

Supplementary 2

Optimised SIAPA's indicator profiles

I. STATE OF CONSERVATION: 6 indicators.

1.1. POPULATION TRENDS OF ENDANGERED SPECIES OR SUB-SPECIES	
Category	State of Conservation
Type	State
Description	This indicator assesses the numerical trends of the populations of species or subspecies included in the Spanish Threatened Species' Catalogue with a category of threat of (EN) or (CR) that regularly dwell within the protected area
Rationale	The main purpose of protected areas is nature conservation (Múgica <i>et al.</i> 2009), especially of endangered biodiversity at the genetic, species and ecosystem levels. In particular, the population dynamics of threatened species must be monitored because of their fragility (Atauri <i>et al.</i> , 2002). This variable is therefore often used to assess the effectiveness of a protected area (Pomeroy <i>et al.</i> , 2005). It is also one of the criteria used to assess the favourable conservation status of the species included in the annexes of the Habitats Directive (Walder <i>et al.</i> , 2006).
Data source	Protected areas' administrations
Data availability	Medium-low
Data collection frequency	Annual
Suggested update	Annual
Scale	Ordinal scale, from 0 to 2 points
Calculation and interpretation	<p>The analysis period will be as long as possible, if possible, since the designation date of the protected area. At a minimum, data for 3 years, not spaced over 2 years (at regular, annual or biennial intervals), up to the most recent date will be considered. The most recent date must not be earlier than 2 years before the assessment year. The assessment period will be split into three equal intervals.</p> <p>The population trends of endangered species or sub-species will be considered:</p> <ul style="list-style-type: none"> • <i>Adequate</i>: If their populations counted by census or estimated by sampling, show an increasing trend in numbers: > 5% between the initial and the intermediate year, and between the intermediate and the final year. A score of 2 points will be given. • <i>Stable</i>: If their populations counted by census or estimated by sampling, do not vary

	<p>notably: $\pm 5\%$ of the average population size between the two periods or they are $< 5\%$ in the intermediate year but $> 5\%$ in the final year in relation to the initial year. A score of 1 point will be given.</p> <ul style="list-style-type: none"> • <i>Negative</i>: If their populations counted by census or estimated by sampling, show a decreasing trend: $< 5\%$ between the initial and the intermediate year and between the intermediate and the final year. A score of 0 points will be given. <p>The total value of the indicator (X) for each protected area will be the average score for each of the values for each species or subspecies that inhabit that protected area, and will be valued and considered as follows:</p> <ul style="list-style-type: none"> • Adequate: $X \geq 1.5 \rightarrow 2$ points • Moderate: $1.5 > X \geq 1 \rightarrow 1$ point • Deficient: $X < 1 \rightarrow 0$ points <p><i>Explanatory notes</i></p> <p>When there are different (EN) or (CR) species or subspecies in the protected area, the results will be shown individually in a table. Then, scores for each species or subspecies will be added and divided by the number of species or subspecies.</p> <p>Because of the importance of this variable for biodiversity conservation, when any of the species or subspecies scores 0, the value of X will always be 0 points, if at the same time there are not two or more species or subspecies with positive trends (with updated data ≤ 2 years old). In this case, X will be 1 point.</p> <p>In any case, lack of data on any (EN) or (CR) species or subspecies, outdated data (> 2 years old) or a negative trend for two or more species or subspecies in the same protected area will entail an X of 0 points.</p> <p>‘Presence/absence’ data are not scored. Therefore, they will be considered ‘Not applicable’ and valued 0 points.</p>
Trend	<p>The trend of the indicator will be <i>positive</i> if all the (EN) or (CR) species or subspecies populations increase in numbers, whatever their magnitudes.</p> <p>The trend of the indicator will be <i>stable</i> if the number of individuals of (EN) or (CR) species or subspecies oscillates within $\pm 5\%$ in the three measurement years.</p> <p>The trend of the indicator will be <i>negative</i> if all the (EN) or (CR) species or subspecies populations decrease in numbers between the two analysed periods, whatever the magnitude of this decrease.</p> <p>The trend will be considered ‘Not applicable’ if different (EN) or (CR) species or subspecies populations have opposite trends or if data are presented as ‘presence/absence’</p>
Applicable legislation	<ul style="list-style-type: none"> • Ley 42/2007, de 13 de diciembre, del Patrimonio Natural y de la Biodiversidad. Arts. 47, 53.3, 53.4, 55.1, 55.3, 56.1 y 56.2. • Real Decreto 139/2011, de 4 de febrero, para el desarrollo del Listado de Especies

