MedECC:
An expert network on climate and environmental changes in the Mediterranean Basin

Wolfgang Cramer

Joël Guiot & Katarzyna Marini

UN environment
United Nations Environment Programme

MAP
Mediterranean Action Plan
Barcelona Convention

Plan Bleu

MedECC
Mediterranean Experts on Climate and environmental Change

Union for the Mediterranean
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MedECC goals and evolution

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The MedECC ambition is to develop

- a scientifically robust assessment of the risks associated with climate and environmental change in the Mediterranean Basin, based on published research (mainly in peer-reviewed journals)
- a regional science-policy interface on climate and environmental change in the Mediterranean, approved by policy-makers

More than 700 scientists from 35 countries have joined the network

Links to other initiatives

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Direct contributions to regional and international science & policies

→ IPCC
- Special Reports on 1.5°C warming (October 2018), Ocean and Cryosphere (October 2019), Land (August 2019)
- 6th IPCC report (AR6): Cross-chapter paper dedicated to Mediterranean Basin

→ UNEP/MAP
- Co-lead of "Climate change" Chapter of the 2019 State of the Environment and Development in the Mediterranean
- Contribution to the next Mediterranean Foresight MED2050

→ UfM Climate Change Expert Group, established by the 1st UfM Ministerial Declaration on Environment and Climate Change (2014)

Brief history of MedECC

MedECC
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- Launched in July 2015, in preparation for UNFCCC-COP21
- 2016-2017 Scoping for First Assessment Report (MAR1)
- 2018-20 Report Preparation (85 Lead Authors from 20 countries)
- 2019-20 External review by experts and policy makers
- Feb 2020: Editorial committee meeting, San Servolo, Italy
- July-Sept 2020: Finalization of MAR1 and its SPM
- 22 Sept 2020: Plenary discussion of SPM with stakeholders
- **17 Nov 2020: Release of full report at Med2020**

Early MedECC products

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The "MedECC Foundation paper"

REVIEW ARTICLE
https://doi.org/10.1038/s41558-018-0299-2
nature climate change

Climate change and interconnected risks to sustainable development in the Mediterranean

Wolfgang Cramer[1*], Joël Guiot[2], Marianela Fader[3], Joaquim Garrabou[4,5], Jean-Pierre Gattuso[6,7], Ana Iglesias[8], Manfred A. Lange[9], Piero Lionello[10,11], Maria Carmen Llasat[12], Shlomit Paz[13], Josep Peñuelas[14,15], Maria Snoussi[16], Andrea Toreti[17], Michael N. Tsimplis[18] and Elena Xoplaki[19]

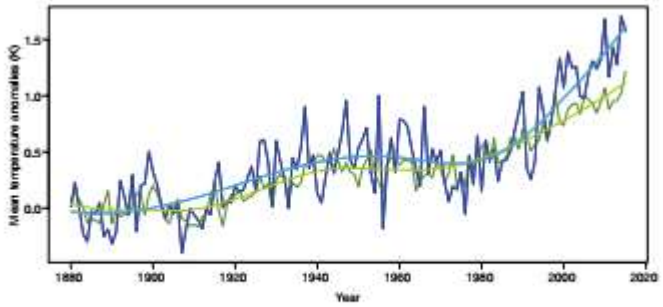

Fig. 1 | Historic warming of the atmosphere globally and in the Mediterranean Basin. Annual mean air temperature anomalies are shown with respect to the period 1880–1899, with the Mediterranean Basin (blue) and the globe (green) presented with (light curves) and without (dark curves) smoothing. Data from http://berkeleyearth.org/

- Published Dec 2018 at UNFCCC COP24 in Katowice, Poland
- updated for IVth UfM Regional Forum
- available In English, French and Arabic

1st Mediterranean Assessment Report (MAR1)

