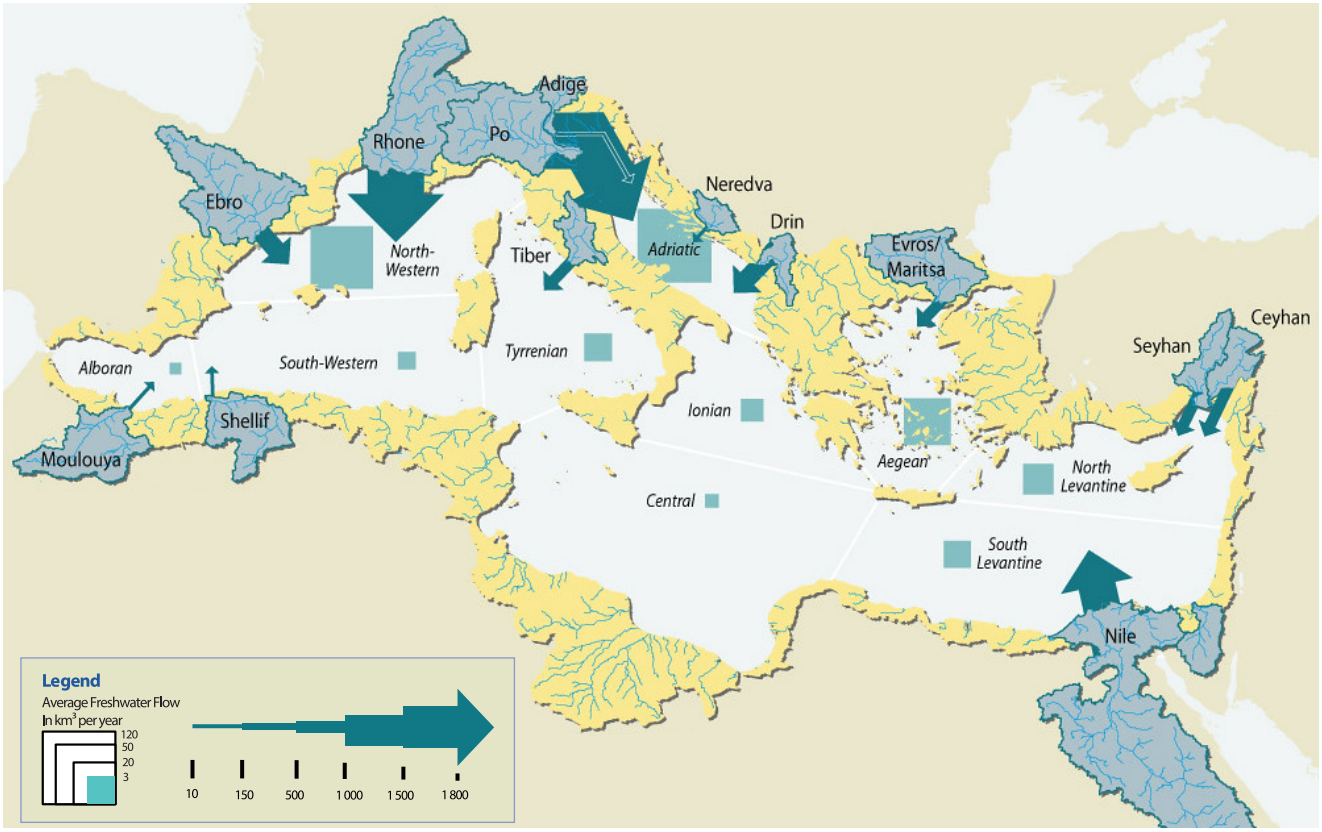
Economic growth dynamics	Continuation of 2010-2020 trends, with moderate growth in the North and stronger growth in the South and East, but without them catching up. Dual economies with high levels of informal work in the South and East.	Structural slowdown linked to the region's economic marginalisation, debt and a succession of crises, including the climate crisis.	Rentier exploitation and comparative advantages (labour costs, resources, specialisations, etc.) with a view to strong growth and job creation. International investments.	Green and blue transition and cooperative development between Europe and the SEMCs, focused on technological innovation, digital technology, the blue economy and the energy transition.	A specific and autonomous Mediterranean economic model for sustainable development. Diversity of trajectories with reduced dependencies.	Continuation of 2010-2020 trends, with moderate growth in the North and stronger growth in the South and East, but without them catching up. Dual economies with high levels of informal work in the South and East.
The sustainable blue economy: opportunities, obstacles and risks	The blue economy is a soft power issue for the major powers. The environment takes a back seat + Sluggish economy and lack of innovation in the region, leading to the protection of traditional sectors.	Weak economic dynamism due to a lack of capital and tensions or crises in the Mediterranean.	Heterogeneity of progress linked to national or economic interests and a competition rationale.	Strong development with a clear definition of the ecological conditions for a "blue economy". EU-MED co-development.	Strong development with a clear definition of the ecological conditions for a "blue economy". EU-MED co-development.	Strong development with a clear definition of the ecological conditions for a "blue economy". EU-MED co-development.
Tourism and tourist mobility: future prospects and impacts of these activities on the environment and coastal and regional economies	Covid forgotten: restoration of past dynamics with almost no progress on sustainability + Two-speed tourism: the rich in preserved areas and the poor in low-cost destinations.	Tourism in decline due to climate change. Low-season tourism.	Covid forgotten: restoration of past dynamics with almost no progress on sustainability + Two-speed tourism: the rich in preserved areas and the poor in low-cost destinations + "MED Disney": artificial recreation of historic sites, hyper-managed concentration of large flows, and museum-based or virtual nature.	"MED Disney": artificial recreation of historic sites, hyper-managed concentration of large flows, and museum-based or virtual nature.	Sustainable development and strong diversification of activities and areas dedicated to tourism. Shift away from tourism as the sole economic activity.	Sustainable development and strong diversification of activities and areas dedicated to tourism. Shift away from tourism as the sole economic activity.

