European Commission

JRC PESETA III Science for Policy Summary Series

CLIMATE CHANGE AND MEDITERRANEAN HABITAT LOSS

The Mediterranean region is home to almost half of the plant and animal species, and more than half of the habitats, listed in the EU Habitats Directive. However, this reservoir of biodiversity is threatened by climate-driven habitat loss because the Mediterranean climate zone is at risk of becoming smaller. Existing protected sites, along with natural and semi-natural areas that remain in the Mediterranean zone, will be critical for adaptation and biodiversity conservation.

IMPACTS ON THE MEDITERRANEAN ZONE IN A HIGH WARMING SCENARIO

The present Mediterranean climate zone may contract by 16% by the end of the century under a high warming scenario and without adaptation (Figure 1). The magnitude of this contraction is equivalent in area to around half of Italy, at 157,000 km^2.

The zone is projected to contract around central and southern parts of the Iberian Peninsula, southern Italy and Sicily, southern and north-eastern Greece and Crete, Cyprus, and parts of southern Turkey. Only 71% of the present area of the Mediterranean zone remains stable.

Expansion of the arid zone is almost always the cause for contraction of the Mediterranean zone. The arid zone is projected to increase by more than twice its current extent - this is equivalent to three times the size of Greece (Figure 1). A conversion of this magnitude will lead to a decrease of biodiversity due to the migration or local extinction of Mediterranean species that are unable to cope with the magnitude of habitat change.

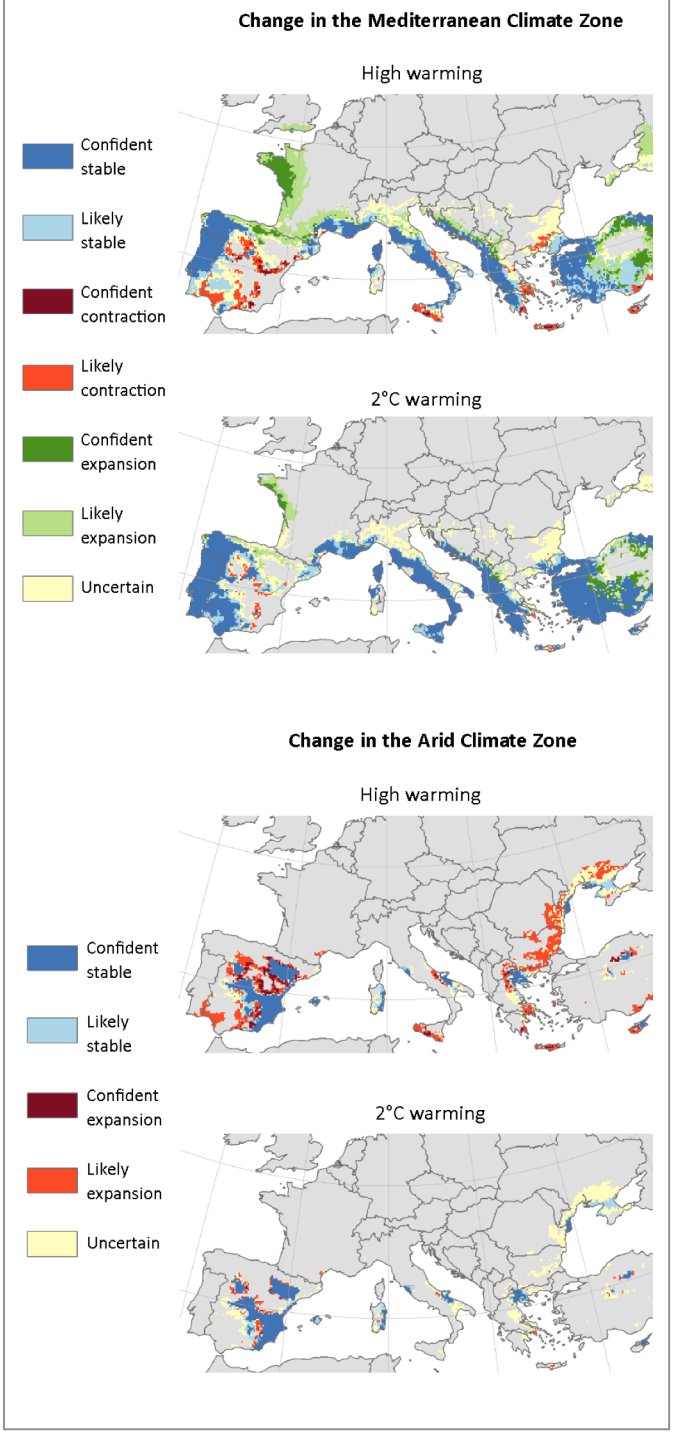
IMPACTS ON THE MEDITERRANEAN ZONE IN A 2°C WARMING SCENARIO

Limiting global warming to 2°C (assuming no adaptation), in line with the goals of the Paris Agreement in 2015, could see less contraction and greater stability of the Mediterranean zone, and significantly less expansion of the arid zone, compared to the high warming scenario.

91% of the present Mediterranean zone remains stable under the 2°C warming scenario – this compares to only 71% with high warming (Figure 1).

Climate change mitigation significantly reduces expansion of the arid climate zone. Under the 2°C warming scenario the arid zone increases in area by 14% from nowadays. This compares to a 128% increase under high warming.

