

Nature-Biodiversity

Update of State of the Environment Report 2018



NCED

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& Sustainable Development

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Foreword

The National Center for Environment and Sustainable Development (NCESD) was established in 2000 with the aim to contribute to the integration of the environmental dimension into broader development policy, sub-sectors and strategic planning, providing appropriate know-how and objective information.

According to the Presidential Decree 325/2000 (A '266) concerning the establishment of NCESD, and in particular the point (e) of paragraph 2 of Article 3, it is provided that the NCESD “*shall draw up an annual report evaluating the environmental status of the country and undertaking assessments of the objectives, directions and measures of the actual environmental policy.*”

In November 2018, NCESD presented its 2018 State of the Environment Report (SoER 2018, https://ekpaa.ypeka.gr/wp-content/uploads/2019/10/181019_Book-YPEKA_LOW.pdf) for the first time after 2013 (concerning 2008-2011) and it was the fourth State of the Environment Report of Greece. The SoER 2018 is a comprehensive overview of the developments and challenges facing key environmental sectors and aims to provide citizens and the State with detailed information and links to the European Environment Agency's report. For the preparation of the Report, NCESD cooperated with academic institutions, research centers and technical companies. The SoER 2018 includes detailed information for the state of the environment in Greece in the fields of climate change, air quality, noise, nature, water, waste and horizontal environmental issues, thus providing to all interested stakeholders a useful database.

This update of SoER 2018 regarding Nature - Biodiversity was based on the most recent available data. The aim of the update is to provide an objective information database as well as contributing to the public dialogue on policy directions and measures in the field of natural environmental protection.

The Project Team for the Update of the SoER 2018 on Nature - Biodiversity was drafted by P. Varelidis, P. Dimopoulos and K. Korizi.

We would like to thank the Department of Natural Environment and Biodiversity Management of MEEN for providing the required data.

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Executive Director of NCESD

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President of the Management Board of NCESD

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Species of European Interest

The indicator presents the conservation status and trends of species of European interest found in Greece. Species of European interest refer to the species in Annexes II, IV and V of the Habitats Directive (Directive 92/43/EEC) and the species in Annex I of the Birds Directive (Directive 2009/147/EC).

The data come from the [national report under Article 17 of the Habitats Directive](#) and the [national report under Article 12 of the Birds Directive](#), for the reporting period 2013-2018, submitted on 31 July 2019 and are available at the European Environment Agency's Central Data Repository.

A. Species of the Habitats Directive

1. Number of species of European interest

According to the National Report on Species of European Interest of the Habitats Directive, in the reference period 2013-2018 there are 308 species (in Annexes II, IV and V of the Directive). The species distribution by taxonomic group and biogeographical area is listed in Table 1. Among the 308 species, 286 are found in the Mediterranean Biogeographical Area (MED), 21 in the Marine Mediterranean Biogeographical Area (MMED) and 1 species of fish fauna (*Acipenser sturio*, code 1101) is found both in inland waters (MED) and in the marine area (MMED) of Greece.

Table 1: Number of species of European interest in Greece (2013-2018)

Taxonomic group	Number of species	Biogeographical region		
		MED	MMED	MED & MMED
Flora	64	64		
<i>Vascular plants</i>	63	63		
<i>Non-vascular plants</i>	1	1		
Invertebrates	44	39	5	
<i>Arthropods</i>	35	34	1	
<i>Mollusks</i>	6	4	2	
<i>Other invertebrates</i>	3	1	2	
Fish	67	66		1
Amphibians	17	17		
Reptiles	51	48	3	
Mammals	65	52	13	
Total	308	286	21	1

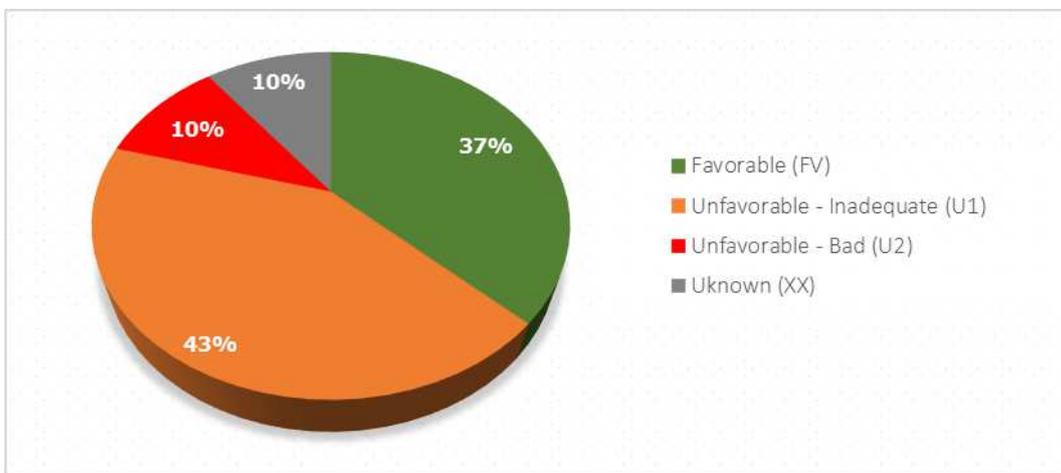
Compared to the previous reference period (2007-2012), 33 new species were added (8 species of flora, 4 invertebrates, 4 species of fish fauna, 6 amphibians, 7 reptiles and 4 mammals) and 31 species were removed (7 species of flora, 6 invertebrates, 4 fish species, 6 amphibians, 6 reptiles and 2 mammals).

Among the 308 total species, no data are available on conservation status, as well as on the pressures and threats of 10 species (1 species of flora, 1 invertebrate, 2 species of fish fauna and 6 mammals).

2. Conservation status and trends of species in the Mediterranean Biogeographical Region (MED)

Among the species in the Mediterranean Biogeographical Area (MES), 37% are in Favorable conservation status (FV), while 53% are in Unfavorable conservation status (U1 and U2), among which 29 species, mainly in the category of fish species, are classified in Bad condition (U2). The conservation status of 29 species remains Unknown (XX).

Graph 1: Conservation status of species of European interest MED (2013-2018)



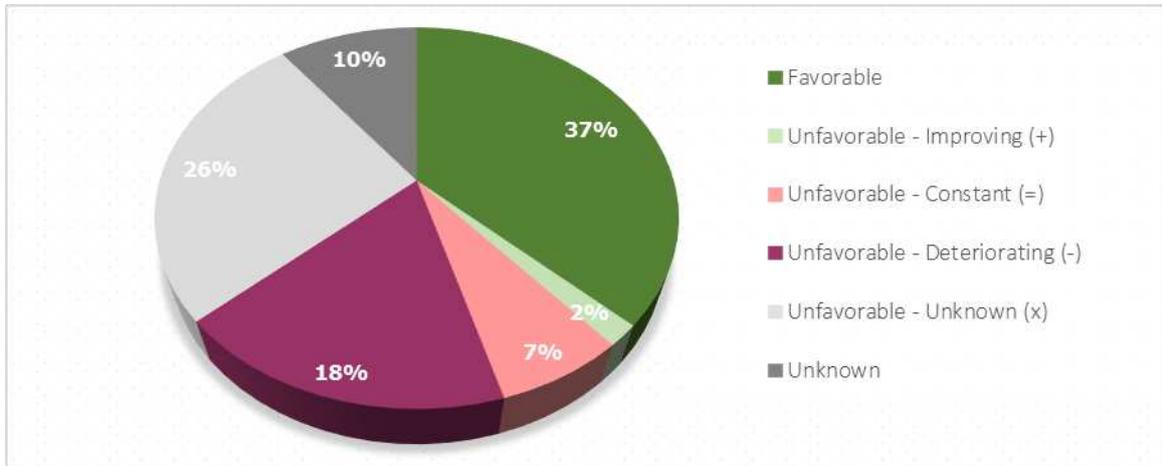
Conservation status	Vascular plants	Non-vascular plants	Fish fauna	Amphibians	Reptiles	Mammals	Arthropods	Mollusks	Other invertebrates	TOTAL SPECIES
Favorable (FV)	22		18	13	38	9	4			104
Unfavorable - Inadequate (U1)	25		23	4	9	25	29	4		119
Unfavorable - Bad (U2)	6	1	20			1	1			29
Unknown (XX)	9		4		1	15				29
Data not available	1		2			2			1	6
Total	63	1	67	17	48	52	34	4	1	287

* For the percentage's estimation the 6 species of MED with no available data are not considered.

** 1 species found in MED and MMED (code 1101) is added to the 66 species of fish fauna of MED

Regarding the trend of species in Unfavorable conservation status (U1 and U2), it is recorded as unfavorable, but improving (+) for only 5 of them, constant (=) for 19 species, deteriorating (-) for 50 species, while for 74 species the trend is unknown (x).

Graph 2: Trends of species of European interest MED (2013-2018)



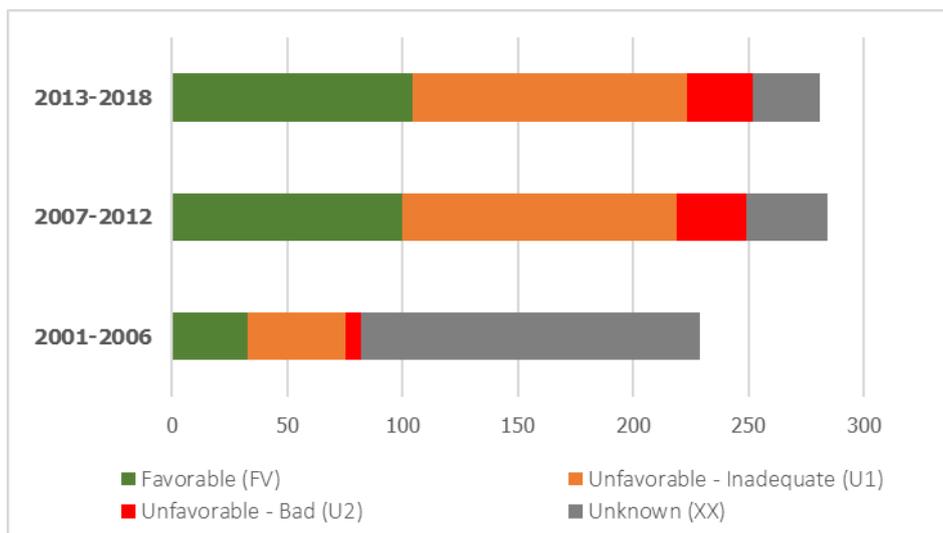
Conservation status	Vascular plants	Non-vascular plants	Fish fauna	Amphibians	Reptiles	Mammals	Arthropods	Mollusks	Other invertebrates	TOTAL SPECIES
Favorable	22		18	13	38	9	4			104
Unfavorable - Improving (+)	1		1			3				5
Unfavorable - Constant (=)	6		7		1	1	4			19
Unfavorable - Deteriorating (-)	6		20	1	8	1	10	4		50
Unfavorable - Unknown (x)	18	1	15	3		21	16			74
Unknown	9		4		1	15				29
Data not available	1		2			2			1	6
Total	63	1	67	17	48	52	34	4	1	287

* For the percentage's estimation the 6 species of MED with no available data are not considered.

** 1 species found in MED and MMED (code 1101) is added to the 66 species of fish fauna of MED

A comparison of the conservation status of species of European interest between the three reference periods (2001-2006, 2007-2012 and 2013-2018) in the Mediterranean Biogeographical Region (MES) shows a significant decrease in the Unknown conservation status (XX) between the period 2001 - 2006 and the next two periods due to knowledge improvement. As shown in Graph 3, overall, there is no significant change in the conservation status of the species between 2007-2012 and 2013-2018.

Graph 3: Change in the conservation status of the species of European interest MED between reference periods

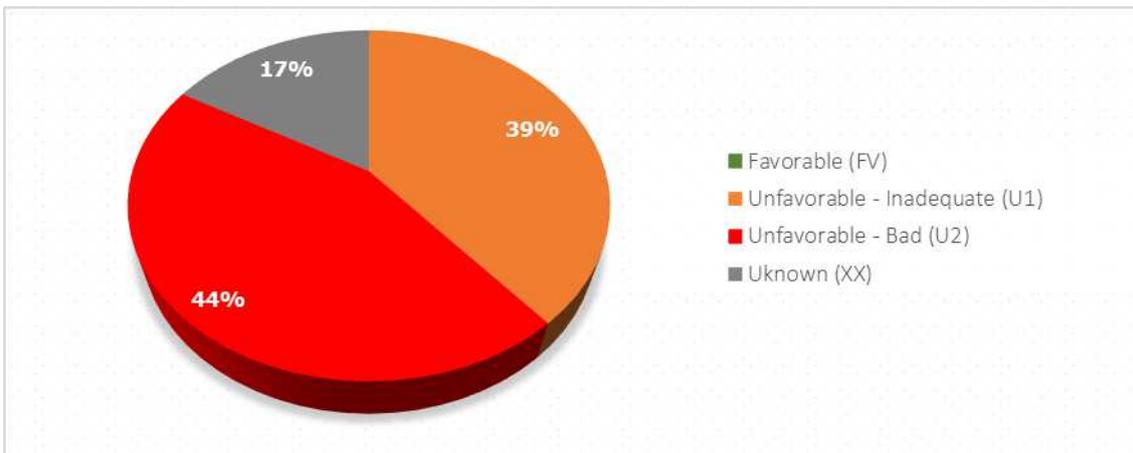


* MED species with no available data are not considered in the distribution.

3. Conservation status and trends of species in the Marine Mediterranean Biogeographical Region (MED)

Among the species in the Marine Mediterranean Biogeographical Region (MMED), no species is found in Favorable conservation status (FV). 87% are in Unfavorable conservation status, 39% in Inadequate (U1) and 44% in Bad (U2) status, while the conservation status of the remaining 17%, which concerns 3 conservation species, remains Unknown (XX).

Graph 4: Conservation status of species of European interest MMED (2013-2018)



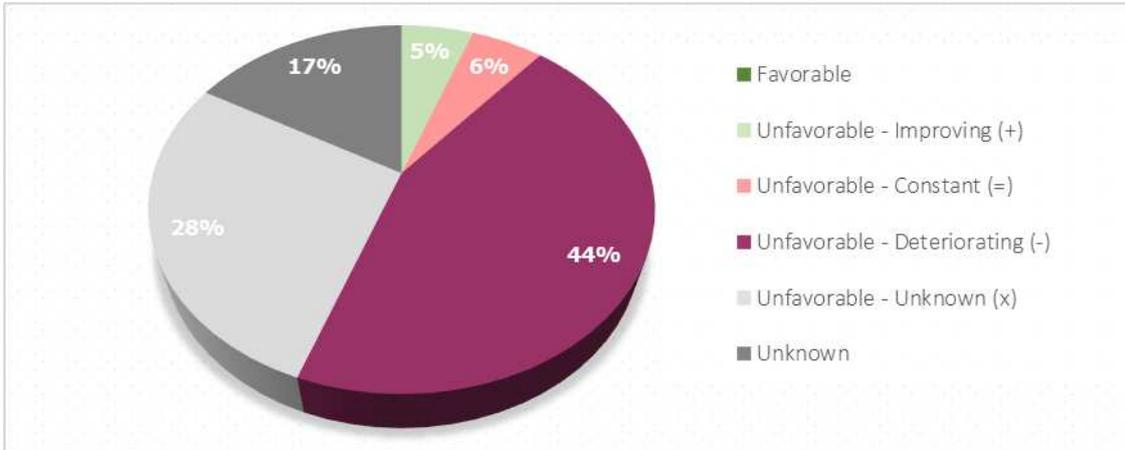
Conservation Status	Vascular plants	Non-vascular plants	Fish fauna	Amphibians	Reptiles	Mammals	Arthropods	Mollusks	Other invertebrates	TOTAL SPECIES
Favorable (FV)										0
Unfavorable - Inadequate (U1)						3	1	1	2	7
Unfavorable - Bad (U2)					3	4		1		8
Unknown (XX)			1			2				3
Data not available						4				4
Total			1		3	13	1	2	2	22

* For the percentage's estimation the 4 species of MMED with no available data are not considered.

** 1 species of fish fauna found in MED and MMED (code 1101) is added to the species of fish fauna of MMED

The trend of the 15 species being in Unfavorable conservation status (U1 and U2) appears improved (+) for 1 species, constant (=) for 1 species and deteriorating (-) for 8 among them, while for 5 species the trend is unknown (x).

Graph 5: Trends of species of European interest MMED (2013-2018)



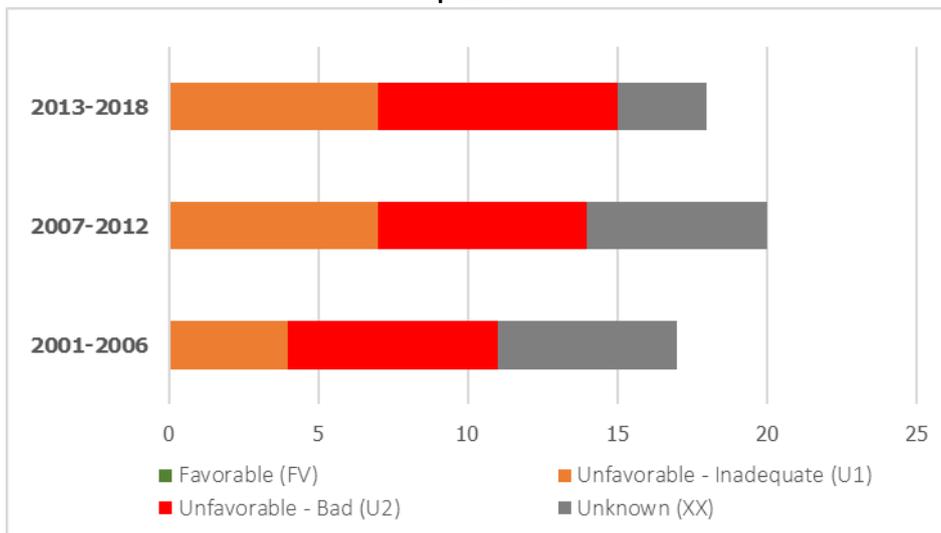
Conservation Status	Vascular plants	Non-vascular plants	Fish fauna	Amphibians	Reptiles	Mammals	Arthropods	Mollusks	Other invertebrates	TOTAL SPECIES
Favorable										0
Unfavorable - Improving (+)						0	1	0	0	1
Unfavorable - Constant (=)						0	0	0	0	1
Unfavorable - Deteriorating (-)						1	4	0	2	8
Unfavorable - Unknown (x)						2	2	1	0	5
Unknown			1				2			3
Data not available							4			4
Total			1			3	13	1	2	22

* For the percentage's estimation the 4 species of MMED with no available data are not considered.