	Silvestres en Régimen de Protección Especial y del Catálogo Español de Especies Amenazadas.
References	<ul style="list-style-type: none"> Atauri, J.A.; de Lucio, J.V. y Castell, C. 2002. <i>El papel de los indicadores en la gestión de los espacios naturales protegidos</i>. En Ramírez, L. (Coord.). <i>Indicadores ambientales. Situación actual y perspectivas</i>. Organismo Autónomo Parques Nacionales. Madrid. Walder, C.; Dick, G.; Baumüller, A.; and Weatherley, J. 2006. Towards European Biodiversity Monitoring. Assessment, monitoring and reporting of conservation status of European habitats and species. European Habitats Forum. Wien, Cambridge, Brussels. Mallarach, J.M.; Germain, J.; Sabaté, X. y Basora, X. 2008. <i>Protegits de fet o de dret? Primera avaluació del sistema d'espais naturals protegits de Catalunya</i>. Institució Catalana d'Història Natural. Available from: http://ichn.iec.cat/Avaluaci%C3%B3%20d%27espais.htm Música, M.; Martínez-Alandi, C.; Gómez-Limón, J.; Puertas, J.; Atauri, J.A. y De Lucio, J.V. 2009. <i>Anuario EUROPARC-España del estado de los espacios naturales protegidos 2009</i>. Fundación Fernando González Bernáldez. Madrid. Pomeroy, R.S., Parks, J.E. and Watson, L.M. 2005. <i>How is your MPA doing? A methodology for evaluating the management effectiveness of marine protected areas</i>. IUCN, Gland, Switzerland, and Cambridge, United Kingdom. Generalitat Valenciana. 2013. <i>Informe Técnico 06/2013. Guía para la Evaluación del Estado de Conservación de los Hábitats y Especies en Red Natura 2000</i>. Available from: http://bdb.cma.gva.es/web/indice.aspx?nodo=81025&idioma=C Rodríguez Rodríguez, D. y Martínez Vega, J. 2013. <i>Evaluación de la eficacia de las áreas protegidas: el Sistema de Evaluación integrada de áreas protegidas. Resultados de la primera evaluación integrada de los espacios naturales protegidos de la Comunidad de Madrid</i>. FBBVA, Madrid. Available from: http://www.fbbva.es/TLFU/tlfu/esp/publicaciones/informes/fichainforme/index.jsp?codigo=722 IUCN. 2014. <i>The Green List for Protected Areas Global Standard Approved by IUCN GLPA Steering Group 2014-05-15</i>. Available from: http://cmsdata.iucn.org/downloads/pilot_phase_iucnlpastandard20140515_.pdf MAGRAMA. Ministerio de Agricultura, Alimentación y Medio Ambiente. 2016a. <i>Biodiversidad. Espacios protegidos. Red Natura 2000</i>. Available from: http://www.magrama.gob.es/es/biodiversidad/temas/espacios-protegidos/red-natura-2000/rn_tipos_habitat_especies.aspx MAGRAMA. Ministerio de Agricultura, Alimentación y Medio Ambiente. 2016b. <i>Biodiversidad. Conservación de especies. Especies en protección especial</i>. Available from: http://www.magrama.gob.es/es/biodiversidad/temas/conservacion-de-especies/especies-proteccion-especial/default.aspx Rodríguez-Rodríguez, D. & Martínez-Vega, J. 2016. What should be evaluated from a manager's perspective? Developing a salient protected area effectiveness evaluation system

for managers and scientists in Spain. *Ecological Indicators*, 64: 289-296.

1.2 CHANGES IN THE EXTENT OF FOCAL HABITATS

Category	State of Conservation
Type	State
Description	It evaluates the extent of focal (protected, threatened) habitats in the protected area at different time points
Rationale	The extent of Habitats of Community Interest is one of the standard European Union's indicators for assessing the conservation state of the habitats included in Council Directive 92/43/CEE's Annex I (Generalitat Valenciana, 2013; MAGRAMA, 2016).
Data source	Protected area administration; regional or national administration
Data availability	Low
Data collection frequency	
Suggested update	Every three years
Scale	Ordinal scale, from 0 to 2 points
Calculation and interpretation	<p>The areas covered by each priority habitat (X_p) and habitat of Community Interest (X_i) within the boundaries of the protected area will be computed at regular, five-year intervals. The changes in the extent of each focal habitat in the protected area will be calculated and valued as follows:</p> <ul style="list-style-type: none"> ▪ Adequate: $X_t > X_{t-1}$ (the focal habitat's extent increased more than 1% with regard to its previous extent) → 1 point ▪ Stable: $X_t \sim X_{t-1}$ (the focal habitat's extent varies $\pm 1\%$ with regard to its previous extent) → 0 points ▪ Negative: $X_t < X_{t-1}$ (the focal habitat's extent decreased more than 1% with regard to its previous extent) → -1 point <p>The changes in the extent of focal habitats in the protected area (Y) will be calculated adding the points by all existing focal habitats weightily as follows:</p>