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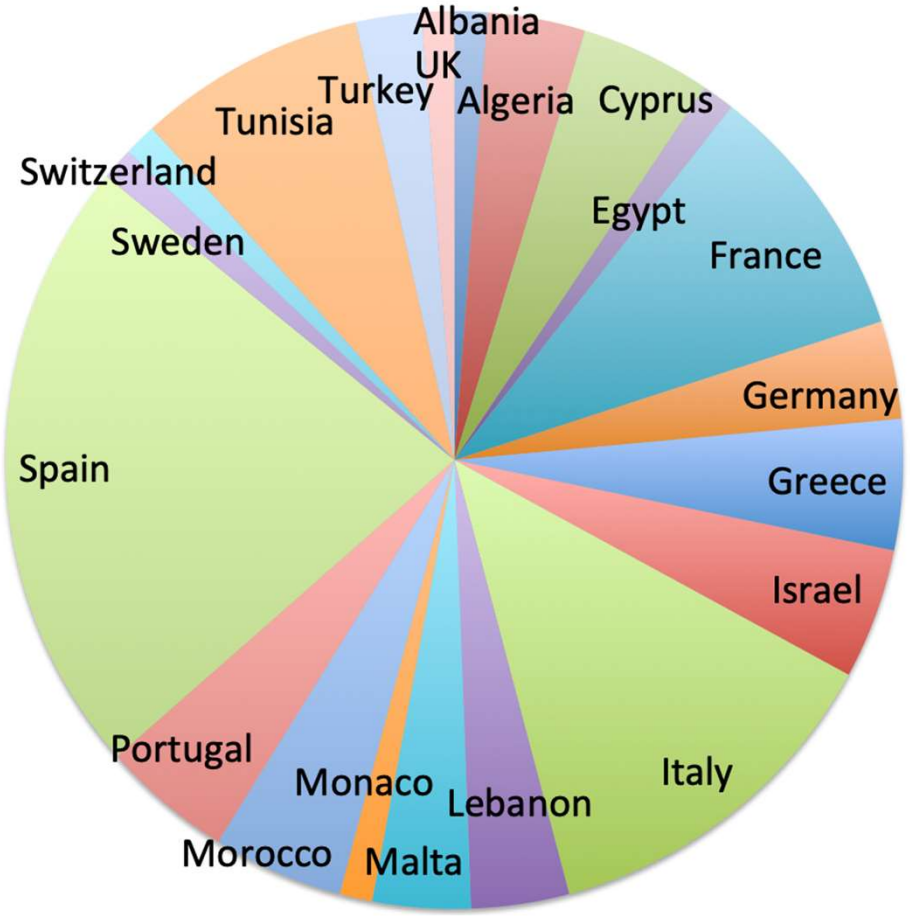
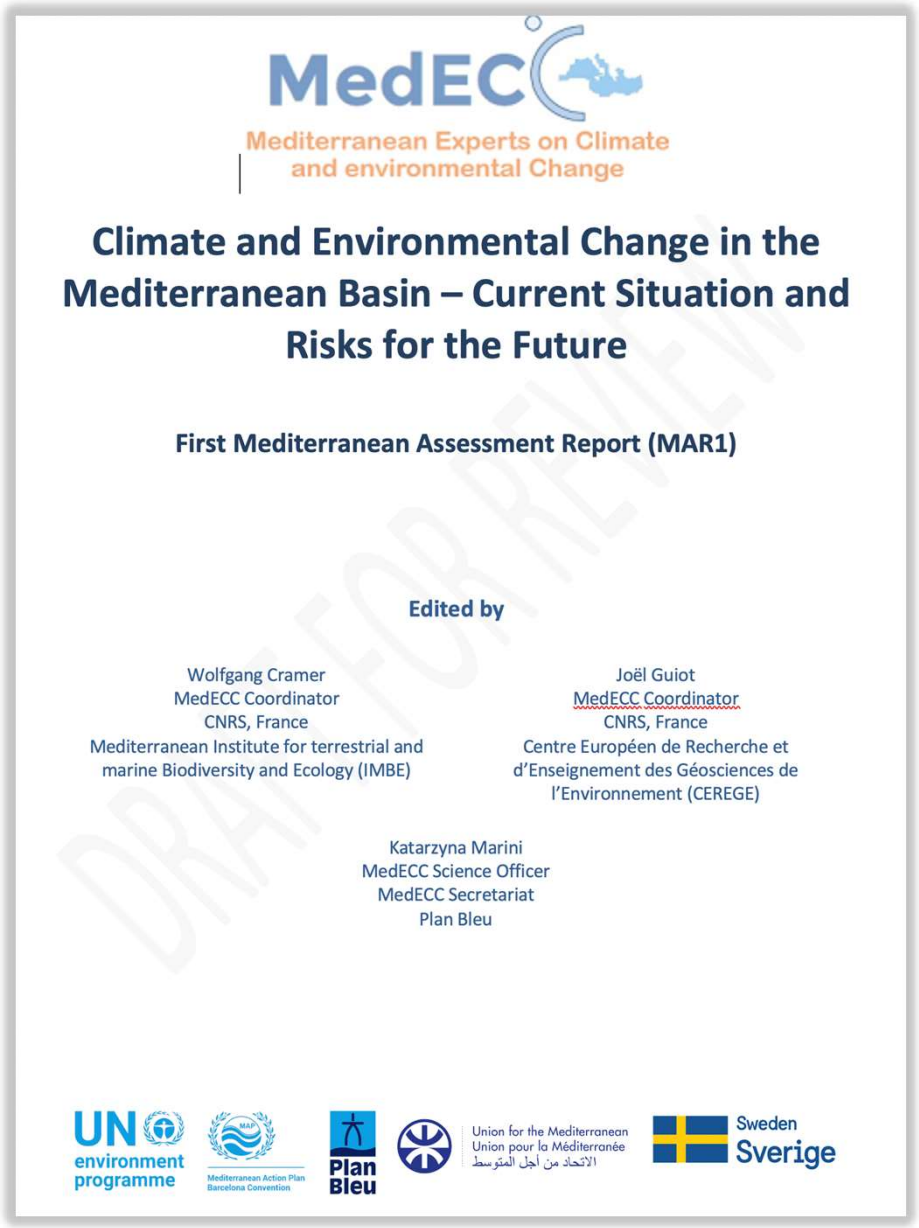
- Assessment Report (~500 p)
- Summary for Policymakers (SPM) (~30 p)
- Collective scoping and writing
- Voluntary contributions
  - 85 scientists from 20 countries
  - 38% authors from southern and eastern Medit.
  - 44% Lead Authors (CLA and LA) are women
- Academic criteria
- Transparent review by scientific experts and stakeholders / policymakers



MAR1 Key Messages



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Climate and Environmental Change in the Mediterranean Basin – Current Situation and Risks for the Future

First Mediterranean Assessment Report (MAR1)

Edited by

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Summary for Policymakers

6 main chapters:

1. Introduction
2. Drivers
3. Resources
4. Ecosystems
5. Society
6. Managing Risks

Climate and environmental change in the Medit. Basin

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- Virtually all sub-regions of the Mediterranean Basin, on land and in the sea, are impacted by recent anthropogenic changes in the environment
- Main drivers of change include climate (temperature, rainfall, extreme events, sea-level rise, and acidification), but also pollution, unsustainable land/sea use, and alien invasive species
- In most areas, both natural ecosystems and human livelihoods are affected
- Impacts are highly likely to be exacerbated in coming decades, especially if global warming exceeds 1.5-2°C above the pre-industrial level
- Significantly enhanced efforts are needed for mitigation and adaptation in the region