** 1 species of fish fauna found in MED and MMED (code 1101) is added to the species of fish fauna of MMED

The comparison of the conservation status of species of European interest between the three reference periods (2001-2006, 2007-2012 and 2013-2018) in the Marine Mediterranean Biogeographical Region (MMED) shows a change in the number of species for each period. It is noted that in the last reference period there is a deterioration in the condition of 1 species of mollusk (code 1028), while one species of mammal (code 5031) evaluated in bad conservation status with another species (code 2624) which was also classified in bad conservation status was deleted.

Graph 6: Change in the conservation status of the species of European interest MMED between reference periods

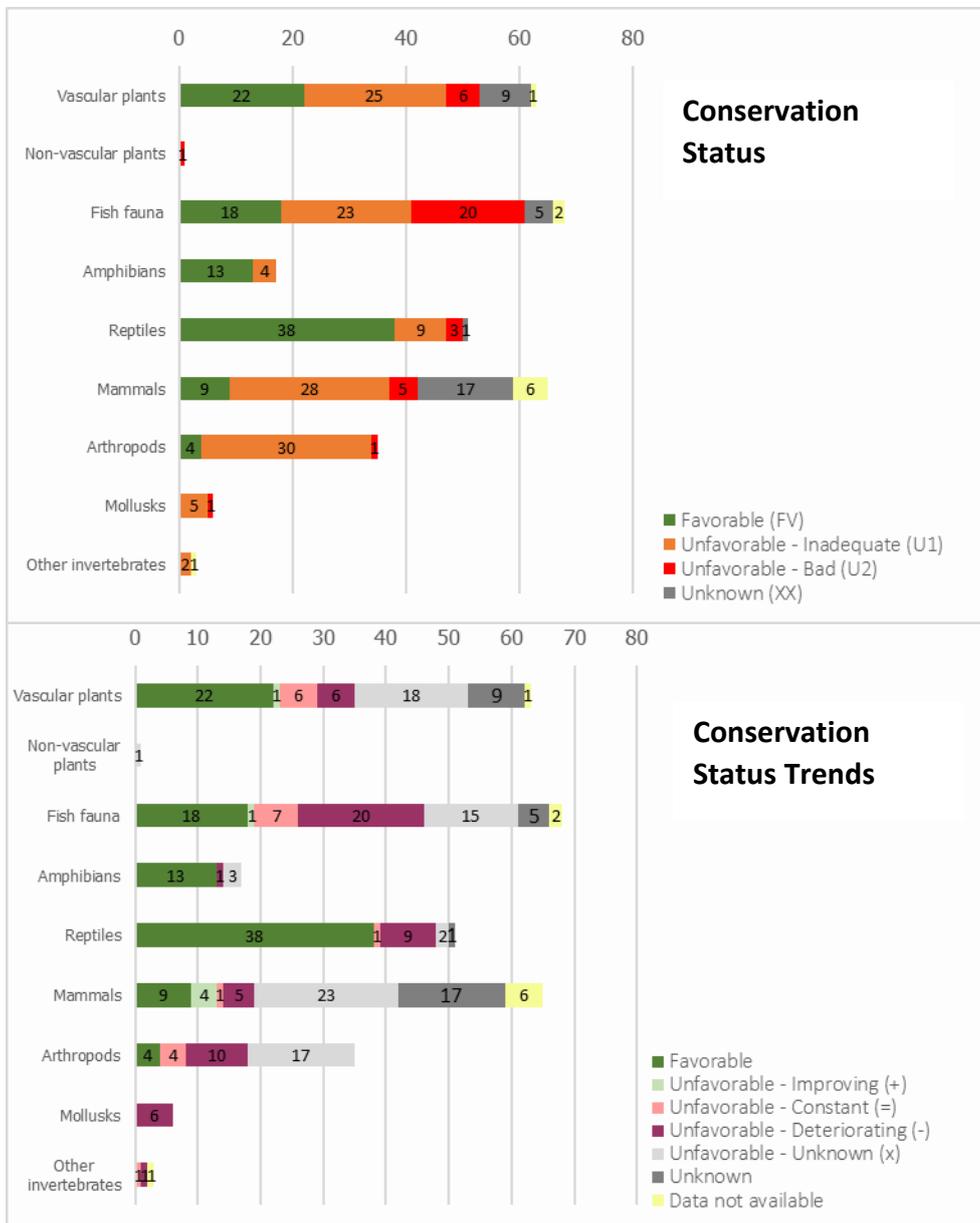


* MMED species with no available data are not considered in the distribution.

4. Conservation status and trends per taxonomic group of species of European interest

Examining the conservation status per taxonomic group of species, it is observed that the majority of amphibians and reptiles (76.5% and 74.5%, respectively) and a significant number of species of vascular plants (35,5%) are in the Favorable conservation status (FV). In contrast, the highest percentages of species in Unfavorable conservation status (U1 and U2) are observed in species of invertebrates (89%), fish fauna (65%), mammals (56%) and vascular plants (50%). Finally, the greatest percentage of species with Unknown conservation status (XX) is observed in the group of mammals (28.8%). Regarding trends, these are recorded as unknown (x) or deteriorating (-) for the majority of species being in Unfavorable conservation status (U1 and U2).

Graph 7: Conservation status and trends per taxonomic group of species of European interest (2013-2018)



B. Species of the Birds Directive

1. Number of birds of European interest

According to the national report on the species of the Birds Directive for the reference period 2013-2018, there are 321 species of birds of European conservation interest in Greece. A total of 255 species are breeding (B - Breeding), 80 species are wintering in Greece (W - Wintering) and 20 are in passage (P - Passage). It is noted that out of the 255 species that are breeding, 34 of them are wintering in Greece. Additionally, 26 species that are breeding and/or are wintering are also in passage.

Table 2: Bird species of European interest in Greece (2013-2018)

	Number of species
Breeding (B)	209
Breeding (B) and Passage (P)	12
Wintering (W)	39
Wintering (W) and Passage (P)	7
Breeding (B) & Wintering (W)	27
Breeding (B), Wintering (W) and Passage (P)	7
Passage (P)	20
Total	321

2. Short-term and long-term trends

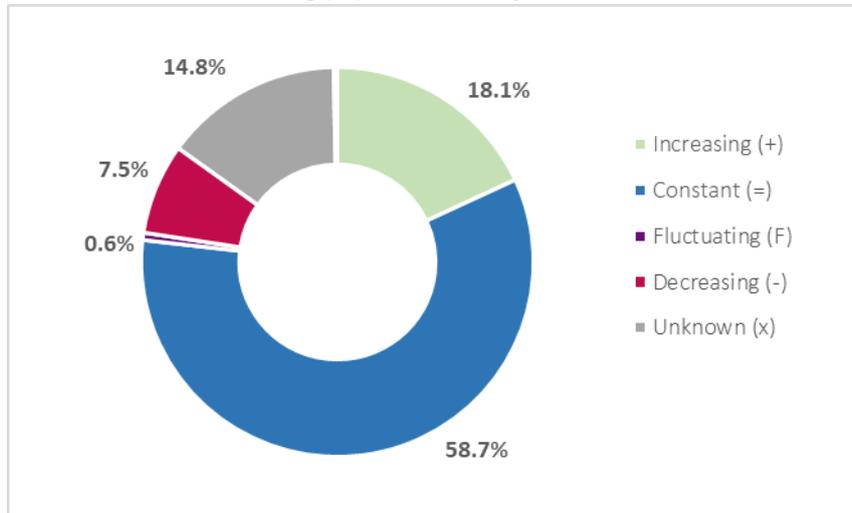
The assessment of the status of bird species is carried out for the breeding and wintering species, examining the population trends on two scales: short-term (period 2007-2018) and long-term (period 1980-2018).

According to the data of the reference period 2013-2018, the short-term trends of bird species are recorded as constant for the 58.7% of the species that are breeding and/or wintering in Greece. 18.1% of the species presents an increasing trend and 7.5% presents a decreasing trend.

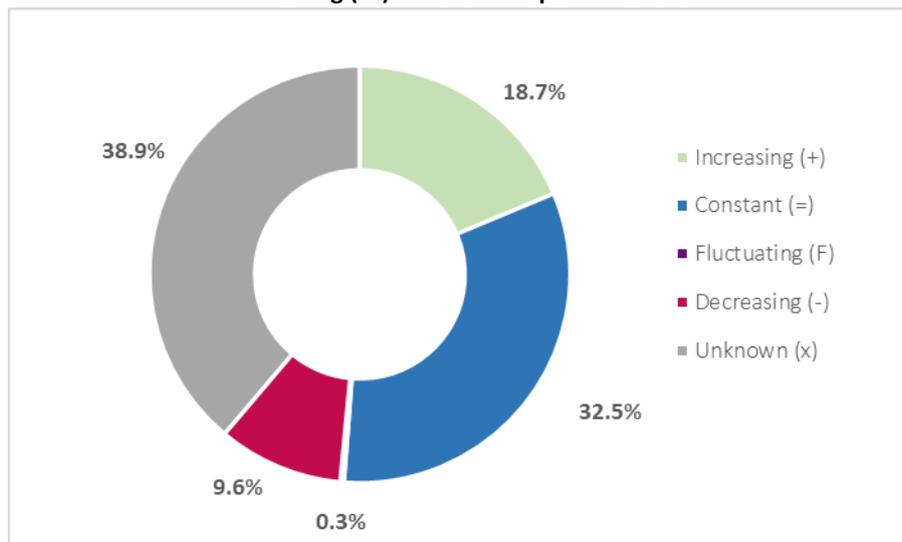
Regarding the long-term trends of breeding and wintering birds, these are recorded as constant for 32.5% of the species. In the long run, the percentage of species that are increasing does not change significantly (18.7%), while the percentage of species with a decreasing trend (9.6%) increases by 2.1% (9.6%).

The percentage of species with short-term unknown trend amounts to the 14.8% of species and increases to the 38.9% with long-term unknown trend. The percentage of species that have a fluctuating trend (short-term or long-term) is significantly low (0.6% and 0.3% respectively).

Graph 8: Short-term trends (2007-2018) of breeding (B) and wintering (W) birds of European interest



Graph 9: Long-term trends (1980-2018) of breeding (B) and wintering (W) birds of European interest



Habitats of European interest

The indicator presents the conservation status and the trends of natural habitat types of European interest that occur in Greece. The types of natural habitats of European interest are listed in Annex I of the Habitats Directive (Directive 92/43/EEC).

The data were taken from the [national report in the framework of the application of Article 17 of the Habitats Directive](#) for the reference period 2013-2018, which was submitted on 31 July 2019 and is available in the Central Data Repository of the European Environment Agency.

1. Number of habitat types of European interest

In Greece there are 89 habitat types of European interest in the reference period 2013-2018, which are divided into nine categories in Table 3 based on Annex I of Directive 92/43/EEC. The category "Forests" includes most of the habitat types (31.5%) followed by the categories "Coastal and halophytic habitats" (16.9%), "Natural and semi-natural grass formations" (11.2%) and "Freshwater habitats" (10.1%). Among the 89 habitat types, 81 belong to the Mediterranean Biogeographical Region (MED) and 8 to the Marine Mediterranean Biogeographical Region (MMED).

Table 3: Number of habitat types of European interest in Greece (2013-2018)

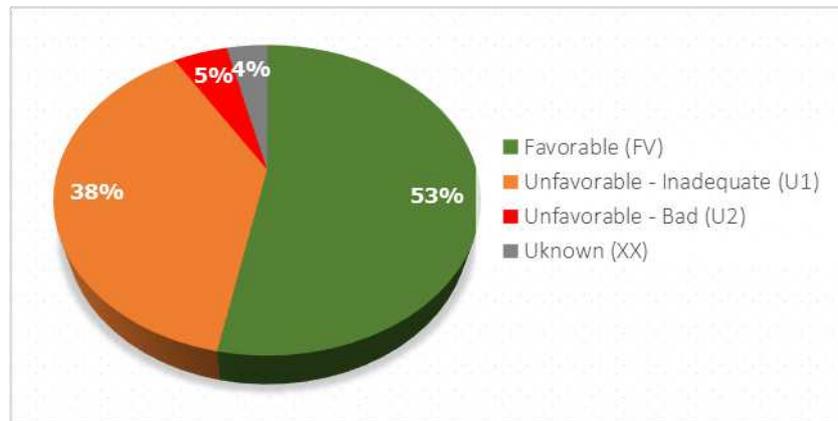
Habitats category	Number of habitats types	Biogeographical Region	
		MED	MMED
COASTAL AND HALOPHYTIC HABITATS	15	8	7
COASTAL SAND DUNES AND INLAND DUNES	8	8	
FRESHWATER HABITATS	9	9	
TEMPERATE HEATH AND SCRUB	2	2	
SCLEROPHYLLOUS SCRUB (MATORRALS)	7	7	
NATURAL AND SEMINATURAL GRASS FORMATIONS	10	10	
RAISED BOGS, MIRES AND FENS	4	4	
ROCKY HABITATS AND CAVES	6	5	1
FORESTS	28	28	
Total	89	81	8

Compared to the previous reference period (2007-2012), a habitat type of the Mediterranean Biogeographical Region (MED), the *Pannonic sand steppes* habitat (code 6260), has been added to the report's updated list.

2. Conservation status and trends of habitat types in the Mediterranean Biogeographical Region (MED)

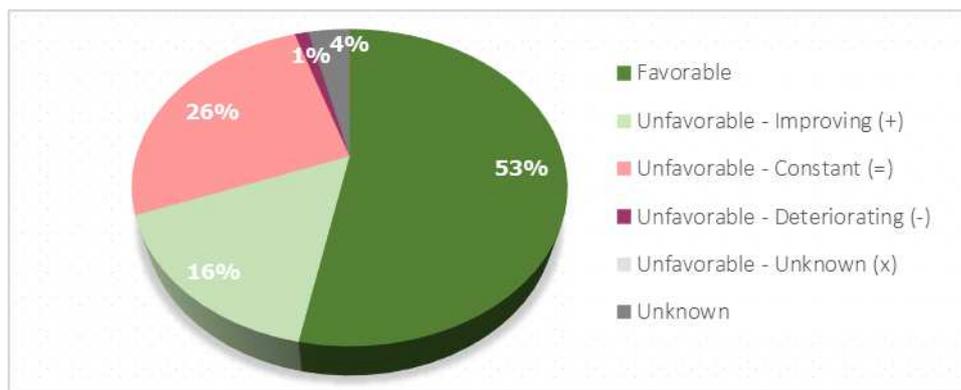
Among the habitat types in the Mediterranean Biogeographic Region (MES), 53% are in Favorable conservation status (FV), while 43% are in Unfavorable conservation status (U1 and U2), with 4 of them being assessed in Bad condition (U2). The conservation status of 3 habitat types remains Unknown (XX). Regarding the trend of the 35 habitat types being in Unfavorable conservation status (U1 and U2), it is recorded as Unfavorable but improved (+) for 13, stable (=) for 21, while it appears deteriorating (-) for 1 habitat type.

Graph 9: Conservation status of habitat types of European interest MED (2013-2018)



Conservation Status	Habitats Number
Favorable (FV)	43
Unfavorable - Inadequate (U1)	31
Unfavorable - Bad (U2)	4
Unknown (XX)	3
Total	81

Graph 10: Trends of habitat types of European interest MED (2013-2018)



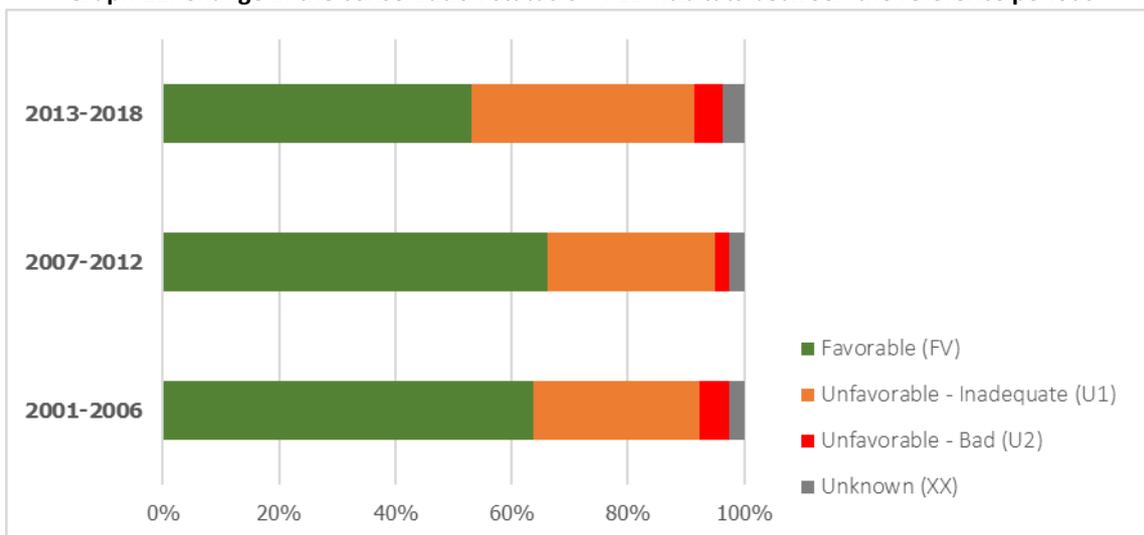
Conservation Status	Habitats Number
Favorable (FV)	43
Unfavorable - Improving (+)	13
Unfavorable - Constant (=)	21
Unfavorable - Deteriorating (-)	1
Unfavorable - Unknown (x)	0
Unknown	3
Total	81

Comparing the conservation status of habitat types of European interest between the three reference periods (2001-2006, 2007-2014 and 2013-2018) in the Mediterranean Biogeographical Region (MED), an overall trend of habitat deterioration in the period 2013-2018 in relation to the period 2007-2012 is found.