	<p>$Y = \sum X_p (x_2) + X_i$ It will be valued and interpreted as follows:</p> <ul style="list-style-type: none"> • Adequate: $Y > 0$ and no $X = -1 \rightarrow 2$ points • Moderate: $Y \geq 0$, and no $X_p = -1$, and no X_i decreased more than 5% between both evaluation periods $\rightarrow 1$ point • Deficient: Any other value of $Y \rightarrow 0$ points <p><i>Explanatory notes.</i></p> <p>If there are different focal habitats in the protected area, the results for each of them will be shown in a table.</p> <p>‘Presence-Absence’ data are not scored. Therefore, they will be considered ‘Not applicable’ and valued 0 points.</p>
Trend	The indicator trend will be considered <i>positive</i> if Y is greater than in the preceding evaluation, as <i>stable</i> if equal, and as <i>negative</i> if smaller
Applicable legislation	<ul style="list-style-type: none"> • Ley 42/2007, de 13 de diciembre, del Patrimonio Natural y de la Biodiversidad. Arts. 2, 3.26, 19.b, 30.1, 34 y 46.
References	<ul style="list-style-type: none"> • Generalitat Valenciana. 2013. <i>Informe Técnico 06/2013. Guía para la Evaluación del Estado de Conservación de los Hábitats y Especies en Red Natura 2000</i>. Available from: http://bdb.cma.gva.es/web/indice.aspx?nodo=81025&idioma=C • Rodríguez Rodríguez, D. y Martínez Vega, J. 2013. <i>Evaluación de la eficacia de las áreas protegidas: el Sistema de Evaluación integrada de áreas protegidas. Resultados de la primera evaluación integrada de los espacios naturales protegidos de la Comunidad de Madrid</i>. FBBVA, Madrid. Available from: http://www.fbbva.es/TLFU/tlfu/esp/publicaciones/informes/fichainforme/index.jsp?codigo=722 • IUCN. 2014. <i>The Green List for Protected Areas Global Standard Approved by IUCN GLPA Steering Group 2014-05-15</i>. Available from: http://cmsdata.iucn.org/downloads/pilot_phase_iucnlpastandard20140515_.pdf • MAGRAMA. Ministerio de Agricultura, Alimentación y Medio Ambiente. 2016a. <i>Biodiversidad. Espacios protegidos. Red Natura 2000</i>. Available from: http://www.magrama.gob.es/es/biodiversidad/temas/espacios-protegidos/red-natura-2000/rn_tipos_habitat_especies.aspx • Rodríguez-Rodríguez, D. & Martínez-Vega, J. 2016. What should be evaluated from a manager’s perspective? Developing a salient protected area effectiveness evaluation system for managers and scientists in Spain. <i>Ecological Indicators</i>, 64: 289-296.

1.3. CHANGES IN THE FEATURES FOR WHICH THE PROTECTED AREA WAS DESIGNATED	
Category	State of Conservation
Type	Response
Description	This indicator assesses the trend of the conservation status of the feature(s) that determined the designation of the protected area according to its designation norm other than species, habitats and other features included as specific indicators in the evaluation
Rationale	The priority objective of any protected area should consist in improving or maintaining (in case of optimal state) the state of conservation of the feature(s) which motivated its designation, as well as evaluating their trend in time, as the main indicator of the effectiveness of the PA (Pullin, 2002; Cuevas, 2003)
Data source	Protected area administration; bibliography; censuses; samplings
Data availability	Medium-low
Data collection frequency	
Suggested update	Annually or every two years for biotic features. Every three years for abiotic features
Scale	Ordinal scale, from 0 to 2 points
Calculation and interpretation	<p>For each feature, a three-value ordinal scale will be established. It will be valued from 0 to 2 points:</p> <ul style="list-style-type: none"> • Positive trend or maintenance of optimal state of the feature: 2 points • Stable trend of the feature in a sub-optimal state: 1 point • Negative trend of the feature: 0 points <p>If there are different features, the results will be shown in a table. A weighted average (X) in which biotic features (Bf) will be scored double than abiotic features (Af) will be done:</p> $X = (\sum Bf \times 2 + \sum Af) / (n_1 + n_2), \text{ where}$ <p>n_1: number of biotic features</p> <p>n_2: number of abiotic features</p> <p>The changes in the features for which the PA was designated will be considered and valued as follows:</p> <ul style="list-style-type: none"> • Adequate: 2 points • Moderate: 1 point