Projected climate change (1)

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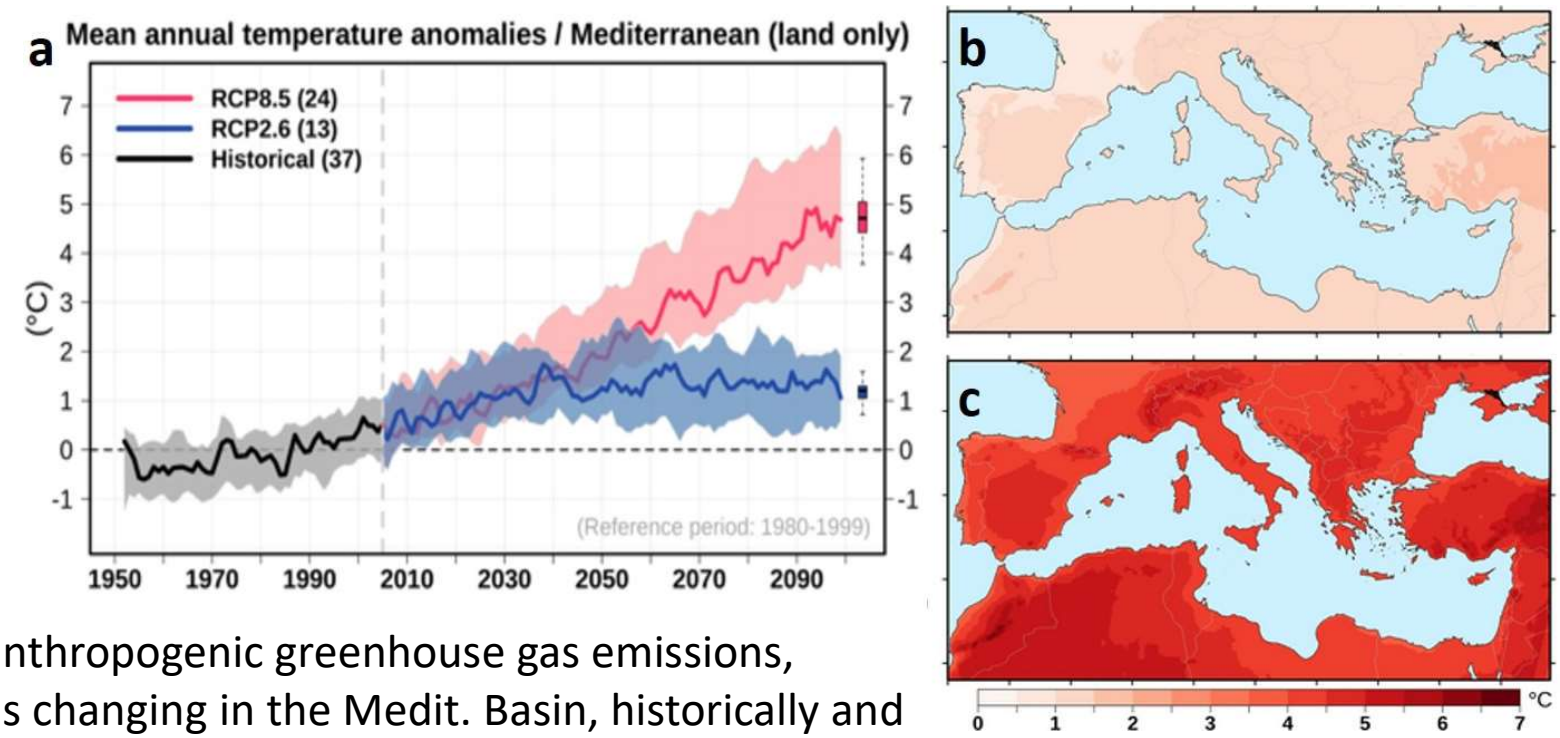

- Due to anthropogenic greenhouse gas emissions, climate is changing in the Medit. Basin, historically and projected by climate models, exceeding global trends
- Today, annual mean temperatures on land and sea in the Mediterranean Basin are 1.5°C higher than in pre-industrial times
- Until 2100, temperatures are projected to rise by additional 3.8-6.5°C for a high emission scenario (RCP8.5) and by 0.5-2.0°C for a scenario (RCP2.6) compatible with the UNFCCC Paris Agreement
- On land and in the sea, heat waves will intensify in both duration and peak temperatures

Projected climate change (2)