The habitat types that are no longer in favorable conservation status during the last reference period (2013-2018) are 16 and belong mainly to the categories "Forests" (codes 9140, 9150, 91CA, 91E0, 9310, 9560 and 95A0), "Natural and semi-natural grass formations" (codes 62A0 & 6430) and "Raised bogs, mires and fens" (codes 7210 & 7230) followed by the categories "Coastal and halophytic habitats" (code 1430), "Coastal sand dunes and inland dunes" (Code 2270), "Freshwater habitats" (code 3290), "Temperate heath and scrub" (code 4060), "Sclerophyllous scrub" (code 5110).

Respectively, the habitats types whose conservation status has improved to Favorable in the period 2013-2018 are 6 and belong mainly to the category "Freshwater habitats" (codes 3170, 3250 & 3280) followed by the categories "Coastal sand dunes and inland dunes" (code 2220), "Natural and semi-natural grass formations" (code 6510) and " Raised bogs, mires and fens " (code 7140).

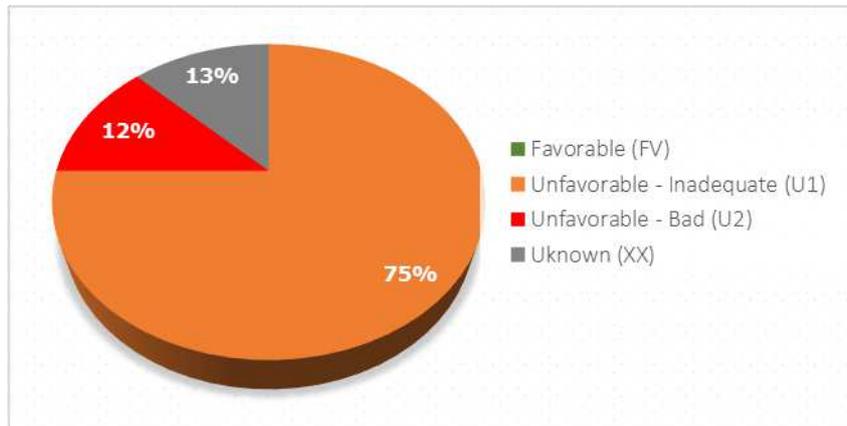
Graph 11: Change in the conservation status of MED habitats between the reference periods



3. Conservation status and trends of habitat types in the Marine Mediterranean Biogeographical Region (MMED)

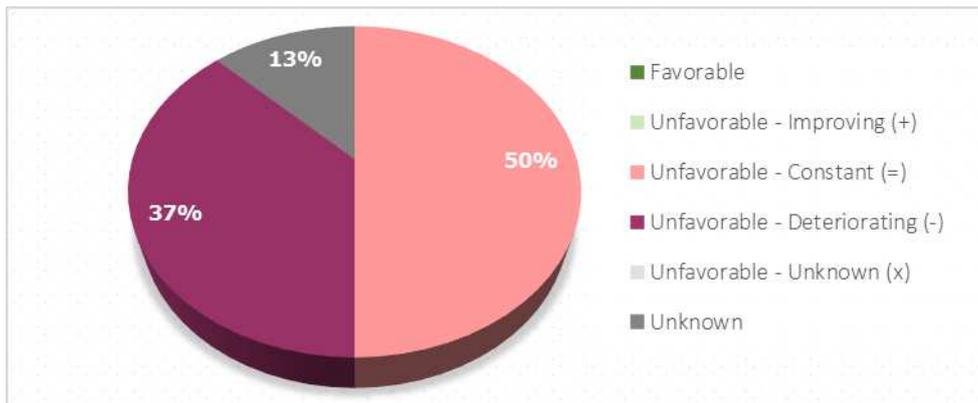
Regarding the eight habitats types of the Marine Mediterranean Biogeographical Region (MMED), none is in Favorable conservation status (FV). Seven habitat types (87%) are in Unfavorable conservation status (U1 and U2), with one of them being assessed as Bad (U2). The conservation status of 1 habitat type is Unknown (XX). Regarding the trend of the 7 habitat types that are in Unfavorable conservation status (U1 and U2), it appears constant (=) only for 4 of them, while it is recorded as deteriorating (-) in the remaining 3.

Graph 12: Conservation status of habitat types of European interest MMED (2013-2018)



Conservation Status	Habitats Number
Favorable (FV)	0
Unfavorable - Inadequate (U1)	6
Unfavorable - Bad (U2)	1
Unknown (XX)	1
Total	8

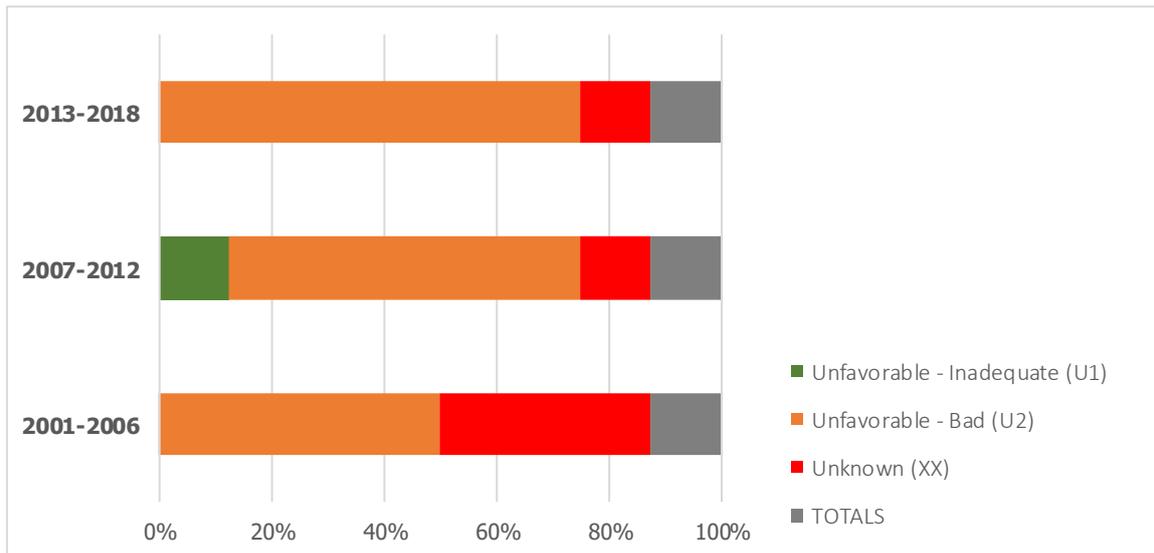
Graph 13: Trends of habitat types of European interest MMED (2013-2018)



Conservation Status	Habitats Number
Favorable (FV)	0
Unfavorable - Improving (+)	0
Unfavorable - Constant (=)	4
Unfavorable - Deteriorating (-)	3
Unfavorable - Unknown (x)	0
Unknown	1
Total	8

Compared to the previous reference period (2007-2012), three habitat types in the Marine Mediterranean Biogeographical Area (MMED) belonging to the category "Coastal and halophytic habitats" present changes in their conservation status. One habitat type from favorable conservation status has now been assessed in unfavorable conservation status with a deterioration trend (code 1110) and the other two types from unfavorable deteriorating conservation status present a stabilization trend (codes 1130 and 1160).

Graph 14: Change in the conservation status of MMED habitats between reference periods



4. Conservation status and trends per habitat type category

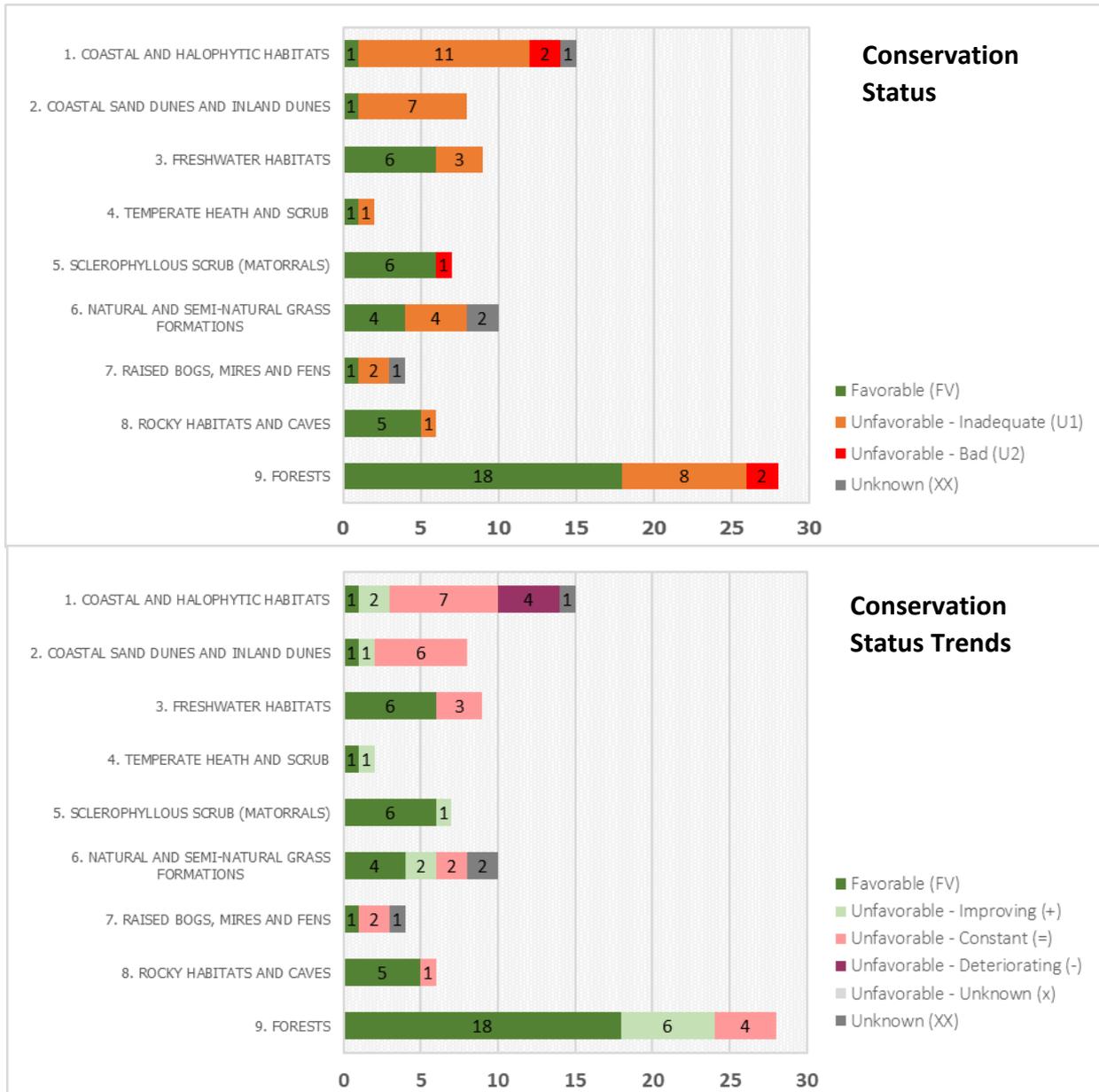
Examining the conservation status per habitat type category (based on Annex I of Directive 92/43/EEC), it is observed that most of the habitats in the categories "Forests", "Rocky habitats and caves" and "Sclerophyllous scrub (matorrals)" as well as "Freshwater habitats" are in Favorable conservation status (FV).

Habitats that are evaluated at a higher percentage in unfavorable conservation status (U1 and U2) belong to the habitat categories of "Coastal and halophytic habitats" and "Coastal sand dunes and inland dunes". Among the 5 habitats that are in Bad conservation status (U2), 2 belong to the category "Coastal and halophytic habitats", 1 to the category "Sclerophyllous scrub" and 2 to the category "Forests".

Among the 4 habitat types whose conservation status is Unknown (XX), 1 habitat belongs to the category "Coastal and halophytic habitats", 2 to the category "Natural and semi-natural grass formations" and 1 to the category "Raised bogs, mires and fens".

Regarding the trends, most of the habitat types that are in Unfavorable conservation status (U1 and U2) show an improved (+) or stable trend (=). Deteriorating trend (-) is recorded for the Unfavorable conservation status of 4 habitat types of the category "Coastal and halophytic habitats".

Graph 15: Conservation status and trends per habitat type category of European interest (2013-2018)



Pressures and threats to species of European interest

The indicator estimates the number of pressures and threats (pressures that have been exerted for a long time and are likely to continue in the future) to species of European interest. In particular, pressures and threats are assessed for (a) the species of Directive 92/43/EEC, separately for the Mediterranean (MED) and Maritime Mediterranean (MMED) Biogeographical Region of Greece and (b) the species of the Birds Directive (Directive 2009/147/EC).

The data come from the [national report under Article 17 of the Habitats Directive](#) and the [national report under Article 12 of the Birds Directive](#), for the reporting period 2013-2018, submitted on 31 July 2019 and being available at the Central Data Repository of the European Environment Agency.

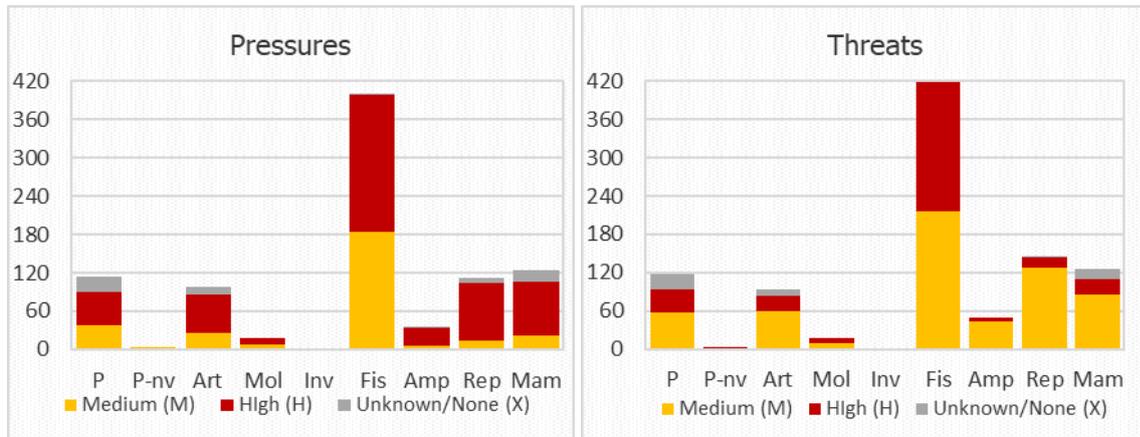
It is noted that in the last reporting period 2013-2018 the standardization of the pressure and threats categories differs from the previous periods, while the evaluation of the intensity of pressures and threats is now standardized in medium and high, so that it is no longer possible to compare the reference periods.

1. Pressures and threats to Habitats Directive species

1.1 Species of the Mediterranean Biogeographical Region (MED)

During the reference period 2013-2018, pressures and threats of medium and high intensity were recorded to the species of European interest of the Mediterranean Biogeographical region, which are depicted per taxonomic group of species in Graph 17. Overall, the pressures and threats are mainly of medium intensity (65%). Ichthyofauna species receive most of the pressure and threats, at a percentage greater than 45%, followed by reptiles and mammals at percentages of the order of 12-16%.