	<ul style="list-style-type: none"> • Deficient: 0 points <p><i>Explanatory notes</i></p> <p>It is considered 'positive change' the increase in numbers or quality (>5%), or maintenance of an optimal state, of the considered feature since the designation of the protected area or previous data.</p> <p>It is considered 'moderate change' the numeric ($\pm 5\%$) or quality maintenance of the state of the considered feature since the designation of the protected area or previous data, or the oscillation of its value if no continuous trend towards increase or decrease is observed (≥ 3 consecutive years).</p> <p>It is considered 'negative change' the decrease in numbers or quality (< 5%) of the considered feature since the designation of the protected area or previous data.</p> <p>For those features without previous data, the tendency will be considered 'Not applicable' and valued 0 points.</p> <p>When the designation norm does not specify the features to protect, or these are too generic, the indicator will not be valued</p>
Trend	The trend will be <i>positive</i> if the X is greater than in the previous assessment, <i>stable</i> if it is the same, and <i>negative</i> if X is smaller than previously
Applicable legislation	
References	<ul style="list-style-type: none"> • Cessford y Muhar, 2003. <i>Monitoring options for visitor numbers in national parks and natural areas</i>. Journal for Nature Conservation, 11: 240-250. • Pullin, A. 2002. <i>Conservation Biology</i>. Cambridge University Press. Cambridge, UK. • Cuevas, J. A. 2003. <i>Inventario y descripción de los hábitats incluidos en la Directiva 92/43/CEE presentes en la Comunidad de Madrid</i>. Serie Documentos nº 40. Centro de Investigaciones Ambientales de la Comunidad de Madrid Fernando González Bernáldez. Soto del Real. • Hockings, M.; Stolton, S.; Leverington, F.; Dudley, N.; and Courrau, J. 2006. <i>Evaluating effectiveness: A framework for assessing management effectiveness of protected areas</i>. 2nd Edition. IUCN. Gland, Swizerland y Cambridge, R.U. • Rodríguez Rodríguez, D. y Martínez Vega, J. 2013. <i>Evaluación de la eficacia de las áreas protegidas: el Sistema de Evaluación integrada de áreas protegidas. Resultados de la primera evaluación integrada de los espacios naturales protegidos de la Comunidad de Madrid</i>. FBBVA, Madrid. Available from: http://www.fbbva.es/TLFU/tlfu/esp/publicaciones/informes/fichainforme/index.jsp?codigo=722 • IUCN. 2014. <i>The Green List for Protected Areas Global Standard Approved by IUCN GLPA Steering Group 2014-05-15</i>. Available from: http://cmsdata.iucn.org/downloads/pilot_phase_iucn_glpa_standard20140515_.pdf

1.4 VISUAL IMPACT	
Category	State of Conservation
Type	Pressure
Description	This indicator evaluates the impacts on and around protected area landscapes in an aggregated manner
Rationale	Despite the relevance of landscapes as aesthetic, cultural, ecological and recreational resources, they are not usually considered in protected area assessments or other environment or sustainability evaluations. Human activities, such as the growth of urban areas, the building of infrastructure or the installation of waste dumps, change the characteristics of the landscapes (Aramburu <i>et al.</i> , 2003). In order to compare the visual quality of a landscape independently of its intrinsic quality, only the quantity and severity of the impacts on the landscapes in each protected area were considered. Therefore, the best-conserved landscape is that with the fewest impacts on its visual quality
Data source	Spanish Centre for Geographic Information
Data availability	High
Data collection frequency	Variable
Suggested update	Every four years
Scale	Ordinal scale, from 0 to 2 points
Calculation and interpretation	<p>The viewsheds of the main elements that have negative impacts on landscapes in the territory comprising each protected area and one 8km surrounding area will be calculated using GIS, at 1.5m over the floor level. An average height will be assigned to each impacting element.</p> <p>Landscape impact scores will be obtained by simple addition of the scores for each raster output layer, each pixel scoring 0 (not visible) or 1 (visible). Then, the average landscape impact score will be calculated for each protected area (X) by weighting each impacting element as follows:</p> <ul style="list-style-type: none"> -Highway network: average height of 0m (x3) -Main road network, average height of 0m (x2) -Secondary road network, average height of 0m (x1) -Local road network, average height of 0m (x1) -Railway network, average height of 3m (x1) -Mine areas, average height of 5m (x3)

	<p>-Power lines, average height of 10m (x2)</p> <p>-Dams' retaining walls, average height of 10m (x2)</p> <p>The landscape impact in the protected area (X) will be considered and valued as follows:</p> <ul style="list-style-type: none"> • Low: If $0 \leq X \leq 4 \rightarrow 2$ points • Moderate: If $4 < X \leq 7 \rightarrow 1$ point • High: If $X > 7 \rightarrow 0$ points
Trend	The trend will be <i>positive</i> if the X is greater than in the previous assessment, <i>stable</i> if it is the same, and <i>negative</i> if X is smaller than previously
Applicable legislation	<ul style="list-style-type: none"> • Ley 42/2007, de 13 de diciembre, del Patrimonio Natural y de la Biodiversidad. Arts. 2, 3.26, 19.b, 30.1, 34 y 46. • Convenio Europeo del Paisaje (2000)
References	<ul style="list-style-type: none"> • Aramburu, M. P.; Escribano, R.; Ramos, L.; y Rubio, R. 2003. <i>Cartografía del Paisaje de la Comunidad de Madrid</i>. Consejería de Medio Ambiente. Comunidad de Madrid. Madrid. • Rodríguez Rodríguez, D. y Martínez Vega, J. 2013. <i>Evaluación de la eficacia de las áreas protegidas: el Sistema de Evaluación integrada de áreas protegidas. Resultados de la primera evaluación integrada de los espacios naturales protegidos de la Comunidad de Madrid</i>. FBBVA, Madrid. Available from: http://www.fbbva.es/TLFU/tlfu/esp/publicaciones/informes/fichainforme/index.jsp?codigo=722