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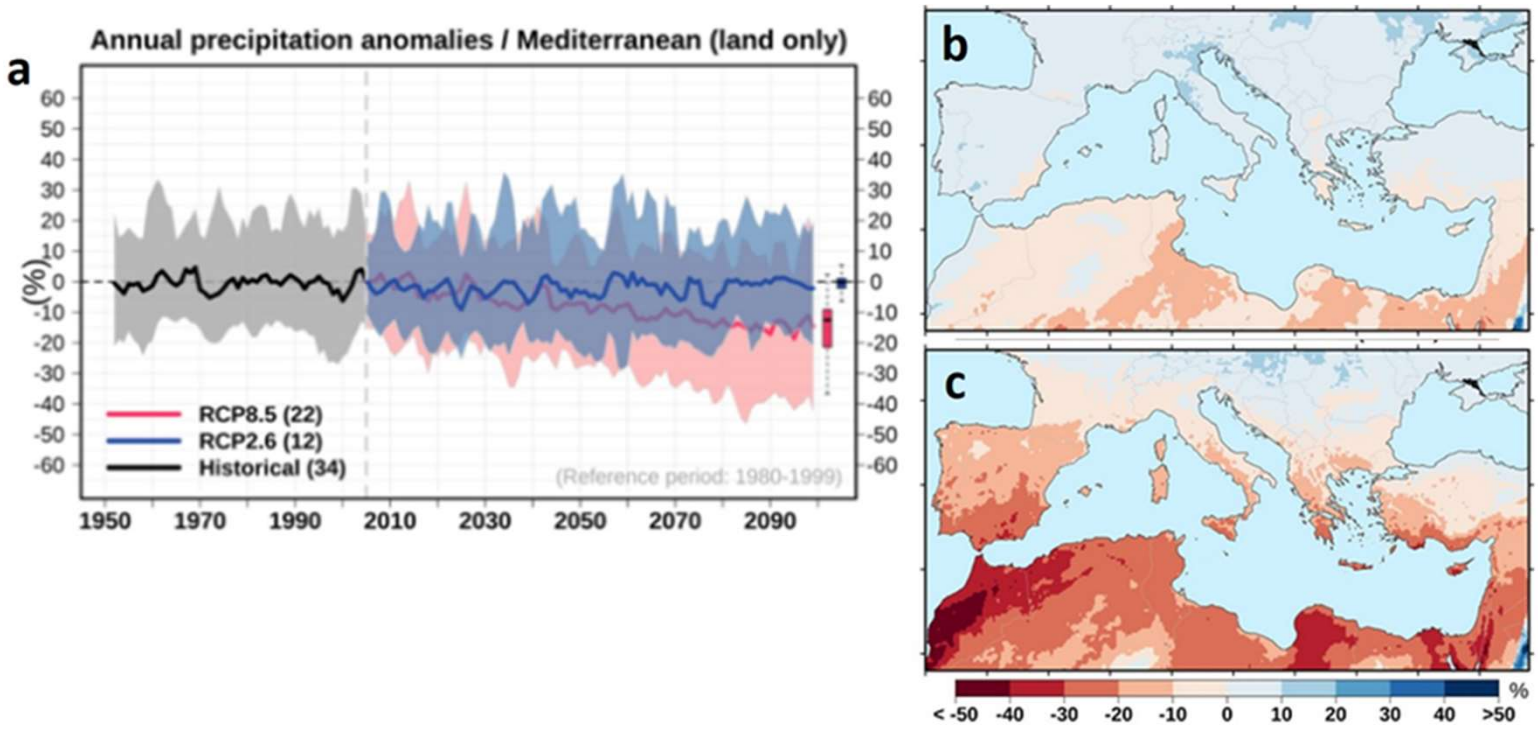

- Despite strong regional variation, summer rainfall will likely be reduced by 10-30% in some regions, enhancing existing water shortages and decreasing agricultural productivity

Sea-level rise

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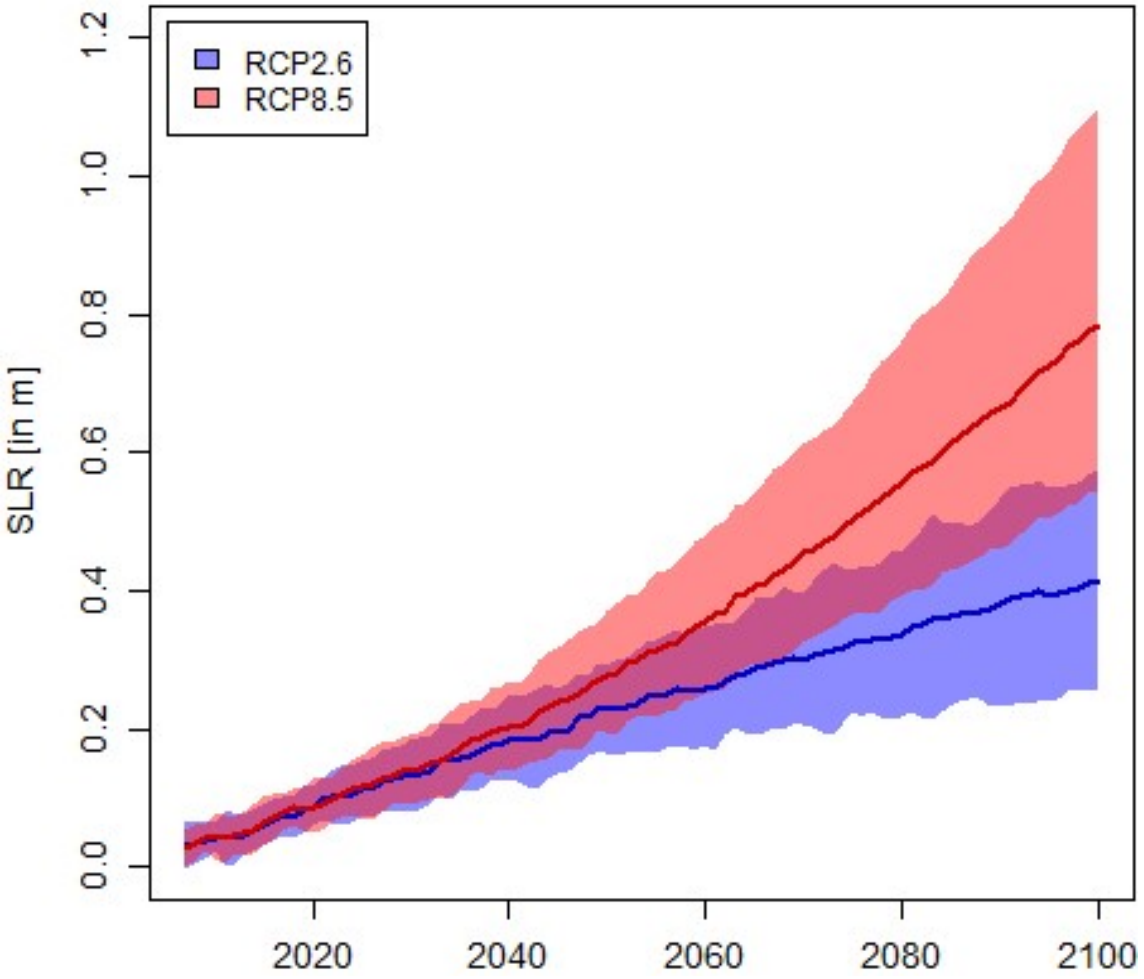
- Mean sea level has risen by 6 cm during the last 20 years, currently rising 2.88 per year
- This trend is likely to accelerate (with regional differences) by the global rate of 43-84 cm until 2100, but possibly more than 1 m
- These conditions apply to the Mediterranean