Inequalities, poverty, changes in social mobility, the informal economy and the solidarity system	The 1% and no trickle-down effects: exacerbation of inequalities and policies with minimal redistribution. Development of informal solidarity networks + Attractive policies based on fiscal and social dumping that increase poverty and inequality. Further decline in public services.	Social collapse and revolt in some countries. Popular movements of tax refusal or protest leading to "populist" social measures.	The 1% and no trickle-down effects: exacerbation of inequalities and policies with minimal redistribution. Development of informal solidarity networks + Attractive policies based on fiscal and social dumping that increase poverty and inequality. Further decline in public services.	"Tax the rich!" and tax evasion. Introduction of disruptive tax systems on capital and strong redistribution, which is hampered by tax evasion.	Structural reforms of tax and social security systems to guarantee a minimum income and transfer taxes on labour to the environment.	"Tax the rich!" and tax evasion. Introduction of disruptive tax systems on capital and strong redistribution, which is hampered by tax evasion.
Changes to production and consumption patterns	The economy at the expense of sustainability. Inertia in behaviour and reuse of waste + Regulation by the market, costs and technical innovation.	Changes in values and local, community or individual initiatives. Territorial transitions.	The economy at the expense of sustainability. Inertia in behaviour and reuse of waste.	Regulation by the market, costs and technical innovation + Public constraints and incentives hindered by inequalities in social and geographical situations.	Sobriety rather than growth (coordinated transitions at national and international levels) + Changes in values and local, community or individual initiatives. Territorial transitions.	Changes in values and local, community or individual initiatives. Territorial transitions.
Component: Societies	**Scenario 1**	**Scenario 2**	**Scenario 3**	**Scenario 4**	**Scenario 5**	**Scenario 6**
Mediterranean identities	The Mediterranean divide: growing distance between North and South.	Fragmentation and isolationism around sub-regional and national identities.	Fragmentation and isolationism around sub-regional and national identities.	The Mediterranean, as a link between Europe and Africa + Diluted identities in a "globish" culture.	The Mediterranean, as a link between Europe and Africa.	The Mediterranean as a uniting force, a common identity based on culture and the sea.
The place of young people in society and inter-generational relations. Employment for young people and care for the elderly	The economic imperative takes precedence: high mobility and migration for jobs + "No Future": Perception of young people as the first victims of climate change and socio-economic changes.	Revolution and secession among young people and a growing generational gap + "No Future": Perception of young people as the first victims of climate change and socio-economic changes + Youth left to their own devices: civic withdrawal and self-organisation.	The economic imperative takes precedence: high mobility and migration for jobs + Youth left to their own devices: civic withdrawal and self-organisation.	The economic imperative takes precedence: high mobility and migration for jobs + Renewal from young people: A driving force behind societal change and the fight against climate change.	Renewal from young people: A driving force behind societal change and the fight against climate change.	Renewal from young people: A driving force behind societal change and the fight against climate change.