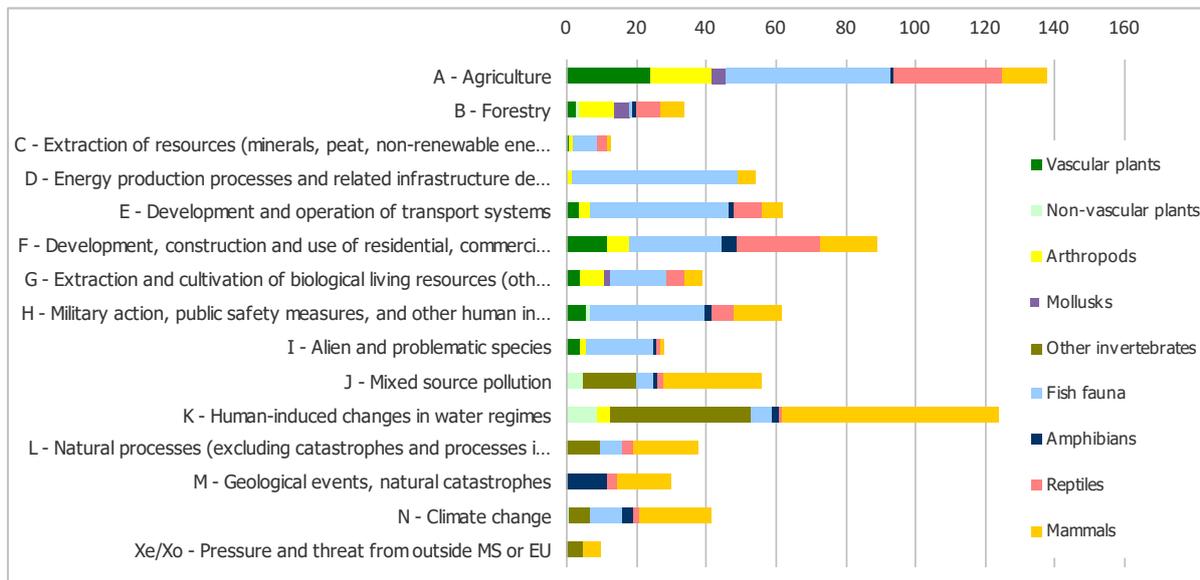
Graph 16: Number of pressures and threats per group of species of European interest MED (2013-2018)



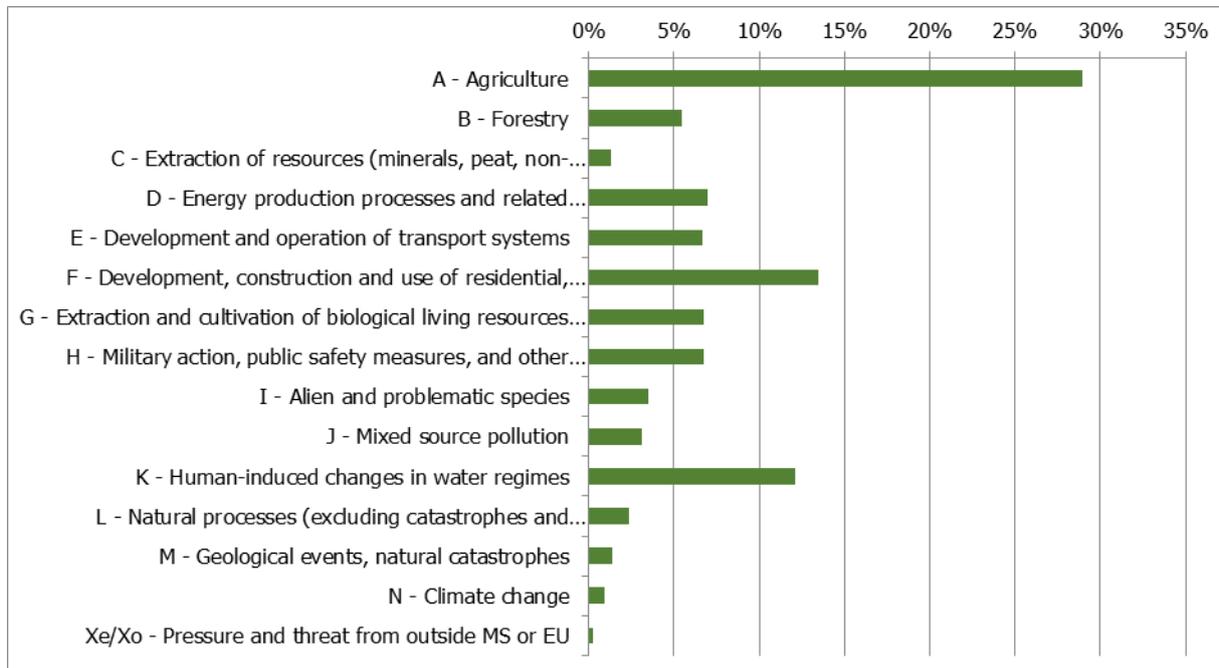
* P-nv: Non-vascular plants, P: Vascular plants, Art: Arthropods, Mol: Mollusks, Inv: Other invertebrates, Fis: Fish fauna, Amp: Amphibians, Rep: Reptiles, Mam: Mammals

Agriculture (A) is the first major threat, followed by urbanization and other infrastructures (F), as well as other activities of anthropogenic origin (K & H). No threat was recorded in 38 MED species (13.2% of species). Among the high intensity pressures and threats recorded in the species of the Mediterranean Biogeographical region, the hierarchy of the main categories with the highest frequency of occurrence is practically not differentiated.

Graph 17: Number of species of European interest of MED per taxonomic group recorded threats (2013-2018)



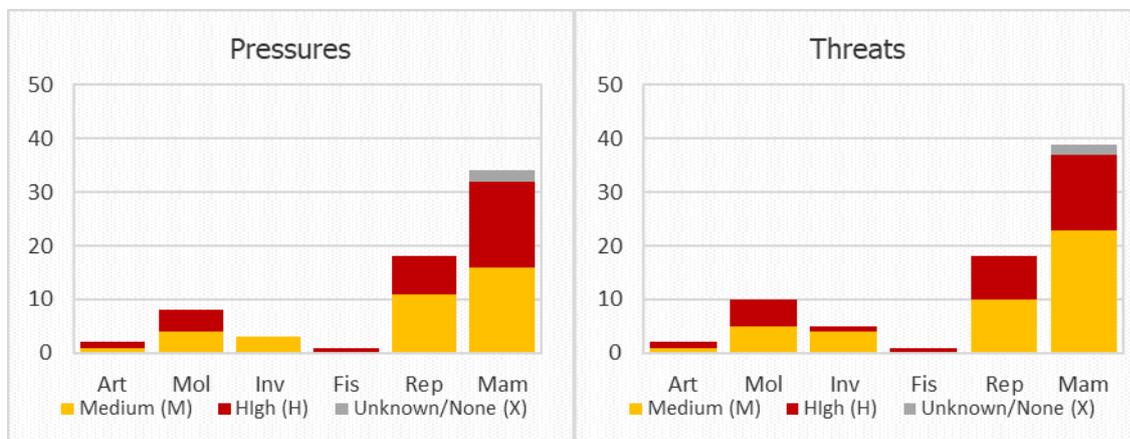
Graph 18: Frequency (%) of (jointly) high intensity pressures and threats recorded in MED species of European interest (2013-2018)



1.2 Species of the Marine Mediterranean Biogeographical Region (MMED)

The pressures and threats of medium and high intensity in the species of European interest of the Marine Mediterranean Biogeographical region, during the reference period 2013-2018, are depicted per taxonomic group of species in Graph 20. Overall, the pressures and threats are mainly of medium intensity (55% and 59% respectively). The mammals group receives most of the pressures and threats at a percentage of the order of 50%, followed by reptiles at a percentage of the order of 25-28%. The highest number of threats was recorded for *Caretta caretta* (10 threats) and *Pinna nobilis* (8 threats).

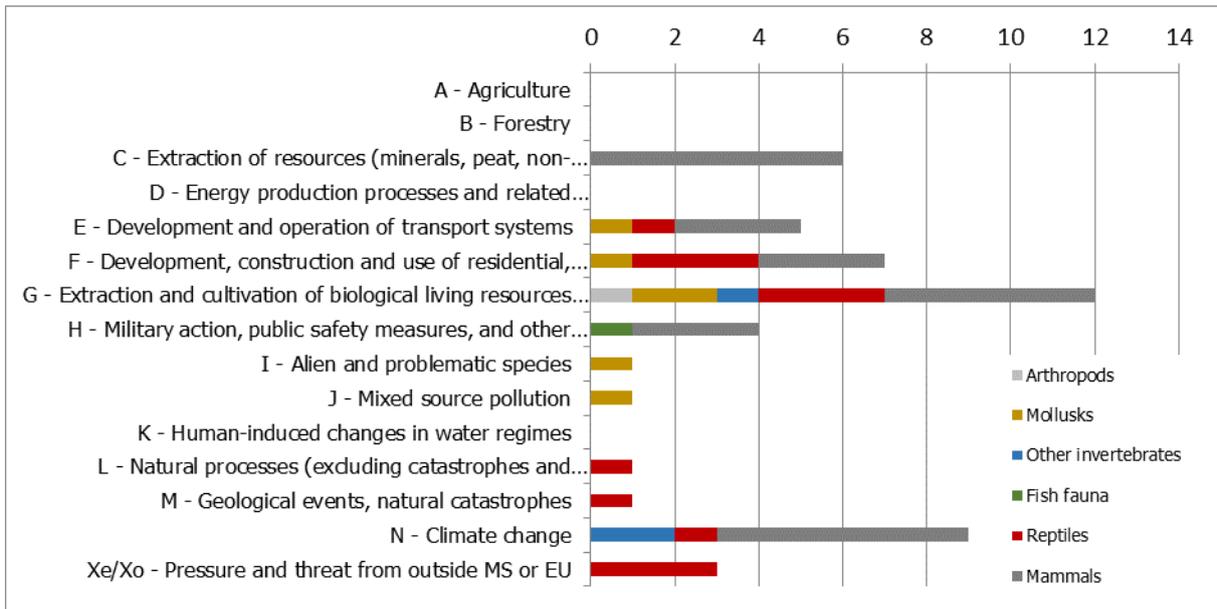
Graph 19: Number of pressures and threats per group of species of European interest MMED (2013-2018)



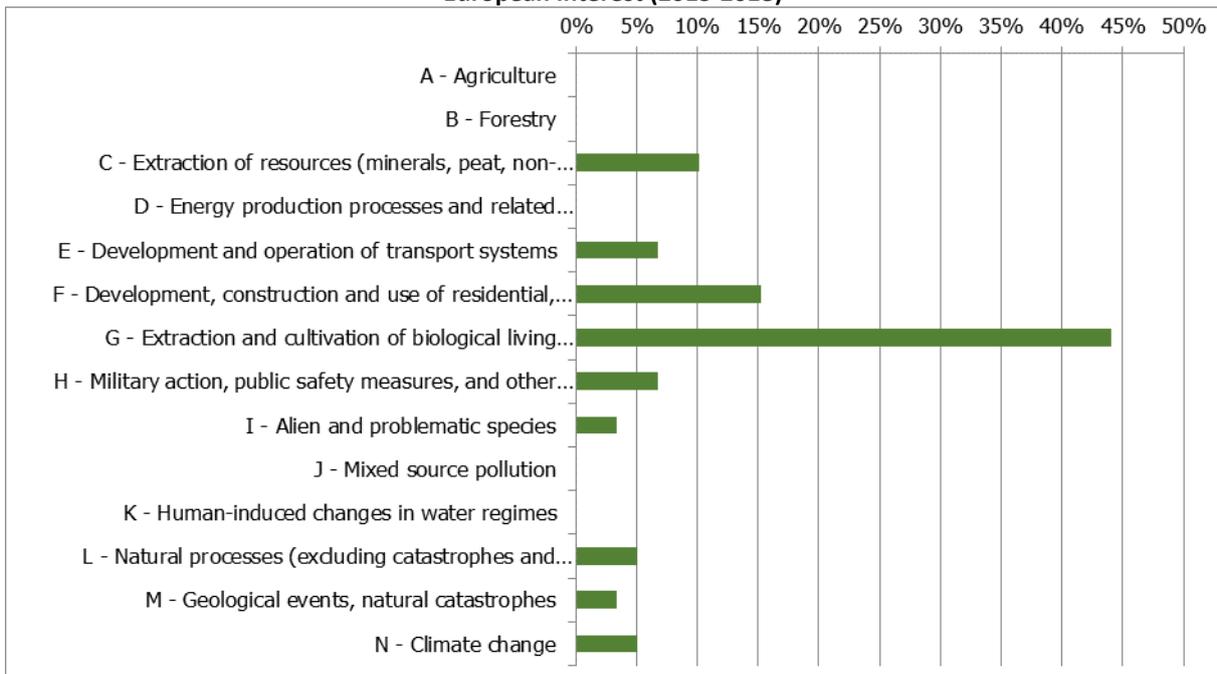
* Art: Arthropods, Mol: Mollusks, Inv: Other invertebrates, Fis: Fish fauna, Rep: Reptiles, Mam: Mammals

The major threats to the species of the Marine Region are the biological resource exploitation (G) and climate change (N), followed by urban, commercial, industrial and tourist infrastructure (F), which particularly concern the mammals' group. Among the high intensity pressures and threats recorded in the species of the Marine Mediterranean Biogeographical Region, the use of biological resources (G) is predominant, followed by infrastructures (F) and resources extraction (C).

Graph 20: Number of species of European interest of MMED per taxonomic group recorded threats (2013-2018)



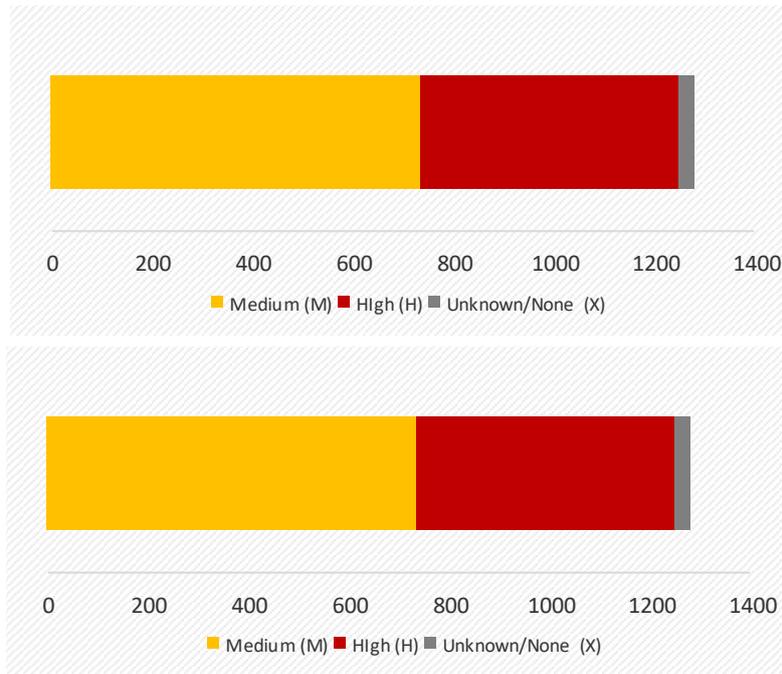
Graph 21: Frequency (%) of (jointly) high intensity pressures and threats recorded in MMED species of European interest (2013-2018)



2. Bird Species of Directive 2009/147/EC

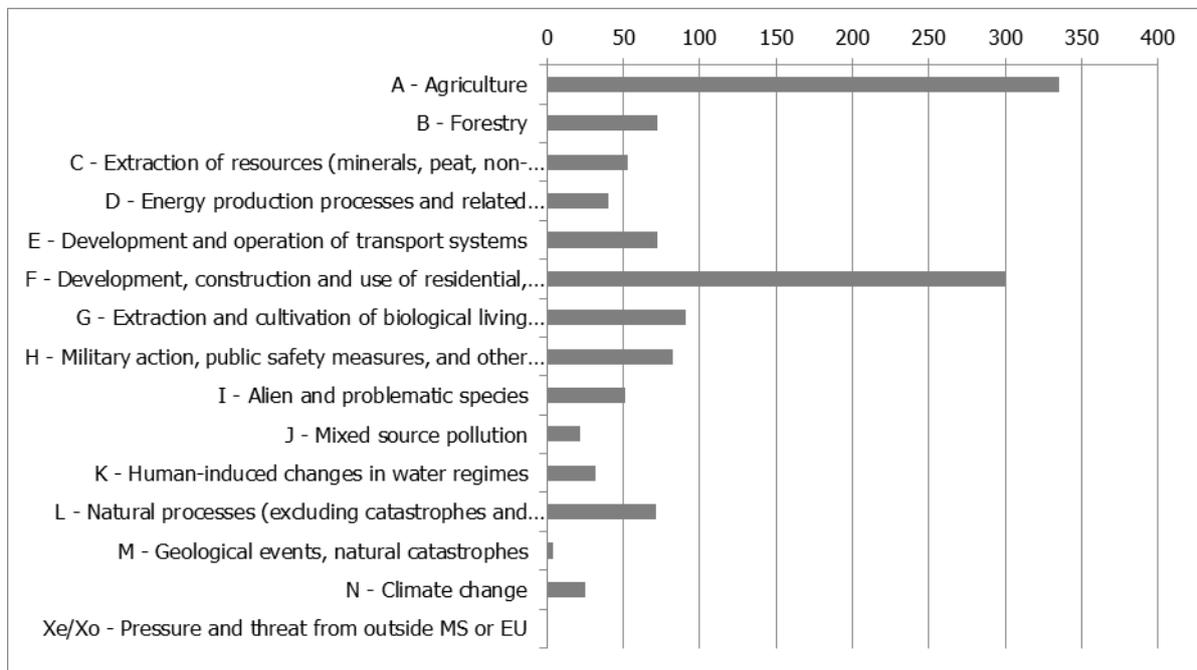
In the bird species, pressures and threats of medium intensity were mainly recorded at a percentage of 57-58%. The greatest number of high-intensity pressures was recorded for the species *Microcarbo pygmaeus* (15 pressure types), followed by the species *Aythya nyroca*, *Pelecanus crispus* and *Charadrius alexandrinus* (12 pressure types).

Graph 22: Number of pressures and threats recorded for bird species of European interest in Greece (2013-2018)

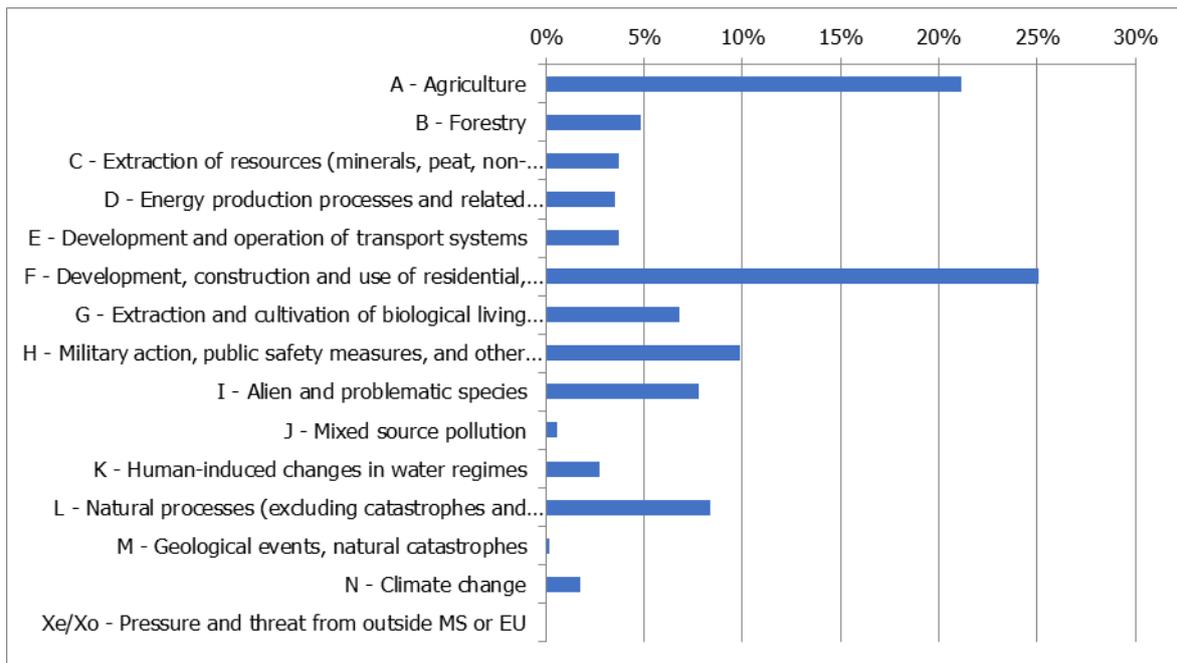


The main pressures affecting most of the bird species for the period 2013-2014 are agriculture (A) and urbanization and commercial, industrial and tourist infrastructures (F), that present the highest frequency of occurrence of high-intensity threats.