Non climate drivers: pollution, land and sea use, non-indigenous species

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- Changing land and sea use, urbanization, tourism, agricultural intensification, land degradation, and pollution.
- Tropospheric ozone concentrations increase and high-level episodes will be more frequent. SO_2 and NO_x have sharply increased recently, mainly because of shipping activity, and this trend will likely increase in the future.
- Pollution includes plastic, emerging contaminants, fecal bacteria and viruses, all with expected increase in the future.
- The Mediterranean Basin is affected by many non-indigenous species
- These trends are expected to continue in the future.

Risks for water resources due to warming and agricultural use

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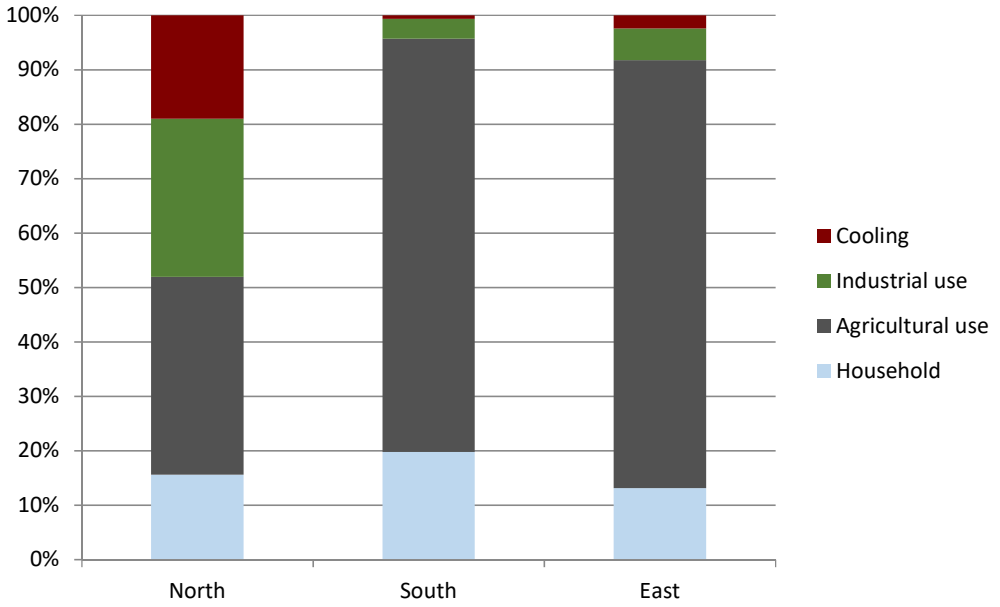
- Agriculture is the largest user of water in the Mediterranean region.
- Climate change impacts water resources in combination with demographic and socio-economic drivers, reducing runoff and groundwater recharge, water quality, increasing conflicts among users, and risk of ecosystem degradation.
- Demand for irrigation is expected to increase by 4-18% by 2100.
- Demographic change, including the growth of the large urban centers, could enhance this demand by 22-74%.
- There is adaptive potential in the improvement of water use efficiency and reuse.



Mediterranean agriculture

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The Mediterranean region holds 60% of the world's growing area for durum wheat. Through bread, pasta or couscous, this is the base of the food pyramid and are daily included as part of the main meals in Mediterranean diet.

Crop yield reductions are projected for the coming decades in most current areas of production and for most crops.

Irrigation demand may not be met.

Sea-level rise will increase risk of salinization.

Yield losses will potentially be worsened by emerging pests and pathogens.

There is large adaptation potential in changing farming practices and management to agroecological methods.

The agroecology transition also has important potential for climate change mitigation through increased carbon storage in soils.

Increasing drought, degradation of land ecosystems

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- During the last 40 years, biodiversity changes and species loss have led to homogenization and a general simplification of biotic interactions.
- Wildfire risk increases due to drought and land abandonment.
- Half of the wetland area has already been lost or degraded. This trend is expected to continue due to warming and sea-level rise.
- Increase of dryland area and areas burnt during wildfires are expected.