Women in the Mediterranean	Growing tensions in relations between women and men despite partial progress: continuing inequalities and failure of public intervention + False parity between men and women: quotas and gender bashing.	U-turn: backward steps for women's rights in certain countries against a backdrop of radicalism.	Over 25% employment rate for women in SEMCs.	Policies to reduce gender inequalities.	Policies to reduce gender inequalities + Over 25% employment rate for women in SEMCs.	Policies to reduce gender inequalities.
Greater environmental awareness: the role of the media, governments and civil society organisations	Strong North-South differences: more media involvement in the environment in the North, intermittent in the South + Scrambled messages: controversy and misinformation hamper progress in awareness-raising.	Denial and censorship of ecological information: NGOs controlled, journalists monitored, scientists criticised.	Scrambled messages: controversy and misinformation hamper progress in awareness-raising.	Pressure and influence of international news.	Significant progress in awareness-raising: everyone involved in environmental information and policy of transparency.	Significant progress in awareness-raising: everyone involved in environmental information and policy of transparency.
Component: Technology & Science	**Scenario 1**	**Scenario 2**	**Scenario 3**	**Scenario 4**	**Scenario 5**	**Scenario 6**
Innovation policies in the Mediterranean	Marginalisation and dependency of the Mediterranean. Region falls further behind in digital technology, research and training.	Marginalisation and dependency of the Mediterranean. Region falls further behind in digital technology, research and training.	Intentional and national (or regional) specialisations. National champions.	Digital and knowledge-based societies + Mediterranean innovation space focused on digital technologies, the blue economy and the energy transition.	Creative and attractive territories. Hubs for positive and low-tech innovation.	Digital and knowledge-based societies.
Observation, monitoring, warning systems	Fragmentation of observation, monitoring and warning systems, except in European countries + High-performance private observation and monitoring systems (GAFAMs and Asian operators), but developed for economic rather than ecological reasons.		High-performance private observation and monitoring systems (GAFAMs and Asian operators), but developed for economic rather than ecological reasons.	The era of Big Data 2.0, shared, standardised and connected under the control of public state agencies, research centres or international commissions.	Citizen science and strong involvement of civil society in environmental and information issues.	Citizen science and strong involvement of civil society in environmental and information issues + Collection and publication of information for political needs (SDGs, etc.). Role of international institutions (UN, EU, etc.).

Annex 10. Map showing the discharge of freshwater from rivers into the Mediterranean Sea