Graph 23: Frequency of occurrence of pressures recorded on bird species of European interest in Greece (2013-2018)



Graph 24: Frequency of occurrence of high intensity threats recorded in bird species of European interest in Greece (2013-2018)



Pressures and threats to habitats of European interest

The indicator estimates the number of pressures and threats (pressures that have been exerted for a long time and are likely to be continued in the future) that receive the habitats of European interest, which are assessed separately for the Mediterranean (MED) and Marine Mediterranean (MMED) Biogeographical Region of Greece.

This indicator represents the degree of pressures and threats that different ecosystems receive, but is directly related to their extent, and to the corresponding sampling intensity of their recordings. Therefore, it cannot be used to compare ecosystems to one another in terms of the receiving pressures and threats. However, it reflects the current situation and can be used as a comparative indicator of the time evolution of the number and the intensity of pressures and threats.

The data were taken from the [national report under the Article 17 of the Habitats Directive](#), for the reference period 2013-2018, which was submitted on 31 July 2019 and is available in the Central Data Repository of the European Environment Agency.

It is noted that in the last reporting period 2013-2018 the standardization of the pressures and threats categories is different from the previous periods, while the evaluation of the pressures and threats intensity is now standardized in medium and high, so that it is not possible to compare the reference periods.

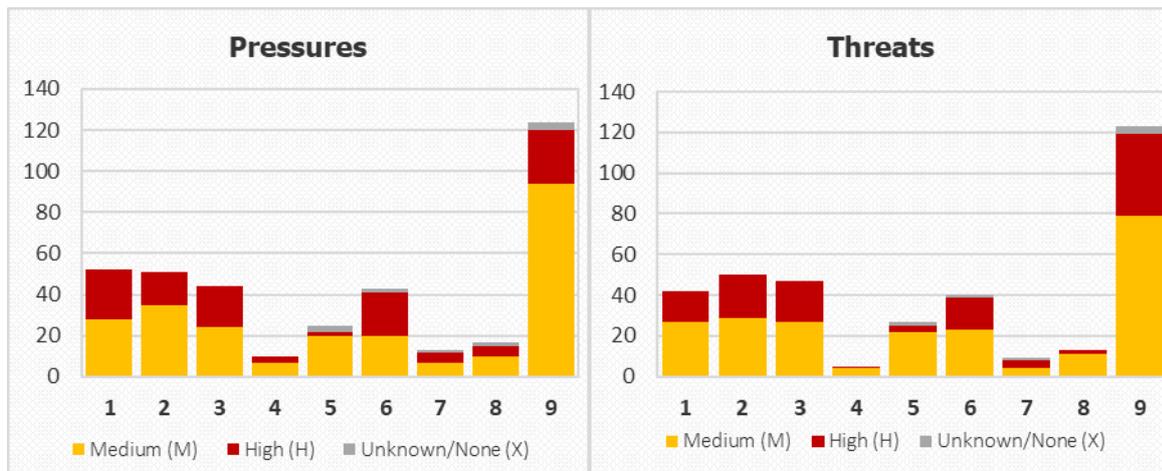
1. Habitats of the Mediterranean Biogeographical Region (MED)

During the period 2013-2018, a significant number of pressures and threats are recorded in the terrestrial habitats of European interest in Greece, most of which are of medium intensity (67% of the pressures and 65% of the threats).

In absolute terms, the forest category receives the highest number of pressures and threats (also due to the higher number of habitat types compared to the other habitat categories), followed by coastal sand dunes and inland dunes and coastal halophytic habitats, while the lowest number of pressures and threats was recorded in temperate heath and swamps and in raised bogs, mires and fens (Graph 26). At weighted values (also considering the number of habitat types per habitat category), most of the pressures are received on coastal and halophytic habitats and coastal sand dunes and inland dunes, followed by temperate heath and scrub, freshwater habitats, and forests.

Coastal lagoons (1150), the Mediterranean seasonal swamps (3170) and the forests of *Olea* and *Ceratonia* (9320) are the habitats that receive the highest number of threats (10 species of threats), followed by the coastal moving dunes of the *Ammophila arenaria* (2120) and the Pannonian-Balkan forests of Turkish oak - common oak (91M) (9 types of threats).

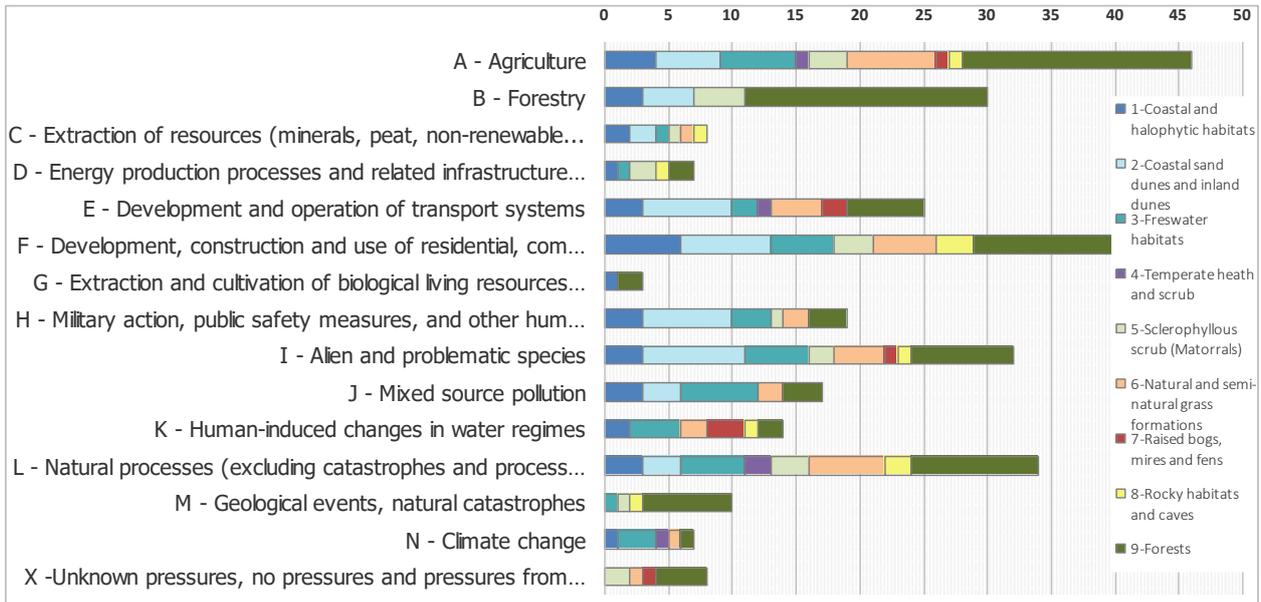
Graph 26: Number of pressures and threats per habitat type category of European interest in MED in Greece (2013-2018)



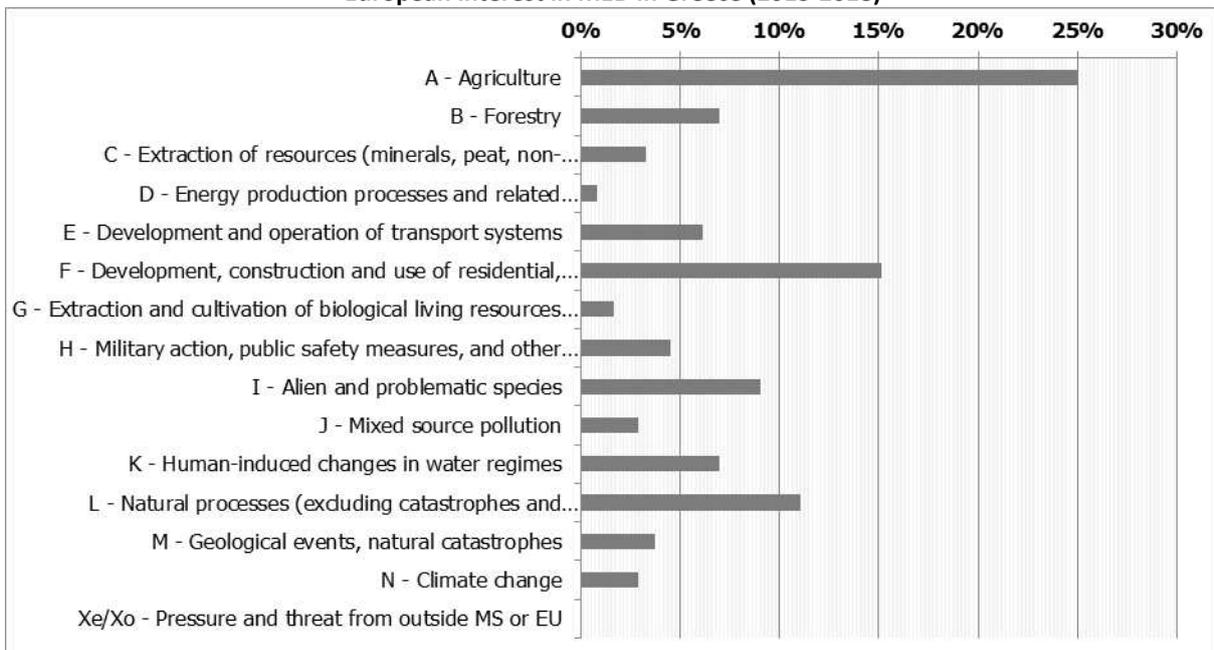
* 1: Coastal and halophytic habitats, 2: Coastal and inland dunes, 3: Freshwater habitats, 4: Temperate heath and scrub, 5: Sclerophyllous Scrub (Matorral), 6: Natural and semi-natural grassland formations, 7: Raised bogs and mires and fens, 8: Rocky habitats and caves, 9: Forests

The main threat categories on terrestrial habitats are agriculture (A) and residential, commercial, industrial and recreational infrastructure (F), which have been recorded in 46 and 40 habitat types respectively. These are followed by natural processes (L) (34 habitat types), invasive alien species (I) (32 habitat types) and forestry (B) (30 habitat types). No threat was recorded in 8 out of 89 habitat types (9%). Among the high intensity pressures and threats recorded in the habitats of the Mediterranean Biogeographical region, the hierarchy of the main categories with the highest frequency of occurrence is practically not differentiated.

Graph 27: Number of habitat types of European interest in MED in Greece (2013-2018) per threat category



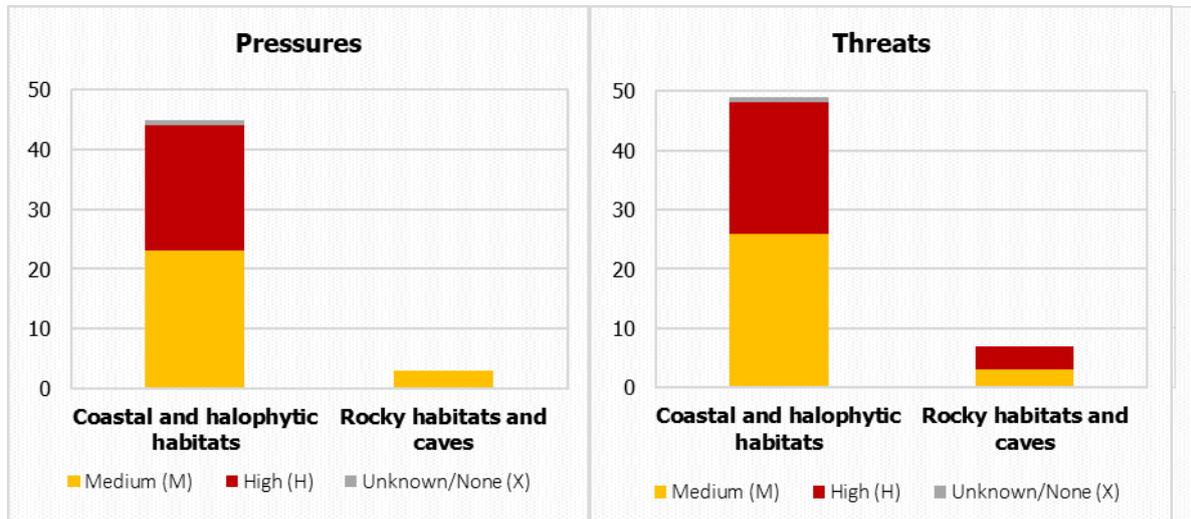
Graph 28: Frequency (%) of (jointly) high intensity pressures and threats recorded in habitat types of European interest in MED in Greece (2013-2018)



2. Habitats of the Marine Mediterranean Biogeographical Region (MMED)

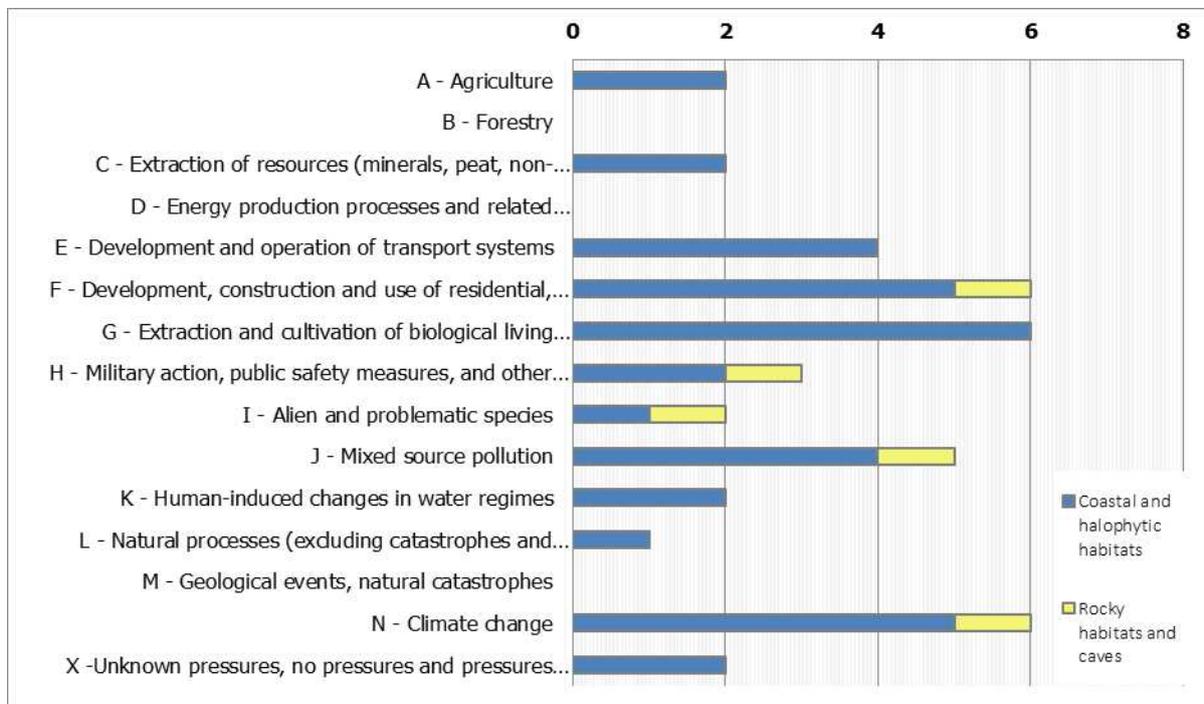
In the 8 marine habitats, the intensity of pressures and threats is shared between medium (54%) and high intensity (46%). Taking also into consideration the number of habitat types, the coastal and halophytic habitats receive the most of pressures and threats, especially the reefs (1170) and posidonia beds (1120). These are followed by shallow inlets and bays (1160) and sandbanks which are slightly covered by sea water all the time (1110).

Graph 29: Number of pressures and threats per habitat type category of European interest in MMED in Greece (2013-2018)

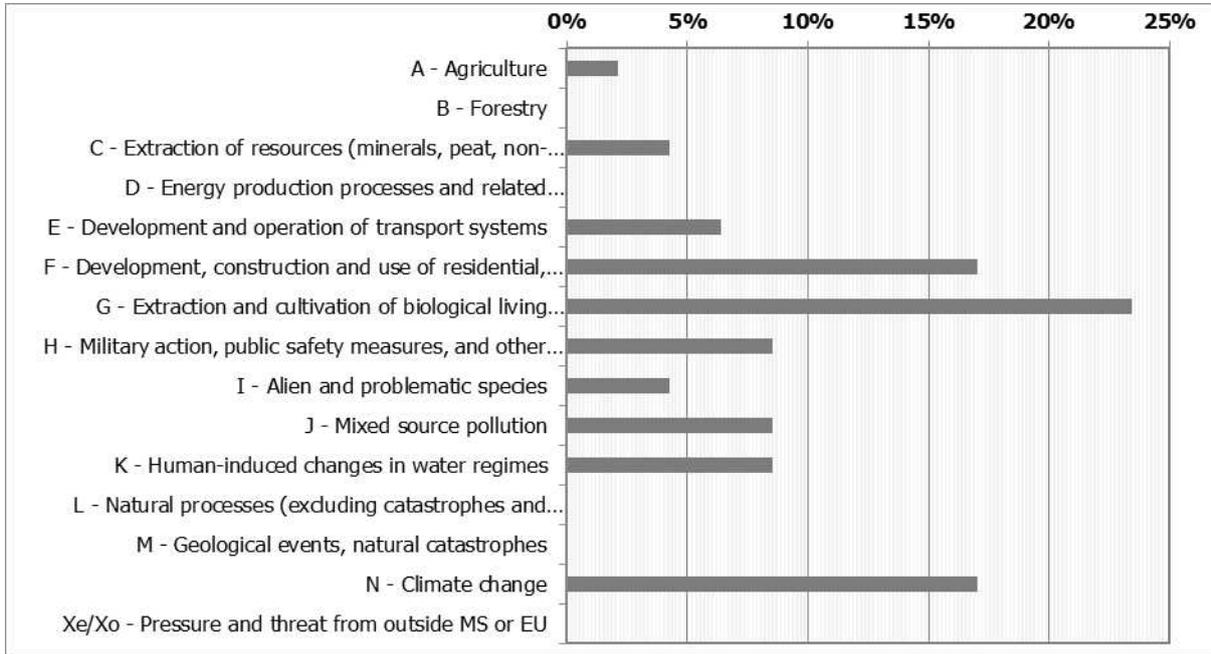


The main threats for the habitats of the Marine Mediterranean Biogeographical Region are the use of living resources (G), residential, commercial, industrial and recreational infrastructure (F) and climate change (N). Among the pressures and threats of high intensity, the use of living resources (G) is the threat with the highest frequency (23.4%), followed by infrastructure (F) and climate change (M) with a frequency of 17.0%.