Risks for the marine ecosystems

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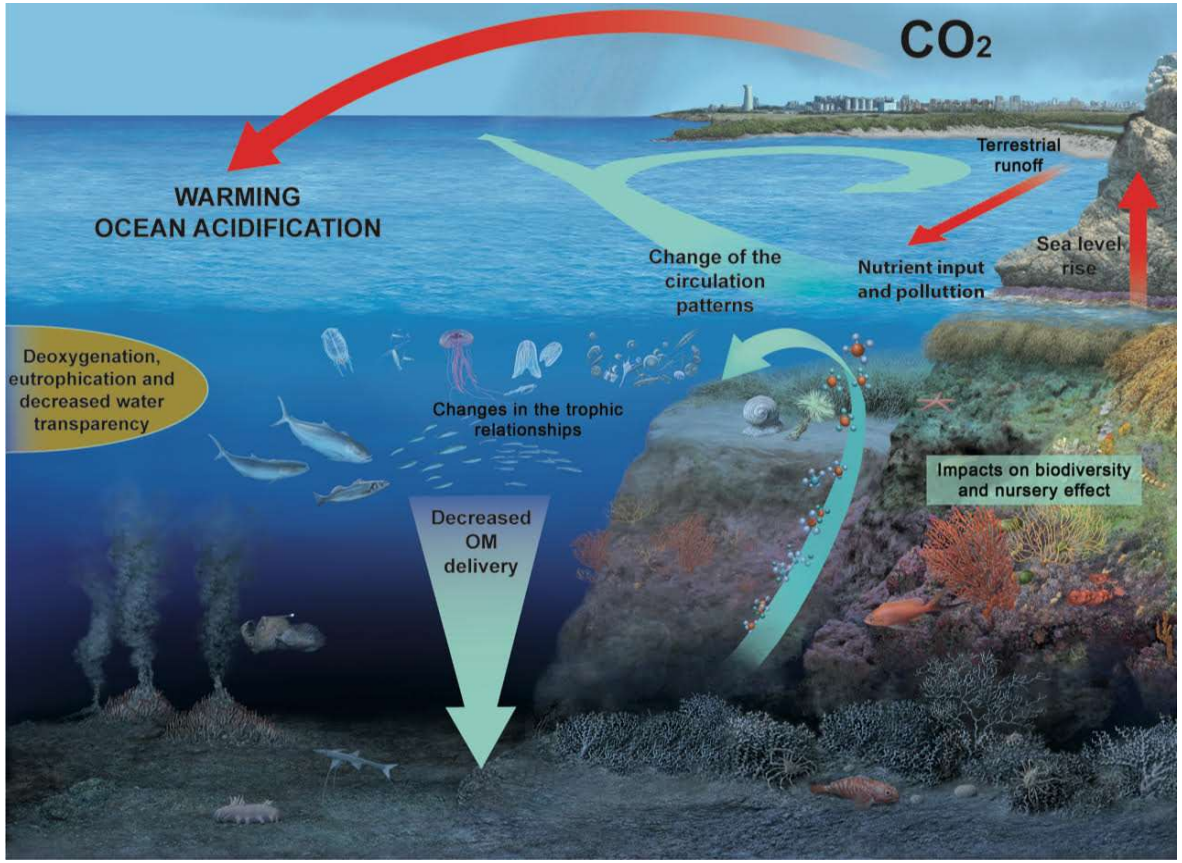
- Marine ecosystems and their biodiversity are impacted by overfishing, warming, acidification and the spread of non-indigenous species from tropical waters.
- Expected consequences include increased jellyfish outbreaks, reduced commercial fish stocks, and general biodiversity loss due to altered physiology and ecology of most marine organisms.
- Total landings from fisheries have declined 28% since 1994
- There is potential for mitigating these impacts through improved conservation in marine protected areas, more sustainable fishing practices and by reducing pollution from agriculture, urban areas and industry.



Mediterranean coral bleaching

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Necrosis in *Cladocora caespitosa* in the Columbretes Islands Marine Reserve

The ocean both warms and acidifies – and these trends will continue.

Risks for human health (1)

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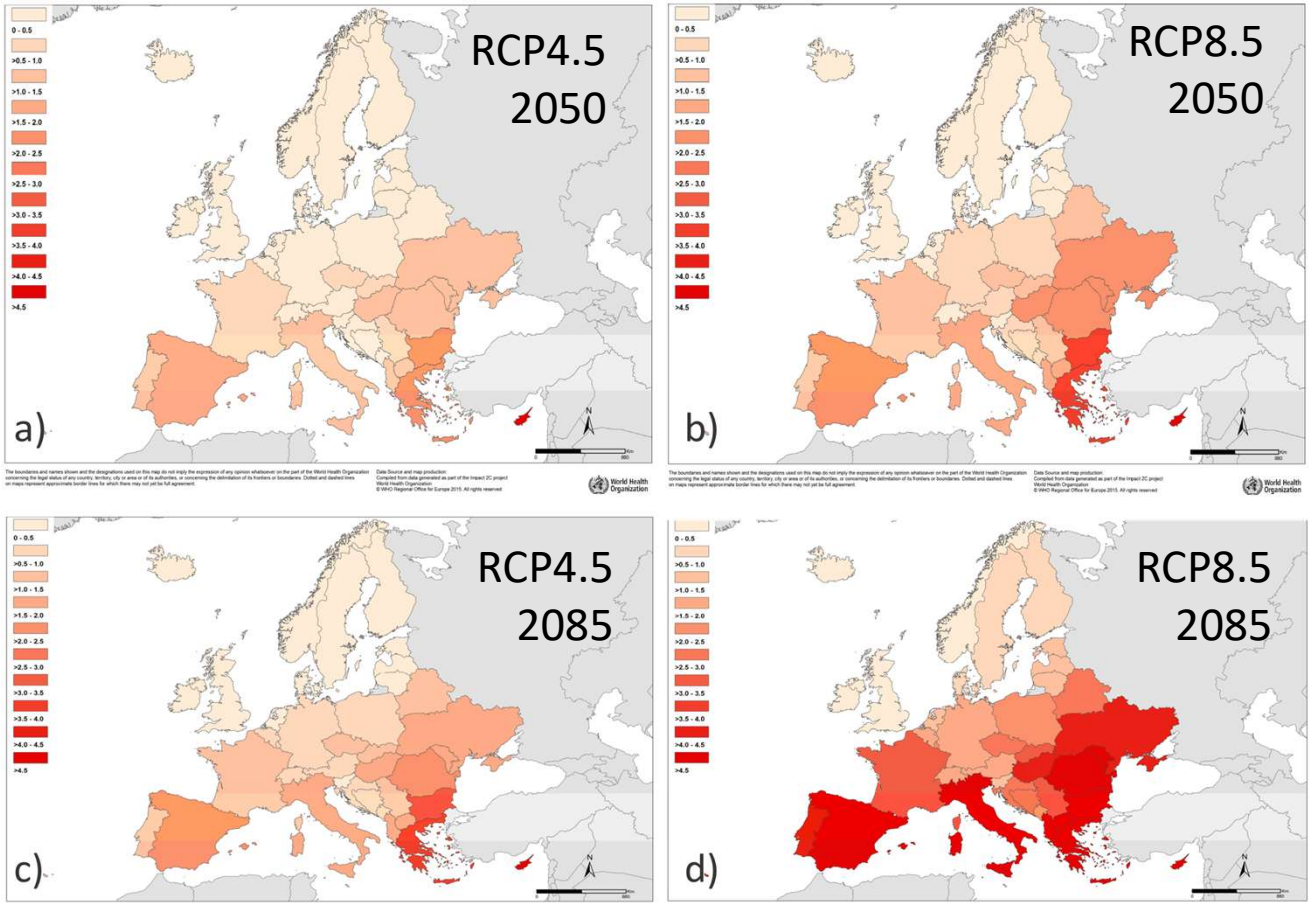