1.5 SURFACE WATER QUALITY	
Category	State of Conservation
Type	State
Description	This indicator evaluates the state of different physico-chemical variables affecting the quality of surface waters (water masses or water courses), which may affect living organisms
Rationale	Surface waters are the living environment for many organisms. They are also a vital need for all of them. Surface waters are present in numerous ecosystems and protected areas. Many organisms and ecosystems (some of which are endangered) depend on adequate water quality. As a result, evaluating the quality of surface waters is relevant to determining the state of conservation of protected areas (Pomeroy <i>et al.</i> , 2005; Mallarach <i>et al.</i> , 2008; VVAA, 2008)
Data source	Hydrographic Management Bodies of rivers Tajo, Duero and Ebro

Data availability	High
Data collection frequency	Annual (mínimum)
Suggested update	Annual
Scale	Ordinal scale, from 0 to 2 points
Calculation and interpretation	<p>The annual average values of the following variables will be measured from a minimum of two non-consecutive quarterly values, in surface water masses and courses, since the designation date of the protected area or the previous data, up to the last available annual value. They will be valued as follows:</p> <ol style="list-style-type: none"> Dissolved oxygen (DO): <ul style="list-style-type: none"> - If $[DO] > 5$ mg/l: 1 point - If $[DO] \leq 5$ mg/l: 0 points 5-year biochemical oxygen demand (BOD_5): <ul style="list-style-type: none"> - If $BOD_5 < 6$ mg/l: 1 point - If $BOD_5 \geq 6$ mg/l: 0 points pH: <ul style="list-style-type: none"> - If $pH: 6 < pH < 9$: 1 point - If $pH \leq 6$ or $pH \geq 9$: 0 points Total phosphorus (tP): <ul style="list-style-type: none"> - If $tP < 0.4$ mg/l: 1 point - If $tP \geq 0.4$ mg/l: 0 points Nitrate: <ul style="list-style-type: none"> - If $[NO_3] < 25$ mg/l: 1 point - If $[NO_3] \geq 25$ mg/l: 0 points Nitrite: <ul style="list-style-type: none"> - If $[NO_2] < 0.3$ mg/l: 1 point - If $[NO_2] \geq 0.3$ mg/l: 0 points Ammonium: <ul style="list-style-type: none"> - If $[NH_4] < 1$ mg/l: 1 point - If $[NH_4] \geq 1$ mg/l: 0 points

	<p>The <u>quality of each water mass or water course</u> (Q_i) will result from the addition of the results for the n variables* (X) for the last year for which data are available. Thus, its quality will be considered:</p> <ul style="list-style-type: none"> • Q_i is Adequate: If $X = n$ points • Q_i is Moderate: If $X = n-1$ points • Q_i is Deficient: If $X \leq n-1$ points <p>Surface water quality (Q_w) in the protected area will be calculated as the average value of the scores for the water masses or water courses considered within the protected area (Y). It will be considered and valued as follows:</p> <ul style="list-style-type: none"> • Q_w is Adequate: If $Y = n$ points $\rightarrow 2$ points • Q_w is Moderate: If $n > Y \geq n-1$ points $\rightarrow 1$ point • Q_w is Deficient: If $Y < n-1$ points $\rightarrow 0$ points <p><i>Explanatory note</i></p> <p>*For a minimum of 5 variables. If data for at least five variables is not available, the value of Q_w will be 0.</p> <p>The variables for water quality and their thresholds were selected according to the legally established values in <i>Orden ARM/2656/2008, de 10 de septiembre, por la que se aprueba la instrucción de planificación hidrológica</i>: Tables 10, 11, 12 and 14.</p>
Trend	<p>The trend will be measured by comparing the Q_w value for the last year analysed with the Q_w value for the previous year analysed. Whenever possible, the comparison will be made with the year immediately before the last year analysed.</p>
Applicable legislation	<ul style="list-style-type: none"> • Directiva 2000/60/CE del Parlamento Europeo y del Consejo, de 23 de octubre de 2000, por la que se establece un marco comunitario de actuación en el ámbito de la política de aguas. Arts. 1.a, 2, 4.1.a, 4.2, 8.1 y Anexo V. • Real Decreto Legislativo 1/2001, de 20 de julio, por el que se aprueba el texto refundido de la Ley de Aguas. • Real Decreto 927/1988, de 29 de julio, por el que se aprueba el Reglamento de la Administración Pública del Agua y de la Planificación Hidrológica, en desarrollo de los Títulos II y III de la Ley de Aguas. Anexo 3. • Real Decreto 1664/1998, de 24 de julio, por el que se aprueban los Planes Hidrológicos de Cuenca. Art. 1. • Planes Hidrológicos de Cuenca en vigor. Available from: http://www.magrama.gob.es/es/agua/temas/planificacion-hidrologica/planificacion-hidrologica/planes-cuenca/default.aspx • Orden ARM/2656/2008, de 10 de septiembre, por la que se aprueba la instrucción de