Graph 30: Number of habitat types of European interest in MMED in Greece (2013-2018) per threat category



Graph 31: Frequency (%) of high intensity pressures and threats (jointly) recorded in habitat types of European interest in MMED in Greece (2013-2018)



Ecosystem coverage

The indicator records the change in area of ecosystems types and their conversion to other ecosystem types, based on the MAES classification (MAES ecosystem classes). It is especially important for species living exclusively in these ecosystems, due to their specialized ecological niche or their endemic character. The conversion of a land cover to a different one indicates the dynamic natural evolution of the ecosystems, as well as the anthropogenic impact.

Data for the change in area of ecosystems types were drawn from the land cover geodatabase of the European programme Corine Land Cover (CLC), which are available in the web site of the Land Monitoring Service of the European flagship program on Earth Observation Copernicus ([CLMS, Corine Land Cover](#)). In order to calculate the relative change in the area of ecosystem types from 2012 to 2016, the geospatial land cover data of Corine Land Cover 2012 was used.

The association of the MAES classification of ecosystem types to the Corine Land Cover classification is available in the web site of the European Environmental Agency ([EEA, Ecosystem coverage, 2018](#)), as shown in the table below:

MAES ecosystem classes	Corine Land Cover typology (level 3)
Urban	1.1.1., 1.1.2., 1.2.1., 1.2.2., 1.2.3., 1.2.4., 1.3.1., 1.3.2., 1.3.3., 1.4.1., 1.4.2.
Cropland	2.1.1., 2.1.2., 2.1.3., 2.2.1., 2.2.2., 2.2.3., 2.4.1., 2.4.2., 2.4.3., 2.4.4.
Grassland	2.3.1., 3.2.1.
Woodland and forest	3.1.1., 3.1.2., 3.1.3., 3.2.4.
Heathland and shrub	3.2.2., 3.2.3.
Sparsely vegetated land	3.3.1., 3.3.2., 3.3.3., 3.3.4., 3.3.5.
Inland wetlands	4.1.1., 4.1.2.
Rivers and lakes	5.1.1., 5.1.2.
Marine inlets and transitional waters	4.2.1., 4.2.2., 4.2.3., 5.2.1., 5.2.2.
Marine	5.2.3.

During the period 2012-2018, changes of a total area of 26061 hectares were recorded in terrestrial ecosystems (excluding marine areas and marine inlets and transitional waters), corresponding to 0.2% of Greek land territory. The greatest changes in absolute values took place in the classes of Heathland and Shrub (-7419 hectares), Urban Land (+6684 hectares), Cropland (-4252 hectares). The greatest change in percentage appears in the classes Inland Wetlands (-5.32%) and Rivers & Lakes (2.47%), as well as in Urban Land (1.58%).

Regarding the classes Rivers & Lakes, which appears to have increased by 3000 hectares, and Inland Wetlands, which appears to have decreased by 1300 hectares, the change could be fictitious, caused by adjustments in the classification of land cover categories during this period. More specifically, regarding the Wetlands class, the overwhelming percentage of decrease is attributed to the Rivers & Lakes class.

Graph 32: Changes in the area of general ecosystem types in Greece in the period 2012-2018

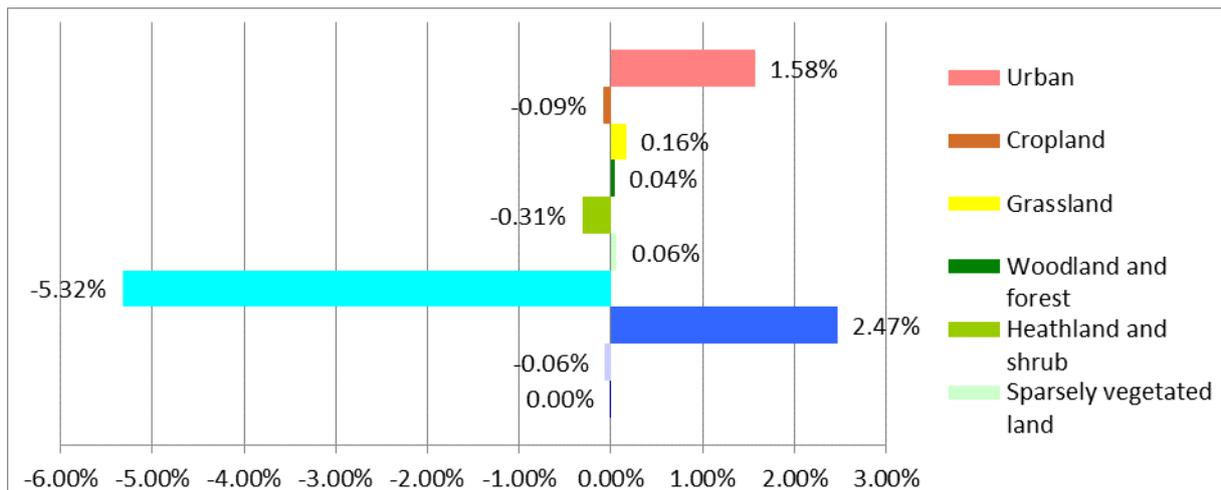
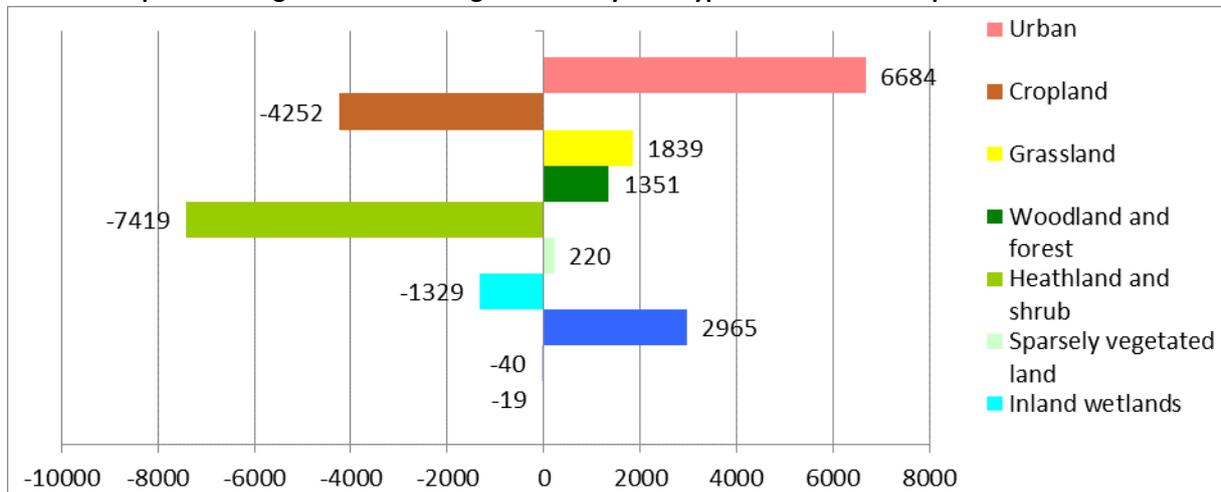


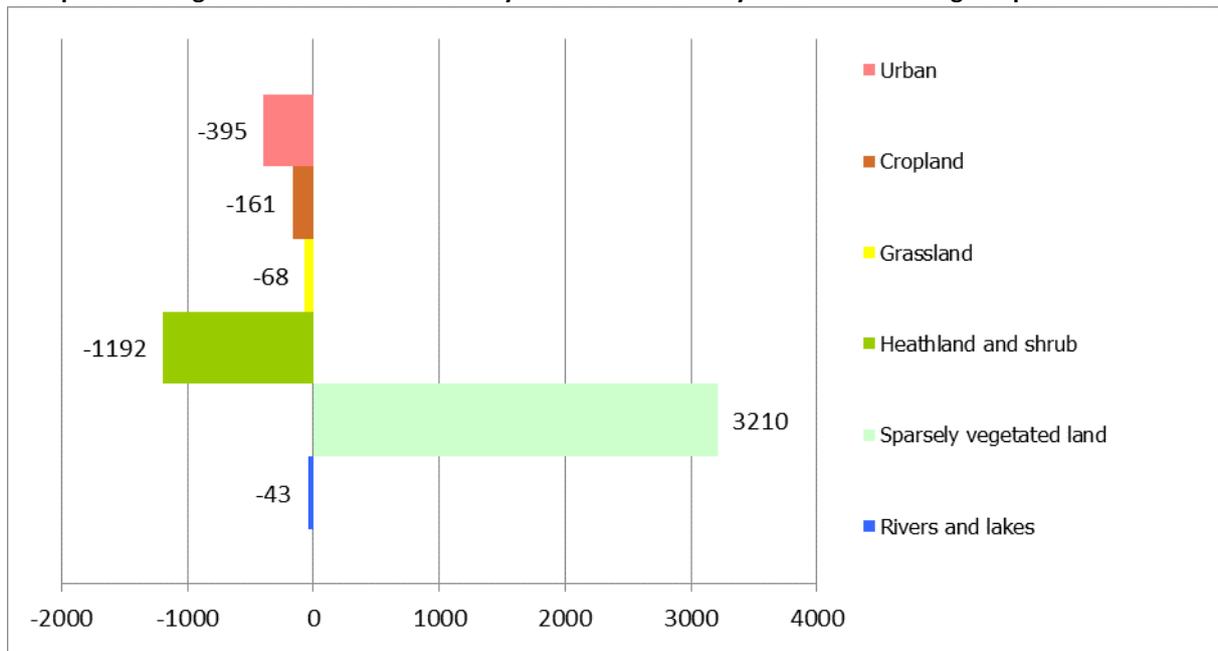
Table 4: Changes in the area of general ecosystem types during the period 2012-2018 in Greece

Ecosystem classification (MAES)	Land cover changes 2012-2018												
	Urban	Cropland	Grassland	Woodland and forest	Heathland and shrub	Sparsely vegetated land	Inland wetlands	Rivers & lakes	Marine inlets & transitional waters	Marine	Decrease	Increase	Total change
Urban		37.9	94.7	514.9	66.2	43.5		295.1			1052.3	7736.6	6684.3
Cropland	3773.7		44.3	3.4	151.1	104.8	64.3	692.2			4833.9	581.5	-4252.5
Grassland	1499.0	225.7		67.3	272.3	689.3		9.7			2763.3	4602.6	1839.3
Woodland and forest	910.1	164.4	135.0		1577.8	9496.8		42.9			12326.9	13678.1	1351.2
Heathland and shrub	1408.8	107.5	4270.2	385.9		12379.3		609.5			19161.1	11741.9	-7419.2
Sparsely vegetated land	80.6	26.7		12706.6	9674.5			26.6			22515.0	22735.0	219.9
Inland wetlands			58.4					1463.6			1522.0	192.5	-1329.5
Rivers & lakes	5.9	19.3				21.3	128.2				174.7	3139.6	2965.0
Marine inlets & transitional waters										49.8	49.8	9.8	-40.0
Marine	58.5								9.8		68.3	49.8	-18.5
Total	7736.6	581.5	4602.6	13678.1	11741.9	22735.0	192.5	3139.6	9.8	49.8	64467.3	64467.3	0.0

Changes in forest ecosystems

Regarding total area in the period 2012-2018, there is a slight increase in forest ecosystems of 0.04% (1351 hectares), which is caused by the conversion of 3210 hectares of the class “Sparsely vegetated land” to “Woodland and forests”, while at the same time losses of forest ecosystems are recorded, due to the conversion of 1192 hectares (66%) to Heathland and Shrub, 395 hectares (22%) to Urban Land, 161 hectares (9%) to Cropland and 68 hectares (4%) to Grassland.

Graph 33: Change of the area of forest ecosystems to other ecosystem classes during the period 2012-2018

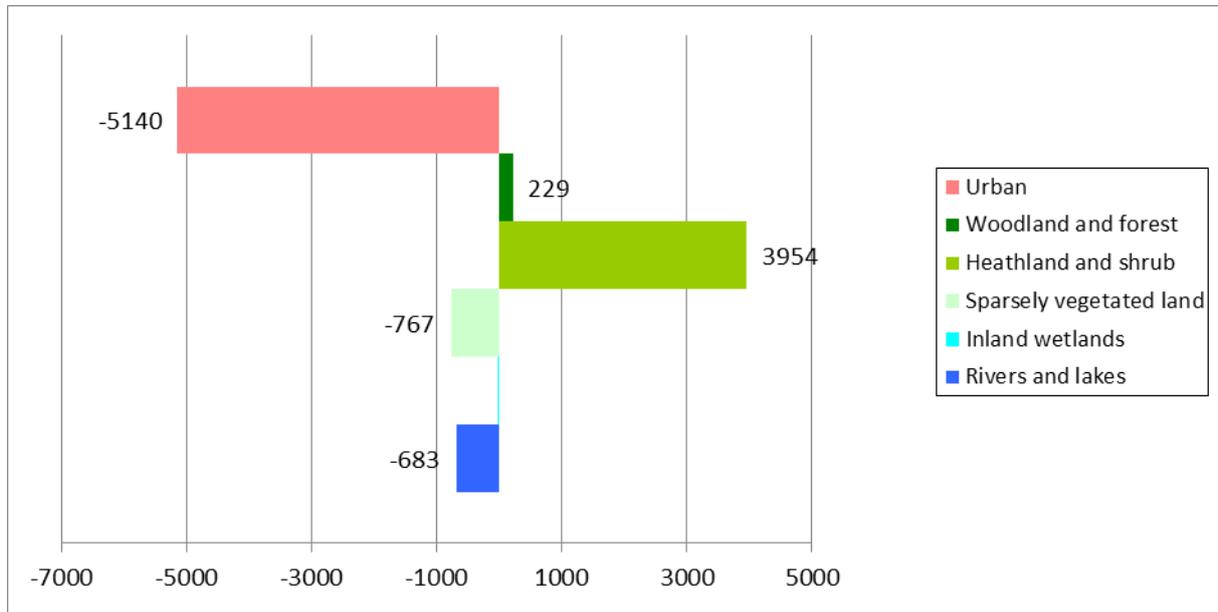


Changes in agricultural ecosystems

Regarding the total area of agricultural ecosystems (cropland and grassland), there is a slight decrease of 0.04% (2413 hectares) during the period 2012-2018, which is caused by the decrease of cropland by 0.09% (4252 hectares) and the increase of grassland by 0.16% (1839 hectares).

The main changes taking place are primarily due to the conversion of 7300 hectares of agricultural ecosystems to urban land (78%), sparsely vegetated land (12%) and water bodies (10%, mainly rivers and lakes), while on the other hand a total of 4900 hectares of natural ecosystems, 95% of which were heathland and shrub, were converted to agricultural ecosystems.

Graph 25: Change of the area of agricultural ecosystems to other ecosystem classes during the period 2012-2018



Nationally Protected Areas

The indicator presents the change over time in the total coverage of areas, which have been designated as protected, based on national legislation.

Data for developing the indicator are derived from country reports to European Environment Agency (EEA) on nationally designated protected areas. The reports include the attribute database “Common Database on Designated Areas – CDDA” and the corresponding geospatial data on the boundaries of the protected areas. These data are available in the Central Data Repository of [EIONET](#).

The declaration of protected areas in various categories of protection was, up to 1986, based mainly on provisions of the Forest Code. More specifically, National Woodland Parks, Aesthetic Forests and Natural Monuments are stipulated in Law 996/1971, which is part of the Law 86/1969 “On Forest Code”. Wildlife Refuges, Controlled Hunting Areas and Game Breeding Stations are stipulated in Law 177/75, as amended by Law 2637/1998. Based on the Framework Law on Environment (Law 1650/86) and the following Law 3937/2011 on the protection of biodiversity, the National System of Protected Areas includes the following categories: a) absolute nature reserve areas, b) nature reserve areas, c) natural parks (national or regional parks), d) areas of habitat and species protection (SACs or SPAs or Wildlife Refuges or a combination of these) and e) protected landscapes and landscape elements or protected natural formations. The protected areas of habitats and species of European interest (SACs & SPAs), within the framework of the Habitats Directive (92/43/EEC) and the Birds Directive (2009/147/EC), are included in the National System of Protected Areas, however they constitute a separate indicator for the needs of this report and are dealt with separately.

The categories of nationally designated protected areas of natural environment, as they are included in the European database for Greece, as well as details for each one, are presented in Table 5.

According to official data in 2018, the nationally designated protected areas in Greece, excluding Natura 2000 network sites (SACs and SPAs) and after deduction of overlaps, cover a total surface area of 26158 km² (terrestrial and marine), which remains unchanged since 2012. Terrestrial area corresponds to around 17.7% of the country’s terrestrial surface area, and rises to 34.8% if Natura 2000 network sites are included, whereas it is 26% in the European Union (reference year: 2017, [EEA](#)).

Table 4: Nationally Designated Protected Areas of Greece (reference year: 2018)

Nationally Designated Protected Areas	Cat. (3)	Year (4)	No. (5)	Area (km ²) ⁽⁷⁾			
				Terrestrial	Marine	Total	% country's terrestrial surface area
Absolute Nature Reserve Areas ⁽¹⁾	A	1990	11	116	2	118	0.09%
National Forests (including peripheral zone)	A	1938	10	768	0	768	0.58%
Protected Natural Monuments	A	1975	51 ⁽⁶⁾	160	0	160	0.12%
Nature Reserve Areas (including peripheral zone) ⁽¹⁾	A	1989	38	1967	718	2685	1.49%
Aesthetic Forests	A	1973	19	319	0	319	0.24%
Game Breeding Stations	B	1976	21	31	0	31	0.02%
Controlled Hunting Areas	B	1975	7	1115	0	1115	0.85%
Protected Forests	B	2006	3	417	0	417	0.32%
Protected Natural Formations, Protected Landscapes and Landscape Elements	B	1995	3	37	0	37	0.03%
National Marine Parks (including peripheral zone)	A	1990	2	182	2261	2443	0.14%
National Parks (including peripheral zone)	A	1977	15	11983	872	12855	9.08%
Wildlife Refuges	A	1998	603	10574	56	10630	8.01%
Other ⁽²⁾	A	1992	41	4461	2065	6526	3.38%

[1] Inside and outside of National and Marine Parks.