Attributable fraction of heat-related deaths during summer with different climate scenarios by country in Europe (Kendrovski et al. 2017).

- Human health is already impacted by high temperatures and pollution.
- The combined impacts of expected environmental change (notably air pollution and climate) increase risks for human health, from heat waves and food shortages.
- Risks concern vector-based, respiratory and cardio-vascular diseases.
- Risks particularly impact disfavored populations, including the elderly, young children and people with low income.

Risks for human health (2)

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- Reducing air pollution benefits climate mitigation and public health

Drought, agriculture, conflict, migration

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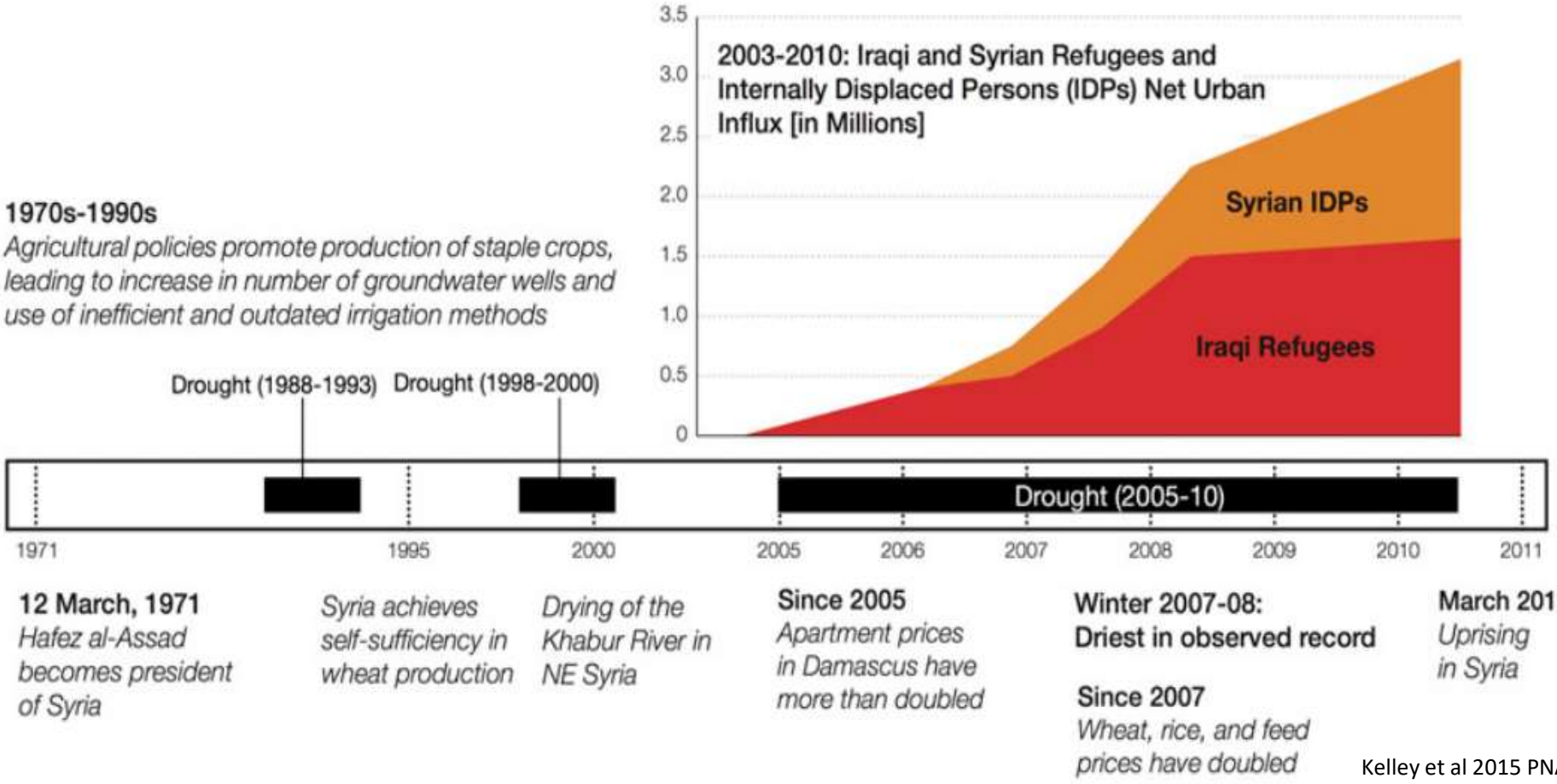