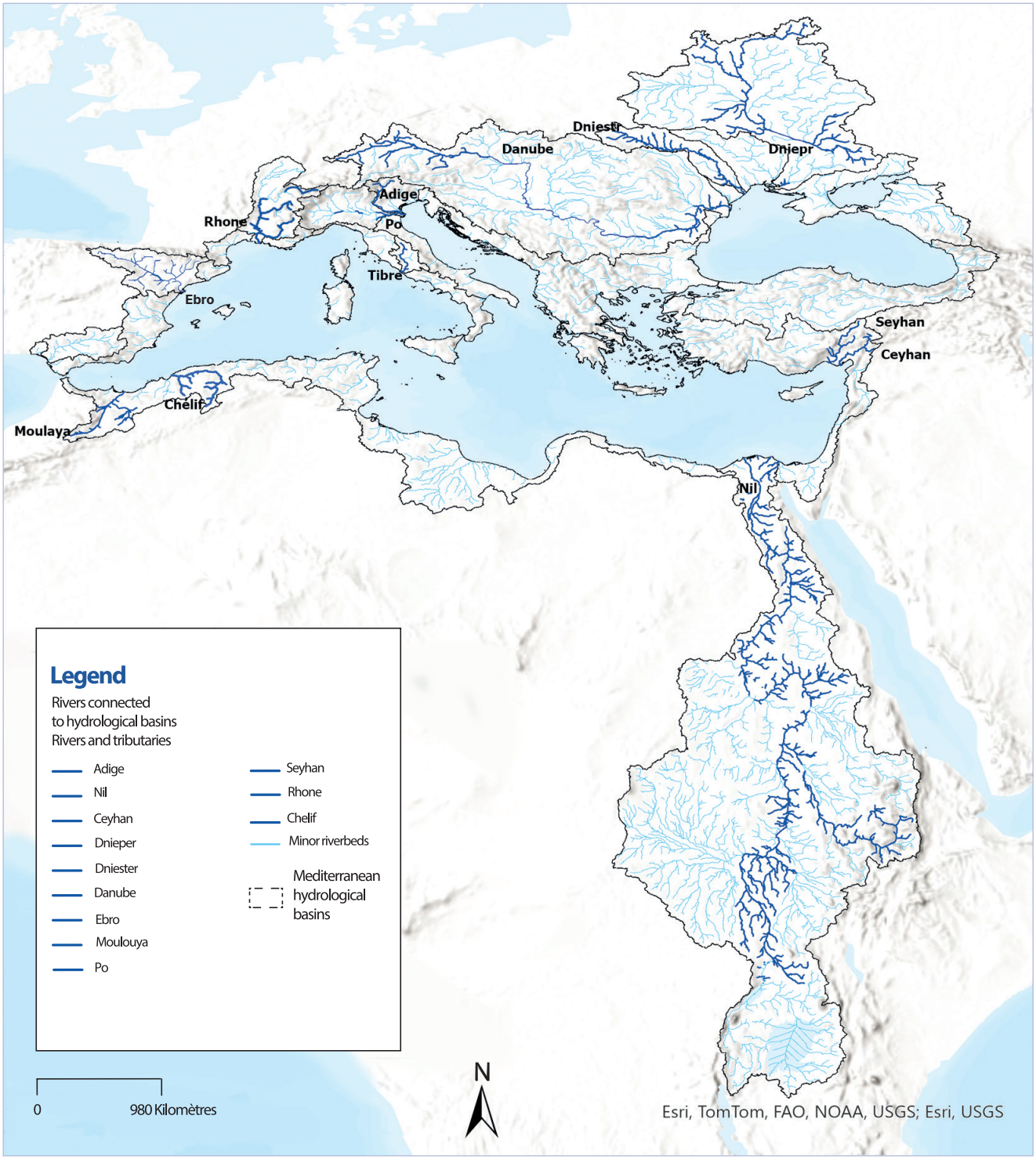
DISCHARGE OF FRESHWATER FROM RIVERS IN THE MEDITERRANEAN



Sources: Struglia, M.V., Mariotti, A. and Filograsso, A. (2004). River discharge into the Mediterranean Sea: Climatology and aspects of the observed variability. Journal of Climate 17,4740-4751; Ludwig, W., Dumont, E., Meybeck, M. and Heussner, S. (2009). River discharges of water and nutrients to the Mediterranean and Black Sea: Major drivers for ecosystem changes during past and future decades? Prog. Oceanogr. 80, 199-217.

Annex 11. The Mediterranean eco-region with its hydrographic boundaries and drainage basins

MEDITERRANEAN DRAINAGE BASINS AND ASSOCIATED RIVER CONNECTIONS



Source : Sébastien Piantoni, University of Reis, 2017 et cartographiée par Samson Bellieres, Plan Bleu.

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