	planificación hidrológica.
References	<ul style="list-style-type: none"> • García Vila, F. (Coord.). 1993. <i>Variables ambientales del espacio natural «Regajal – Mar de Ontígola»</i>. Centro de Estudios y Experimentación de Obras Públicas, Gabinete de Formación y Documentación. Madrid. • Álvarez-Cobelas, M.; Riobos, P.; Himi, Y.; Sánchez-Carrillo, S.; García-Avilés, J. e Hidalgo, J. 2000. <i>Estudio físico-químico de los ambientes estancados del Parque Regional del Sureste de la Comunidad de Madrid</i>. Serie Documentos nº 29. Centro de Investigaciones Ambientales de la Comunidad de Madrid “Fernando González Bernáldez”. • Pomeroy, R.S., Parks, J.E.; and Watson, L.M. 2005. How is your MPA doing? A methodology for evaluating the management effectiveness of marine protected areas. IUCN, Gland, Switzerland, and Cambridge, United Kingdom. • VVAA. 2008. Primer Informe de Situación de la Red de Parques Nacionales a 1 de enero de 2007. Organismo Autónomo Parques Nacionales. Ministerio de Medio Ambiente. • Rodríguez Rodríguez, D. y Martínez Vega, J. 2013. <i>Evaluación de la eficacia de las áreas protegidas: el Sistema de Evaluación integrada de áreas protegidas. Resultados de la primera evaluación integrada de los espacios naturales protegidos de la Comunidad de Madrid</i>. FBBVA, Madrid. Available from: http://www.fbbva.es/TLFU/tlfu/esp/publicaciones/informes/fichainforme/index.jsp?codigo=722

1.6. HEALTH OF VEGETATION	
Category	State of Conservation
Type	State
Description	This indicator evaluates the changes in defoliation and decoloration of trees in protected areas. These changes may be due to air pollution, fires, human activities, plant diseases or adverse soil or weather conditions
Rationale	Health of vegetation is estimated on variables such as decoloration, defoliation or deterioration. In the Mediterranean area, defoliation is considered to be an accurate indicator of ‘forest damage’ (VVAA, 1996). Defoliation thresholds are established by agreement (EU, UNECE), as no physiological thresholds have been defined yet (Lorenz <i>et al.</i> , 2007)
Data source	Regional forest health networks
Data availability	Medium
Data	Annual

collection frequency	
Suggested update	Annual
Scale	Ordinal scale, from 0 to 2 points
Calculation and interpretation	<p>The following variables will be measured for the last year for which data are available. They will be considered and valued as follows:</p> <ul style="list-style-type: none"> • <u>Defoliation</u> (X) <p>Null: If $X \leq 10\% \rightarrow 2$ points</p> <p>Moderate: If $10\% < X \leq 25\% \rightarrow 1$ point</p> <p>High: If $X > 25\% \rightarrow 0$ points</p> <ul style="list-style-type: none"> • <u>Decoloration</u> (Y) <p>Null: If $Y \leq 10\% \rightarrow 2$ points</p> <p>Moderate: If $10\% < Y \leq 25\% \rightarrow 1$ point</p> <p>High: If $Y > 25\% \rightarrow 0$ points</p> <p>If there are different plots within a protected area, a simple average of the scores for the two variables will be used for the year considered.</p> <p>Health of vegetation will be the average value of the two variables [$Z = (X+Y)/2$]. It will be considered and valued as follows:</p> <ul style="list-style-type: none"> • Adequate: If $Z > 1.5 \rightarrow 2$ points • Moderate: If $1.5 \leq Z \leq 1 \rightarrow 1$ point • Deficient: If $Z < 1 \rightarrow 0$ points
Trend	<p>The trend will be measured by subtracting the average defoliation and decoloration values (in percentages) for the last 2 years assessed (H) from the average values for the two parameters (also in percentages) for the 5 years previous to the last 2 years (K).</p> <p>The trend will be <i>positive</i> if $H < K$, <i>stable</i> if $H = K$, and <i>negative</i> if $H > K$</p>
Applicable legislation	<ul style="list-style-type: none"> • Reglamento (CEE) nº 3528/86 del Consejo, de 17 de noviembre de 1986, relativo a la protección de los bosques en la Comunidad contra la contaminación atmosférica
References	<ul style="list-style-type: none"> • VVAA. 1996. <i>Sistema español de indicadores ambientales: subáreas de biodiversidad y bosque</i>. Ministerio de Medio Ambiente. Madrid. • Lorenz, M.; Fischer, R.; Becher, G.; Granke, O.; Roskams, P.; Nagel, H.D.; and Kraft, P. 2007. <i>Forest Condition in Europe. 2007 Technical Report of ICP Forests</i>. Federal Research Centre for Forestry and Forest Products & Department of Wood Science,