Figure 1. Projected changes in the extent of the Mediterranean and arid climate zones respectively, assuming no adaptation, under two scenarios: high warming by the end of the century and 2°C warming.



Impacts on the area of the Mediterranean zone within protected sites

Climate change will affect the total area of the Mediterranean climate zone that falls within Natura 2000 protection sites because of contraction and expansion of the zone.

Only 63% of the Mediterranean climate zone that is currently within Natura 2000 sites remains stable by the end of the century under the high warming scenario (assuming no adaptation; Table 1). The area of the Mediterranean climate zone within some sites contracts by around 32,000 km^2 and expands within other sites that are currently in other climate domains (i.e. not defined as Mediterranean) by around 40,000 km^2.

A much larger area of the Mediterranean climate zone that currently falls within the sites remains stable under the 2°C warming scenario (assuming no adaptation; Table 1). There is also less expansion and less contraction of the zone within sites.

Adaptation

Target areas for adaptation are identified in Figure 2, which shows existing Natura 2000 sites as well as natural and semi-natural areas where the Mediterranean zone is preserved under the high warming scenario by the end of the century. Both areas are considered critical for biodiversity conservation.

The natural and semi-natural areas, not included in the Natura 2000 network, are important features that can contribute to autonomous adaptation because of their potential role as corridors and stepping-stones that can facilitate migration of species, as well as acting as refuges.

In addition, these areas could facilitate some of the planned adaptation measures identified by the European Commission for Natura 2000 sites, such as establishment of new protected areas for increasing network coherence, implementation of buffer zones around Natura 2000 sites, and creating corridors between Natura 2000 sites[1].

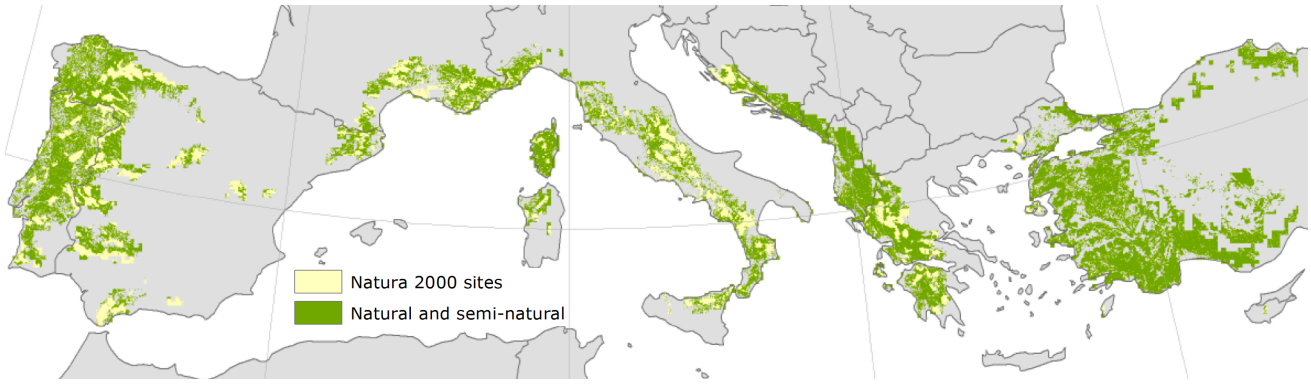
Table 1. The proportion of the area, and area, of Natura 2000 sites currently within the Mediterranean zone, which are at least likely (i.e. likely as well as confident) to be stable, contract or expand due to climate change.

	Proportion (%)		Area (km^2)	
	High warming	2°C	High warming	2°C
Stable	63%	86%	106,025	143,820
Contraction	20%	3%	32,417	6,044
Expansion	23%	12%	39,739	14,673

Note: one Natura 2000 site can be represented in more than one category of change, e.g. one site can be partially in stable and partially in contraction areas, and some area changes are uncertain (see Figure 1), so numbers do not total 100%.

[1] European Commission, Guidelines on climate change and Natura 2000 — Dealing with the impact of climate change on the management of the Natura 2000 network of areas of high biodiversity value, Publications Office of the European Union, Luxembourg, 2013, p. 104.

Figure 2. Existing Natura 2000 sites mapped against natural and semi-natural areas where the Mediterranean zone is preserved under a high warming scenario by the end of the century.



Approach

PESETA III assessed the effects of climate change on the spatial extent of Europe's Mediterranean and arid climate zones. The zones were defined as being stable, contracting, or expanding due to climate change. Measures of confidence were assigned to each change, depending upon how many of 11 climate models showed the same result. If 10-11 models showed the same effect of climate change, then the change was defined as confident, changes projected by 7-9 were defined as likely, and 1-6 as uncertain.

Natura 2000 is a network of nature protection sites established under the EU Habitats Directive. The current extent of the Mediterranean zone includes 2,599 Natura 2000 sites, totalling an area of around 168,000 km^2, which represents 16% of the zone. PESETA III mapped present Natura 2000 sites against areas that are projected to remain stable, contract or expand. The geographical scope of the study was all of Europe.

Read more

PESETA III Task 10: Mediterranean habitat loss under RCP4.5 and RCP8.5 climate change projections. Available on our website https://ec.europa.eu/jrc/en/peseta