Kelley et al 2015 PNAS

- Environmental change does not cause conflict but may act as a threat multiplier

Energy transition

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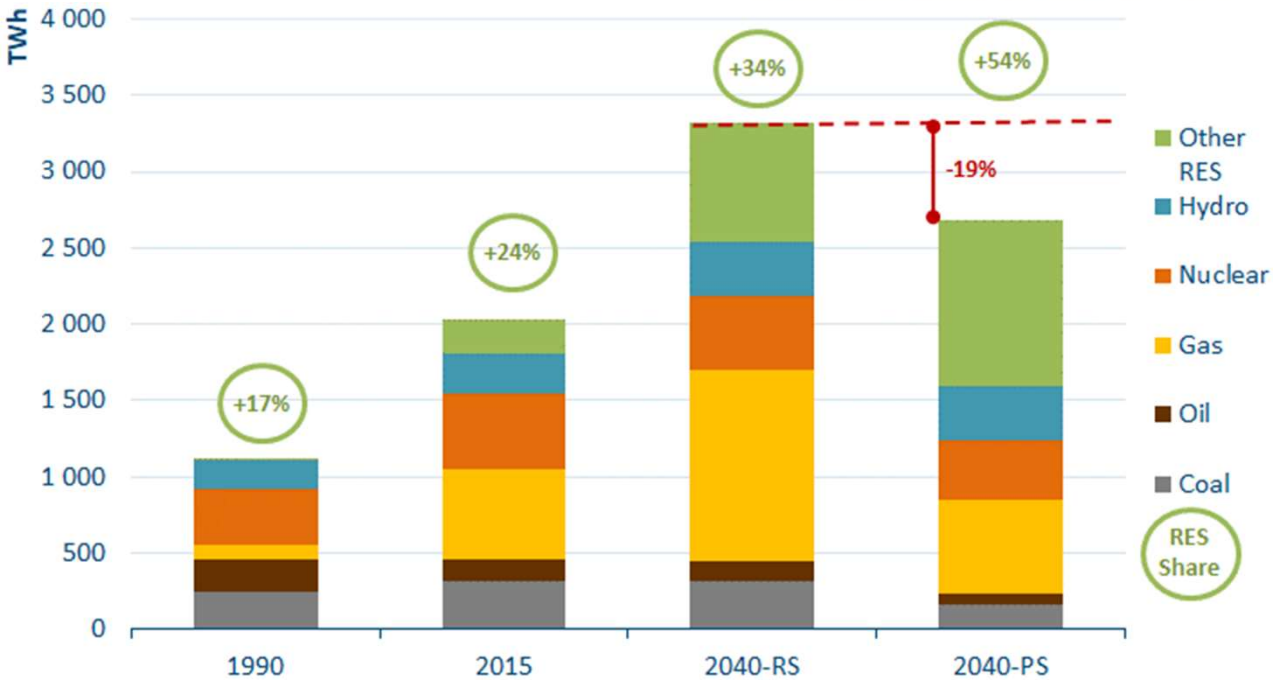
Energy mix for past, present, a reference and a proactive transition scenario for 2040



- Mediterranean countries have significant potential to mitigate climate change through an accelerated energy transition, implying the phase-out of fossil fuels and accelerated development of renewables.
- This energy transition, in line with Paris the Agreement, requires a significant transformation of the energy and economic model in the Mediterranean region.
- Northern countries advance towards this transition by gradually diversifying their energy mix, improving energy efficiency and enlarging the fraction of renewables. Eastern and southern countries still lag behind in these developments.
- Around 2040, the share of renewables could triple to reach 13-27%.
- Enhanced regional energy market integration and cooperation are crucial to enable cost-effective climate change mitigation.

The MedECC ambition is to support policies for sustainable development

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- More effective policy responses to climate and environmental changes will imply both,
  - strengthened **mitigation** of the drivers of environmental change such as greenhouse gas emissions,
  - but also enhanced **adaptation** to impacts.
- **Poverty, inequalities and gender** imbalances presently hamper the achievement of sustainable development and climate resilience in Mediterranean countries.
- **Culture** is a key factor to the success of adaptation policies in the highly diverse multicultural setting of the Mediterranean Basin.
- Policies for climate adaptation and environmental resilience potentially infringe on **human rights** - they need to account for concerns such as justice, equity, poverty alleviation, social inclusion, and redistribution.

Supporting institutions

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CONTEXT | OBJECTIVES | OUTPUTS | ORGANISATION | EVENTS | SCIENTIFIC NEWS | MEDIA

Scientific assessment of climate and environmental changes impacts in the Mediterranean Basin

From science to policy-making

The network of Mediterranean Experts on Climate and Environmental Change (MedECC) has been created in 2015. MedECC is an open and independent international scientific expert network acting as a mechanism for decision-makers and the general public on the basis of available scientific information and on-going research. The construction of this network responds to several intentions of regional institutions, such as the UN Environment/MAP through the MSSD 2016-2015 and the Regional Framework for Climate Change Adaptation in the Mediterranean, and the Expert Group on Climate Change of the Union for the Mediterranean (UfM CCEG). MedECC includes more than 600 scientists from 35 countries.