[2] Under the designation "Other", the protected areas are included, to which none of the other designations of the Law 1650/1986 or the forest legislation have been given. These are protection zones inside National Parks or Urban Control Zones or zones which have been designated through a Joint Ministerial Decision of precaution measures.

[3] Cat: Protected area categories, A = for protection of fauna, flora, habitat types and landscapes, B = mainly provisions of the forest legislation, which provide adequate protection for the conservation of fauna, flora and habitat types..

[4] Year of designating the first site to the category.

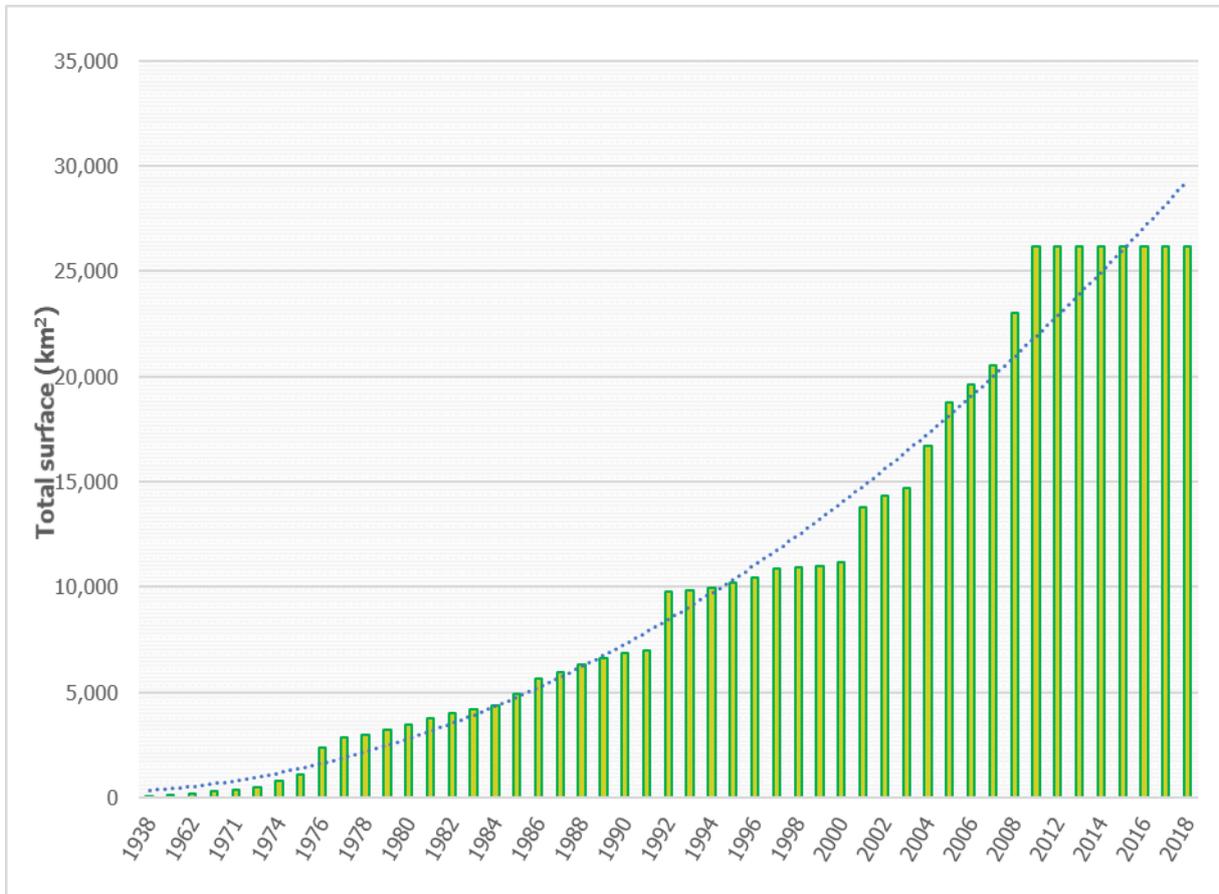
[5] No: Number of protected sites.

[6] These are 9 areas and 42 points with historical trees and groves.

[7] In the reported areas, the overlaps have been excluded.

In Graph 35, the total coverage of nationally protected areas is shown (data 1938-2018). There is an exponential growth in total coverage in the considered period. There is no change in total coverage of protected areas in Greece since 2012.

Graph 35: Trend over time in total (terrestrial and marine) coverage of nationally protected areas (km²) in Greece for the period 1938-2018



* After deduction of overlaps

** Natura 2000 sites (SACs & SPAs) are not included

Sites designated under the EU Habitats and Birds Directives

The indicator shows the change over time in total coverage of the sites of the European Network of protected areas Natura 2000, as these are designated based on the EU Directives on Habitats (Directive 92/43/EEC) and on Birds (Directive 79/409/EEC). These sites are as follows:

(a) “Sites of Community Importance (SCI)”, as they are defined in Directive 92/43/EEC. The habitat types and species in Annexes I and II of the Directive 92/43/EEC are considered by the determination of SCIs, as well as the criteria in Annex III. The member states are obliged to declare these sites as “Special Areas of Conservation (SAC)” within six years at most and to establish priorities for the conservation in a favorable status of the habitat types and species of Community interest within these sites.

(b) “Special Protection Areas (SPA)” for Avifauna, as they are defined in Directive 79/409/EEC “on the conservation of wild birds”.

It is noted that, according to the Law 3937/2011 for the conservation of biodiversity, the sites of Natura 2000 network (SACs and SPAs) are integrated in the National System of Protected Areas of Greece. However, they constitute a separate indicator for the needs of this report and are dealt with separately.

Data for the development of this indicator cover the period 1996-2018 and are derived from country reports to the European Environment Agency (EEA):

- [Cumulative surface area of SCIs/SACs 1996-2009](#)
- [Cumulative surface area of SPAs 1996-2009](#)
- [Natura 2000 Barometer for the period 2010-2018](#)

According to official data for the period 1995-2016, the area of SCIs/SACs of the Natura 2000 network shows a relatively small increase, while the area of SPAs shows an exponential increase. From 2010 to 2016, the Natura 2000 network included 419 sites with small variations in total area.

In 2017, the Natura 2000 network expanded to a total of 446 sites, adding 32 new sites and adjusting 63 existing sites. The main characteristics of the Natura 2000 network in Greece, as they are illustrated in Table 6, now refer to 265 Sites of Community Importance (SCI) based on the Habitats Directive, 239 of which have been designated as Special Areas of Conservation (SCA), and 207 Special Protection Areas (SPA) based on the Birds Directive. 26 out of 446 sites have both designations, i.e. they are SCI/SCA as well as SPA. The most important change in Natura 2000 network in Greece is the increase in marine protected area from 5.24% to 19.6% of the country’s total area. Correspondingly, terrestrial area covers 27.6% of the country’s total terrestrial surface area, whereas the corresponding percentage for the European Union in 2018 is 18.0%.

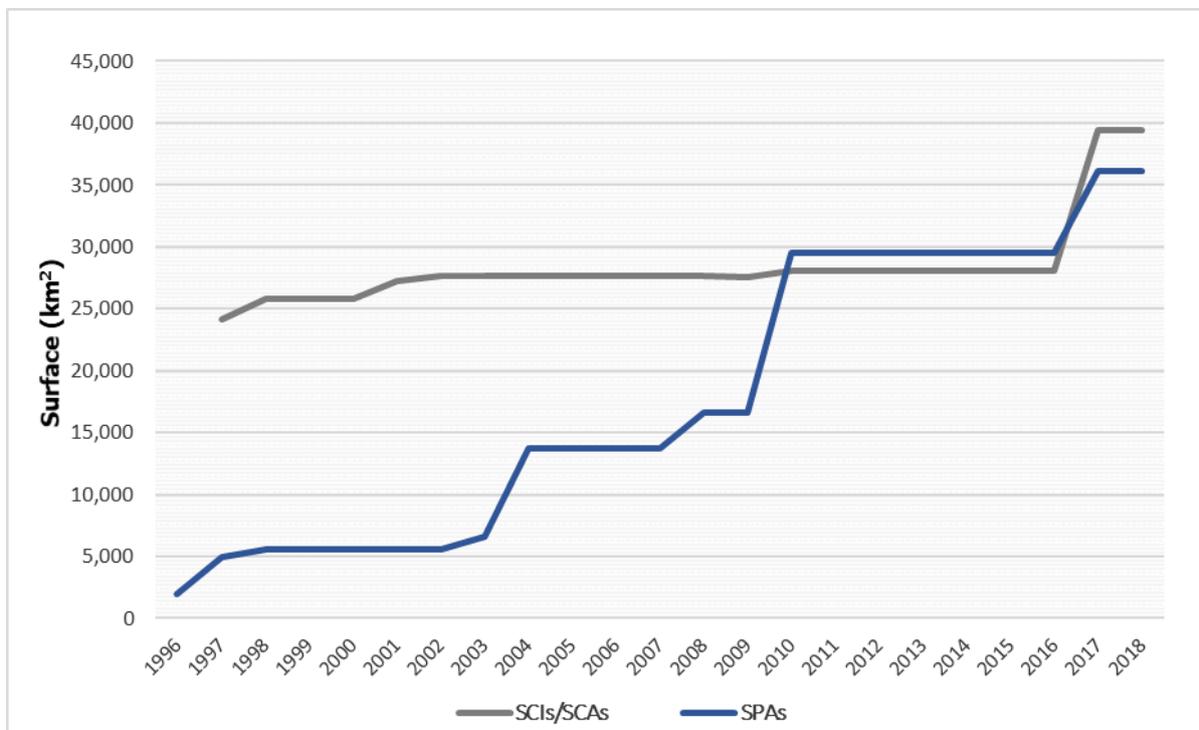
Table 6: Number and area of Natura 2000 sites in Greece in the year 2018

Natura 2000 network	SCI/SAC	SPA	N2K*
Number of sites	265	207	446
Terrestrial area (km ²)	21912	27646	36378
Marine area (km ²)	17528	8.516	22481
Total area (km ²)	39440	36161	58859
Percentage (%) of the country's total surface area	16.6%	21.0%	27.6%

* after deduction of overlaps

Graph 36 illustrates the area of the Natura 2000 sites in Greece for the period 1996-2018, separately for SCIs/SACs and SPAs. Until 2010, the area of SCIs/SACs shows a slight increase during the approximately 30 years since the network's establishment (an increase of ~4000 km², corresponding to 14%), whereas, on the other hand, the area of SPAs (based on the Birds Directive) shows an exponential growth during the same time interval. During the period 2010-2016, no substantial change is recorded, whereas in 2017 there is an important increase in the area of SCIs/SACs and SPA sites (by 40% and 22% respectively).

Graph 26: Development over time of the surface area of Natura 2000 sites in Greece (1996-2018)



* Overlaps between SCIs/SACs and SPAs were not deducted

Geodiversity conservation

The indicator refers to the area of geoparks in Greece, which are included in the Global Geoparks Network of UNESCO. These are areas under protection or management, having clear boundaries, a remarkable richness in geological and geomorphological characteristics, rich flora and fauna, as well as cultural capital. Geoparks include locations of great geological interest in respect to their quality, scarcity, scientific, educational and aesthetic value, which are called geosites, as well as locations of significant ecological, historical and cultural interest. The number of geosites in an area reflects the quality of its local geological heritage.

Data on geoparks of the Global Geoparks Network of UNESCO in Greece was received from the Greek Geoparks Forum, which was founded in 2011.

The development over time of the number and surface area of the geoparks in Greece is set out in Graph 37 and Table 7. According to 2018 data, there are 5 geoparks with a total area of 5294.35 km², in which a total of 335 Geosites have been registered and approved by the international commission of UNESCO. The number of geosites could be increased through the identification of new geosites within a geopark or through a possible extension of its boundaries. It is noted that a big percentage of Greek Geoparks (44.4%) overlaps with sites of the Natura 2000 network, which demonstrates the special natural and ecological value of these sites.

Graph 27: Area of Greek Geoparks included in the UNESCO Global Geoparks Network (2000-2018)

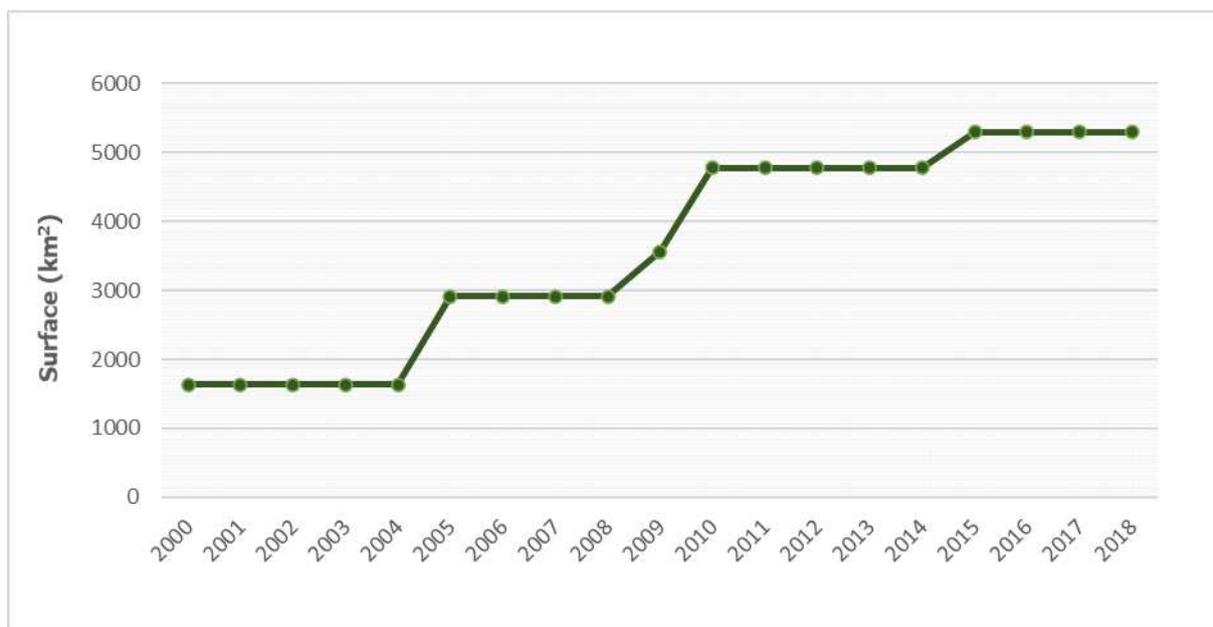


Table 5: Greek geoparks included in the UNESCO Global Geoparks Network in reference year 2018

	Geopark Name	Region	Foundation Year	Area (ha)	Number of geosites	Overlap with Natura 2000
1	Lesvos Geopark	North Aegean	2000	1636.73	95	42.9%
2	Psiloritis Natural Park	Crete	2001	1272.37	80	33.1%
3	Helmos-Vouraikos Geopark	Western Greece	2009	650.62	29	49.5%
4	Vikos-Aoos Geopark	Epirus	2010	1217.93	51	66.2%
5	Sitia Nature Park	Greece	2015	516.70	83	19.8%
Total				5294.35	335	44.4%

Ecological footprint of Greece

The ecological footprint is a measure of the biologically productive land and water surface area, which people need in order to produce all the biological resources that they consume and to absorb the waste that they generate, using the existing technology and relevant management practices. The biocapacity is the carrying capacity of ecosystems to produce biological resources and to absorb the waste generated by the human use of these resources. When the ecological footprint is greater than the biocapacity, the result is an ecological deficit, whereas in the opposite case an ecological reserve. The measure unit of the above is global hectares (Gha), as a uniform global unit which allows for comparison between areas, ecosystems and countries on a global level.

Data on biocapacity and ecological footprint for the period 1961-2016 were derived from the website of the organization [Global Footprint Network](#).

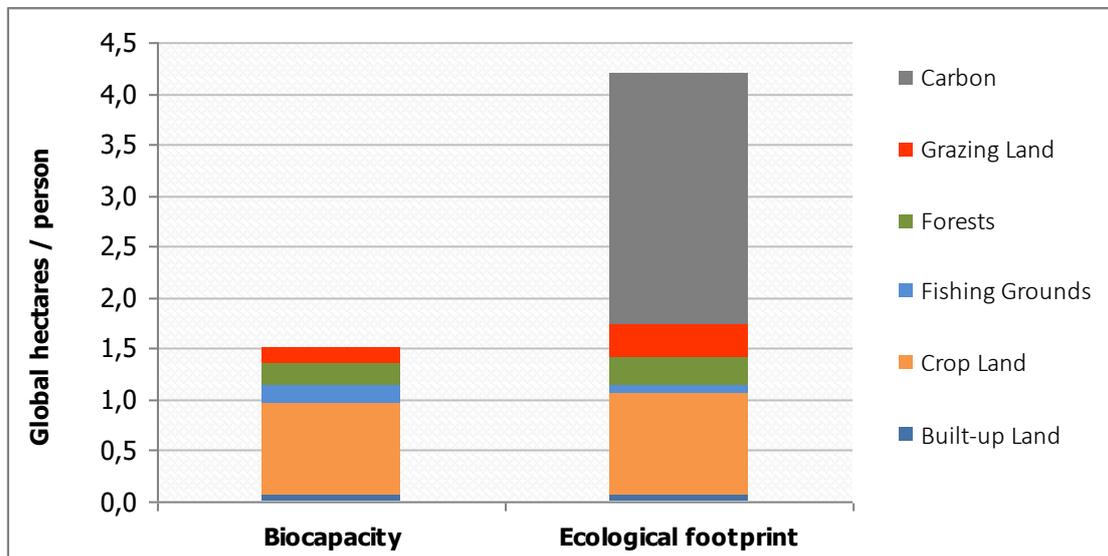
1. Ecological deficit in the year 2016

In 2016, Greece recorded an ecological deficit of -2.71 global hectares per person, which was more than double of the global average (-1.12 Gha/person) in the same year. The carrying capacity of Greece's biological resources was 1.56 Gha/person (global average: 1.63 Gha/person) and was significantly lower than its ecological footprint, which stood at 4.27 Gha/person (global average: 2.75 Gha/person). This evaluation shows that the inhabitants of Greece live with a negative environmental impact, above the limits of their country's biological carrying capacity. By extrapolation of the Greek indicators on a global level, an area equal to 2.62 times the surface area of Earth would be required to meet the consumption needs of the average citizen of Earth.