	<p>University of Hamburg. Hamburg.</p> <ul style="list-style-type: none"> • International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests. 2011. <i>Home</i>. Available from: http://www.icp-forests.org/ • Rodríguez Rodríguez, D. y Martínez Vega, J. 2013. <i>Evaluación de la eficacia de las áreas protegidas: el Sistema de Evaluación integrada de áreas protegidas. Resultados de la primera evaluación integrada de los espacios naturales protegidos de la Comunidad de Madrid</i>. FBBVA, Madrid. Available from: http://www.fbbva.es/TLFU/tlfu/esp/publicaciones/informes/fichainforme/index.jsp?codigo=722 • Junta de Castilla y León. 2016. <i>Medio Ambiente de Castilla y León. Montes y Bosques. Red de seguimiento de daños</i>. Available from: http://www.medioambiente.jcyl.es/web/jcyl/MedioAmbiente/es/Plantilla100/1284277645355/ / / • Gobierno de Aragón. 2015. <i>Desarrollo Rural y Sostenibilidad. Medio Forestal. Sanidad Forestal. Red de Evaluación Fitosanitaria en las masas forestales de Aragón</i>. Available from: http://www.aragon.es/DepartamentosOrganismosPublicos/Departamentos/DesarrolloRuralSostenibilidad/AreasTematicas/MA_MedioForestal/SanidadForestal/ci.AGMA_EVALUACION_FITOSANITARIA_MASAS_FORESTALES.detalleDepartamento?channelSelecte d=302890292fb3a210VgnVCM100000450a15acRCRD
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II. PLANNING: 3 indicators

2.1. APPROPRIATENESS OF PROTECTION REGULATION	
Category	Planning
Type	Response
Description	This indicator evaluates the adequacy of the protection legislation affecting the protected area and, particularly, the designation norm
Rationale	Most protected areas are established through legal processes (Chape <i>et al.</i> , 2008). The existence of an adequate legal framework is considered the first step in the effective management of a protected area (Pomeroy <i>et al.</i> , 2005). It is also one of the minimum standard requirements for individual protected areas (Carabias <i>et al.</i> , 2004)
Data source	National or regional legal repositories
Data availability	High
Data collection frequency	
Suggested update	Every five years
Scale	Ordinal scale, from 0 to 2 points
Calculation and interpretation	<p>The following issues on the legal regime governing the protected area will be evaluated:</p> <ul style="list-style-type: none"> • The protected area was designated after enactment of a law on protected areas containing modern conservation principles¹ (X). Yes: 1 point; No: 0 points. • There is an updated protected area network plan for the assessed protected area category (Y) <ul style="list-style-type: none"> ○ Yes: 1 point; ○ Yes, but it is outdated: 0,5 points; ○ No: 0 points. <p>The appropriateness of the protection legislation for the protected area (Z) will be derived by adding the scores of the two variables ($Z = X+Y$). It will be considered and valued as follows:</p> <ul style="list-style-type: none"> • Adequate: If $Z = 2 \rightarrow 2$ points. • Moderate: If $1 \leq Z < 2 \rightarrow 1$ point.

	<ul style="list-style-type: none"> • Deficient: If $Z < 1 \rightarrow 0$ points. <p><i>Explanatory notes</i></p> <p>¹If, despite having been designated before the 27th of March of 1989 (first modern law on protected areas in Spain), the designation norm of the protected area already includes modern conservation principles (e.g. wider countryside, buffer or connectivity issues), it will be valued 1point.</p> <p>If the designation norm has no defined conservation objectives, or these are generic, it will be valued 0 points.</p> <p>A protected area network plan is considered outdated if its validity date has expired or else, after ten years of its passing</p>
Trend	The trend will be <i>positive</i> if Z increases between the two analysed periods, <i>stable</i> if it remains the same, and <i>negative</i> if it decreases between the two periods
Applicable legislation	<ul style="list-style-type: none"> • Ley 52/1982, de 13 de julio, de reclasificación y ampliación del Parque Nacional de Ordesa y Monte Perdido. • Ley 4/1989, de 27 de marzo, de Conservación de los Espacios Naturales y de la Fauna y Flora Silvestres. Título III. • Ley 42/2007, de 13 de diciembre, del Patrimonio Natural y de la Biodiversidad. Capítulos II y III. • Ley 7/2013, de 25 de junio, de declaración del Parque Nacional de la Sierra de Guadarrama. • Real Decreto 389/2016, de 22 de octubre, por el que se aprueba el Plan Director de la Red de Parques Nacionales. Available from: http://www.boe.es/boe/dias/2016/10/24/pdfs/BOE-A-2016-9690.pdf
References	<ul style="list-style-type: none"> • De Lucio, J. V.; Ramírez, L.; Sastre, P.; Martínez, R.; Cuevas, J. A.; Alcaide, X; y Hernández-Guillén, D. 1997. <i>Metodología de evaluación multiobjetivo/multicriterio para el apoyo a la toma de decisiones en la selección de zonas especiales de conservación (Natura 2000. Unión Europea) en la Comunidad de Madrid</i>. Serie Documentos, nº 25. Centro de Investigaciones Ambientales de la Comunidad de Madrid Fernando González Bernáldez. Soto del Real. Madrid. 46 pp. • Carabias, J.; Boness, M.; De la Maza, J.; and Cadena, R. 2004. <i>Buiding capacity to manage protected areas in an era of global change</i>. In Barber, C.V.; Miller, K.R.; and Bones, M. (Eds.). <i>Securing Protected Areas in the Face of Global Change: Issues and Strategies</i>. IUCN. Gland, Switzerland and Cambridge, UK. • Pomeroy, R.S., Parks, J.E.; and Watson, L.M. 2005. <i>How is your MPA doing? A methodology for evaluating the management effectiveness of marine protected areas</i>. IUCN, Gland, Switzerland, and Cambridge, United Kingdom. • Chape, S.; Spalding, M.; and Jenkins; M.D. 2008. <i>The World's Protected Areas: Status</i>,

