

## Climate change and Mediterranean seagrass meadows: a synopsis for environmental managers

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### Abstract

This synopsis focuses on the effects of climate change on Mediterranean seagrasses, and associated communities, and on the contribution of the main species, *Posidonia oceanica*, to the mitigation of climate change effects through sequestering carbon dioxide. Whilst the regression of seagrass meadows is well documented, generally linked to anthropogenic pressures, global warming could be a cause of new significant regression, notably linked to the introduction of exotic species, the rise of Sea-Surface Temperature (SST), and relative sea level. Seagrass communities could also be affected by climate change through the replacement of high structural complexity seagrass species by species of lower complexity and even by opportunistic introduced species. Although it is currently very difficult to predict the consequences of these alterations and their cascade effects, two main potential conflicting trends in the functioning of seagrass ecosystems are acceleration of the herbivore pathway or the detritivore pathway. The mean net primary production of the dominant species, *Posidonia oceanica*, is relatively high and can be estimated to range between 92.5 to 144.7 g C m<sup>-2</sup> a<sup>-1</sup>. Around 27% of the total carbon fixed by this species enters the sedimentary pathway leading to formation, over millennia, of highly organic deposits, rich in refractory carbon. At the Mediterranean scale, the sequestration rate might reach 1.09 Tg C a<sup>-1</sup>. The amount of this stored carbon is estimated to range from 71 to 273 kg C m<sup>-2</sup>, which when considered at the Mediterranean scale would represent 11 to 42% of the CO<sub>2</sub> emissions produced by Mediterranean countries since the beginning of the Industrial Revolution. The greatest value of the *P. oceanica* ecosystem, in the context of mitigation of global climate change, is linked to this vast long-term carbon stock accumulated over millennia, and therefore, efforts should be focused on preserving the meadows to keep this reservoir intact.

**Keywords:** Seagrass ecosystem, *Posidonia oceanica*, global change, primary production, carbon sink, Mediterranean, seagrasses.