Among the 187 countries which have been evaluated, Greece was ranked as 81st in biological carrying capacity and 52nd in ecological footprint in 2016, whereas in 2007 it was ranked as 89th and 24th respectively. On a European Union level (EU 28), Greece was ranked as 19th and 20th in biological carrying capacity and ecological footprint respectively in 2016, whereas it was ranked as 21st and 10th in 2007.

The ecosystems that contributed to the biocapacity of Greece were mainly the ones under cropland (64%) and to a lesser degree forestry (15%), fishing (11%) and grazing (6%), whereas built-up environment had a very small contribution (4%).

Graph 28: Contribution of various natural resources and their use to shaping the biocapacity and ecological footprint of Greece respectively in year 2016

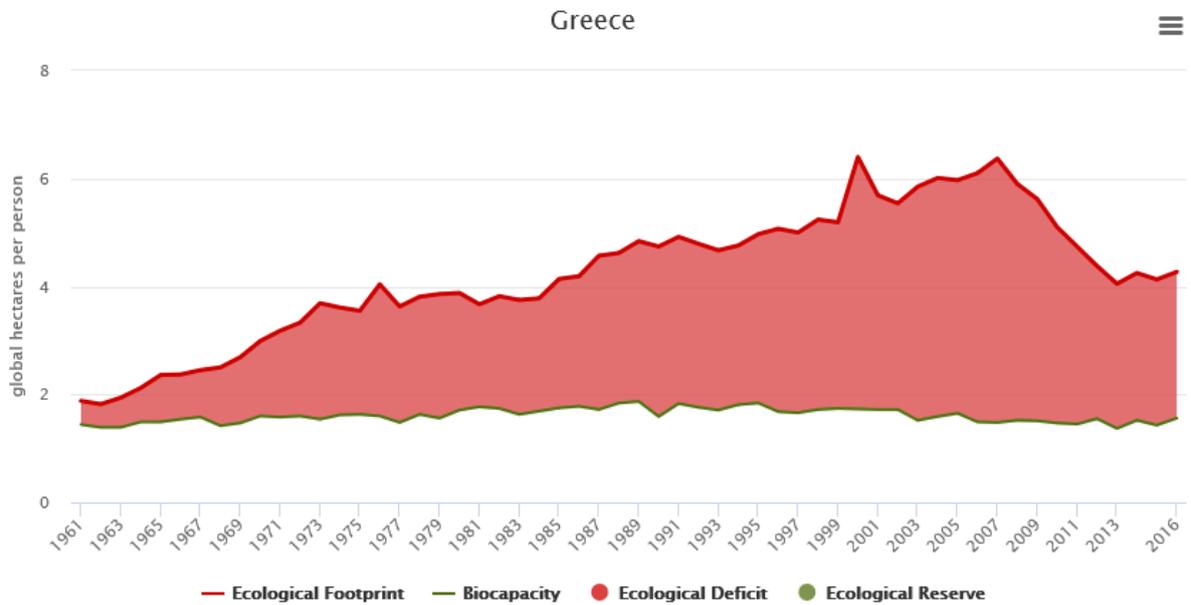


The ecological footprint of carbon was clearly the highest (58% of total footprint), compared to that of cropland (25%), grazing land (7%), forests (6%) and fishing grounds (2%). It was also responsible for 91% of the country’s total ecological deficit, followed by grazing land, cropland and forests (7%, 3% and 1% respectively). Built-up environment did not contribute to the ecological deficit, whereas fishing grounds produced an ecological reserve at 3% of the total ecological deficit.

2. Long-term trend: 1961-2016

The ecological footprint of Greece steadily exceeds its biological carrying capacity (biocapacity) during the last 55 years, resulting to an ecological deficit. This deficit (biocapacity – ecological footprint) is estimated at an average of 2.62 (±1.17) Gha/person for the period 1961-2013. The biocapacity of Greece remains relatively stable with small variations in the same period at an average of 1.61 (±0.13) Gha/person. On the contrary, the ecological footprint, as the area required to produce all of the biological resources and to absorb the waste per inhabitant of Greece, has increased significantly from 1961 (1.88) to 2016 (4.27), with an average of 4.23 (±1.21) Gha/person for the period 1961-2016. Therefore, the problem of the country’s ecological deficit is mainly the high values of ecological footprint, i.e. on the over-consumption of natural resources, rather than the reduction of biocapacity.

Graph 29: Ecological footprint (consumption of biological resources and waste absorption) and biocapacity (production of biological resources) in Greece (1961-2016)



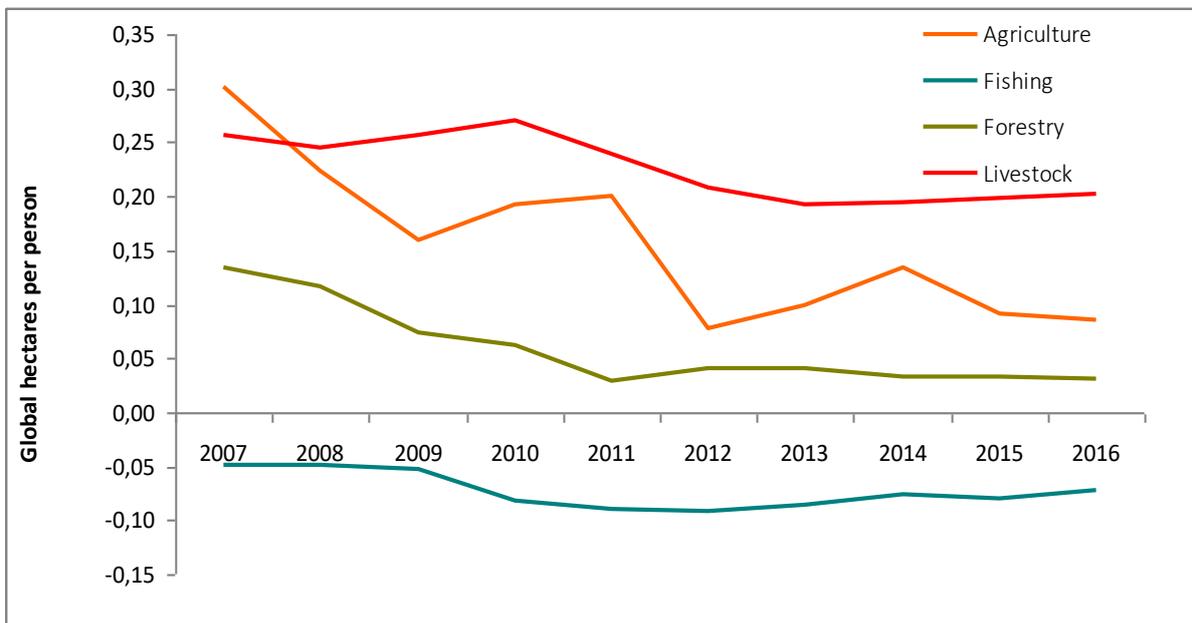
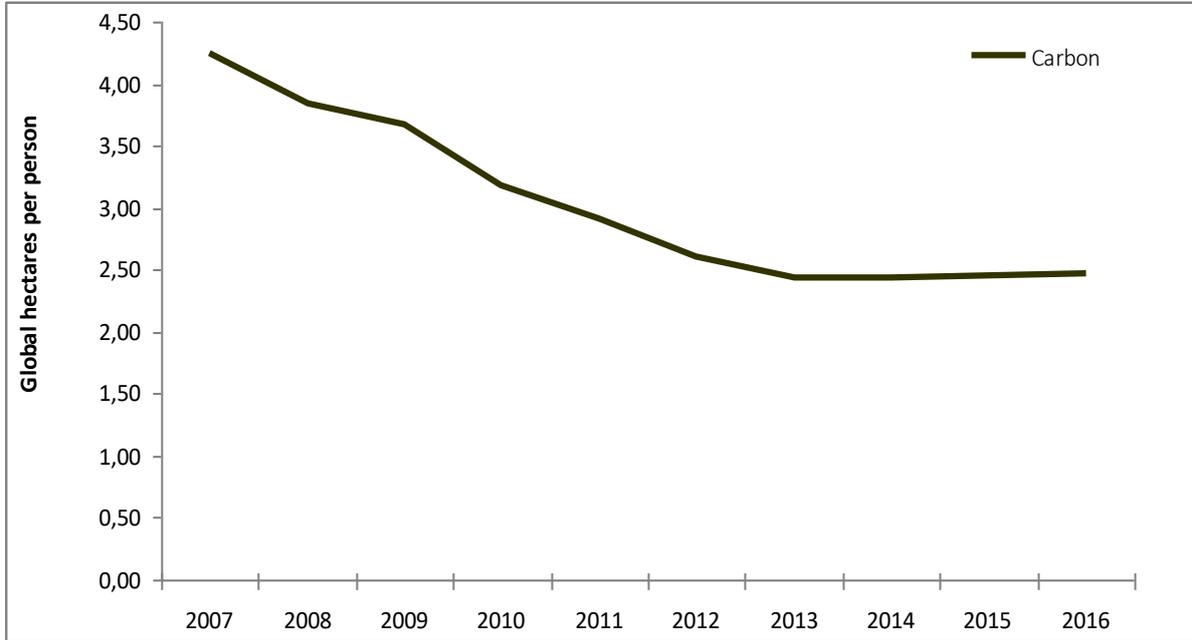
3. Recent trend: 2007-2016

Despite the country’s poor status regarding high ecological deficit and non-sustainable use of its resources, the situation has been improved significantly in the last decade, as there is a remarkable decrease in ecological footprint of Greece. More specifically, the ecological deficit has been reduced by 45% compared to the level of 2007. This is due to the large decrease of the carbon ecological deficit, which is also the main source (89%) creating the country’s ecological deficit. Sustainable use of resources has been improved in all sectors, especially in forestry and crops.

Table 6: Average ecological deficit (-) or reserve (+) by category of use of natural resources during the decade 2007-2016 in Greece, significance of each category in creating the ecological deficit and improvement of the situation (% decrease in deficit or increase in reserve) compared to the values of 2007

Category of use of natural resources	Average ecological deficit/ reserve (global hectares/ person)	Average contribution to ecological deficit (%)	Improvement (%)
Built-up Land	0.00	0.00	0
Cropland	-0.16	4.60	-72
Fishing Grounds	0.07	-2.14	50
Forests	-0.06	1.75	-77
Grazing Land	-0.23	6.67	-21
Carbon	-3.03	89.12	-42
Total	-3.40	100.00	-45

Graph 30: Ecological footprint of carbon and ecological deficit (ecological footprint minus biocapacity) of grazing land, forests, fishing and cropland during the decade 2007-2016 in Greece



Conclusions and assessments on the objectives, directives and measures of the environmental policy

The **status of nature and biodiversity in Greece** is quite satisfactory compared to the rest of Europe and the country has made considerable progress. During the last years, there was a large decrease (35%) of ecological footprint (with Greece occupying one of the last places in Europe) and a corresponding downward trend in ecological footprint of carbon, agriculture, livestock farming, forestry and fishing. In comparison, terrestrial ecosystems appear to be in a better situation than the marine ones, which are mainly under pressure of overfishing and illegal fishing practices. A positive development is the recent increase in marine protected areas included in the Natura 2000 network. At the same time, threats still exist on forest ecosystems, which receive the highest pressure from various activities: mining, industrial, agricultural and residential. The continuing progress in drafting forest maps is a positive development, which by its completion will make a decisive contribution to the capability of monitoring and protection of Greek forests.

Regarding the transport sector, the expansion of the national road network should be limited, to stop the fragmentation of the landscape and the natural ecosystems. It should be pointed out, that there is still a lot of room for further improvement through the enactment of Presidential Decrees for the protection of Natura 2000 network sites, the regulation of land use and management measures, which at present only a few of them possess. Until now, the procedure and practice followed is limited to commissioning a series of successive studies and, for various reasons, is rarely completed through the establishment of a strong and functional legal protection framework. The undertaking of a related project of the IP LIFE program is intended to ensure that this problem will be solved within the next five years.

The inclusion of a site in the Natura 2000 network of protected sites should be a springboard for the development of the area, to be sustainable in the medium to long term. Otherwise, the local population is alienated from the endeavor and faces it with hostility, since it regards it as an obstacle rather than an asset to its well-being. Therefore, maximalist protection targets often work in the opposite direction of the intended result. On the contrary, attainable objectives must be pursued, which must be defined through an exhaustive dialog with the conflicting interest groups and pressures, as well as with the local society.

The Law 4519/2018 intends to secure that all protected areas have a responsible management agency. However, significant difficulties in staffing and smooth functioning of the management agencies persist, whereas 8 out of a total of 36 exist only on paper. It should be noted that, besides institutional interventions, the necessary resources are also required, to secure the strengthening of the operational capability of management agencies.

Therefore, the feasibility of the following measures should be explored:

- Reshaping the mode of legislating Presidential Decrees for nature protection, with the aim of giving a substantial legal armor to the protected site, while on the same time securing their development capacity. The protection system of each site should function as a driver for local development, so that the local community can utilize it, which is a prerequisite for a successful protection,

- proper communication of the benefits and the uniqueness of the protected site, as well as the reasoning behind its choice as a part of the wider European Natura 2000 Network, for the local population to feel proud of it,
- reshaping the mode of administration of the protected sites, to secure their functionality, through the participation of representatives from the local authorities and local producers, since any form of administration will fail without the local societies participating in it,
- direct or indirect (e.g. through program contracts with existing structures of the Greek state, which are in charge of specific tasks e.g. port police, forest offices, local authorities, regional governments) allocation of necessary resources (human and financial), in order to strengthen the operational capacity of management units,
- freeing management units of protected sites from their absolute financial dependency on state e.g. through ticket sales (this already takes place in Samaria Gorge and can be extended to other gorges or small uninhabited islands, which receive a great number of tourists in summer, despite being protected areas, e.g. Chrysi and Koufonisi Lasithiou) or the imposition of a fee on tourist agents, sale of products, actions of corporate social responsibility, sponsorship programs¹, voluntary agreements, as well as through the collection of environmental fines or a part of the fine for illegal construction, a part of the plastic bag fee e.g. for activities like cleaning the beaches of protected areas etc.,
- immediately updating and moving forward the Presidential Decree drafts for final legislation and producing the drafts that are still pending, by laying down clearly defined conservation targets, as well as completing and implementing the management plans,
- attracting resources for funding of actions aiming to the implementation of management measures and achievement of the respective targets e.g. through the provision of tax exemptions for private investments in protected sites, which serve the implementation of management measures as well as the achievement of the respective targets. Through the combination of voluntary agreements and providing financial incentives, the implementation of management measures can be secured, circumventing the problem of lack of money. For instance, contracts (or also memorandums of understanding etc.) could be signed as a result of a voluntary agreement with landowners, so that they implement specific management measures for achieving specific targets and in return they receive some tax exemptions or have a more favourable access to public subsidies for actions related to good management practices (e.g. on cultivation, forestry etc.) concerning the particular object meriting protection,²
- raising awareness on economic benefits from healthy ecosystems and providing incentives for investing on them,
- mapping and evaluation of ecosystem services (MAES) in relation to ecosystem condition,
- implementation of ecosystem services in the management of protected sites, in cooperation with all actors involved,
- updating the red catalog of endangered species, and creating a red catalog of ecosystems,
- a better integration of biodiversity-related aspects in other policies and improvement in communication between relevant actors,

¹ The management units could seek sponsorships from local companies as well as big private bodies active in environmental protection and can make use of possible synergies in the context of promoting e.g. awareness raising campaigns.

² Προστατευόμενες Περιοχές Natura 2000, Ένα Ολοκληρωμένο Σχέδιο για την Προστασία και τη Βιώσιμη Ανάπτυξή τους, Κώστας Τριάντης, Κυριάκος Γεωργίου, Γιώργος Κ. Βαρελίδης, Νικόλαος Χρ. Κακογιάννης, Φαίη Μακαντάση, Νόρα Σκώκου, Θοδωρής Καραουλάνης, ΔΙΑΝΕΟΣΙΣ, Νοέμβριος 2017 (Protected Sites Natura 2000, An Integrated Plan for their Protection and Sustainable Development. Kostas Triantis, Kyriakos Georgiou, Giorgos K. Varelidis, Nikolas Chr. Kakoyiannis, Fei Makantasi, Nora Skokou, Thodoris Karaoulanis, DIANEOSIS, November 2017).

- education of farmers and addressing the issue of overfishing and widespread illegal practices,
- immediate enactment of national legislation for the obligations required under the fourth paragraph of Article 30 of Regulation (EU) 1143/2014 (sanctions – the relevant deadline was at 2/1/2016) on Invasive Alien Species (IAS),
- immediate implementation (also through utilisation of relevant European projects, which have already been launched in Greece) of Regulation (EU) 1143/2014 on IAS, by concentrating the wealth of scientific information on IAS in the list of Union concern found in Greece, which is already available from the country's academia and scientific institutions (e.g. Hellenic Centre for Marine Research), and also by compiling a national IAS list, action plan on IAS routes, management and restoration measures etc.,
- full utilization of LIFE IP "4 Natura"³, which was launched in 2017 and includes mapping and evaluation of the country's ecosystem types and their services, as well as case studies of MAES implementation in selected regions.

³ http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=search.dspPage&n_proj_id=6520