	<p><i>Values and Prospects in the 21st Century</i>. Prepared by the UNEP World Conservation Monitoring Centre, University of California Press, Berkeley, USA.</p> <ul style="list-style-type: none"> • Mallarach, J.M.; Germain, J.; Sabaté, X.; y Basora, X. 2008. <i>Protegits de fet o de dret? Primera avaluació del sistema d'espais naturals protegits de Catalunya</i>. Institució Catalana d'Història Natural. Available from: http://ichn.iec.cat/Avaluaci%C3%B3%20d%27espais.htm • Rodríguez Rodríguez, D. y Martínez Vega, J. 2013. <i>Evaluación de la eficacia de las áreas protegidas: el Sistema de Evaluación integrada de áreas protegidas. Resultados de la primera evaluación integrada de los espacios naturales protegidos de la Comunidad de Madrid</i>. FBBVA, Madrid. Available from: http://www.fbbva.es/TLFU/tlfu/esp/publicaciones/informes/fichainforme/index.jsp?codigo=722 • IUCN. 2014. <i>The Green List for Protected Areas Global Standard Approved by IUCN GLPA Steering Group 2014-05-15</i>. Available from: http://cmsdata.iucn.org/downloads/pilot_phase_iucnglpastandard20140515_.pdf • Rodríguez-Rodríguez, D. & Martínez-Vega, J. 2016. What should be evaluated from a manager's perspective? Developing a salient protected area effectiveness evaluation system for managers and scientists in Spain. <i>Ecological Indicators</i>, 64: 289-296.
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2.2. EXISTENCE OF UPDATED MANAGEMENT PLAN	
Category	Planning
Type	Response
Description	This indicator evaluates the existence of updated management documents of the protected area, such as a management plan
Rationale	Updated, adaptable, information-based management documents are a fundamental requirement for active, effective management of protected areas in a context of global change (Múgica and Gómez-Limón, 2002; Pullin, 2002; de Lucio and Múgica, 2004; Pomeroy <i>et al.</i> , 2005; Chape <i>et al.</i> , 2008). The existence of a published, complete, legally endorsed management plan is one of the minimum international standards for individual protected areas (Carabias <i>et al.</i> , 2004)
Data source	National Parks' administration's website
Data availability	High
Data collection frequency	
Suggested	Every four years

update	
Scale	Ordinal scale, from 0 to 2 points
Calculation and interpretation	<p>The existence of updated management documents will be considered and valued as follows:</p> <ul style="list-style-type: none"> • Adequate: If there is an updated¹ management document in force for the protected area → 2 points. • Moderate: If there is a management document for the protected area, which is not updated or not in force → 1 point. • Deficient: If there is no management document for the protected area → 0 points. <p><i>Explanatory notes</i></p> <p>¹A document is considered ‘outdated’ when it is older than its stipulated validity period or, if that period is not specified, the document or plan is over 10 years old.</p> <p>If detailed management criteria are specified in other types of planning documents, these will be considered independent management plans, except for parks, which must have an independent management plan.</p>
Trend	The trend will be <i>positive</i> if the value of the indicator is higher than in the previous assessment, <i>stable</i> if the value is the same in the two assessments, and <i>negative</i> if the most recent value is lower than the previous one.
Applicable legislation	<ul style="list-style-type: none"> • Ley 42/2007, de 13 de diciembre, del Patrimonio Natural y de la Biodiversidad. Arts.15, 28.1, 30.5 y 45.a. • Ley 30/2014, de 3 de diciembre, de Parques Nacionales. Arts. 18, 20.
References	<ul style="list-style-type: none"> • Múgica, M. y Gómez-Limón, J. (Coords.). 2002. <i>Plan de Acción para los espacios naturales protegidos del Estado español</i>. Fundación fernando González Bernáldez. Madrid. • Pullin, A. 2002. <i>Conservation Biology</i>. Cambridge University Press. Cambridge, UK. • De Lucio, J. V. y Múgica, M. 2004. <i>Objetivos de gestión e intensidad de la gestión</i>. En Actas del X Congreso EUROPARC-España. <i>Alcanzar la eficacia en la gestión de los espacios naturales protegidos</i>. En: http://www.redeuroparc.org/documentos_anexos/Publicaciones/Actas_ESPARC/actas_esp_arc04.pdf • Carabias, J.; Boness, M.; De la Maza, J.; and Cadena, R. 2004. <i>Buiding capacity to manage protected areas in an era of global change</i>. In Barber, C.V.; Miller, K.R.; and Bones, M. (Eds.). <i>Securing Protected Areas in the Face of Global Change: Issues and Strategies</i>. IUCN. Gland, Switzerland and Cambridge, UK. • Pomeroy, R.S., Parks, J.E.; and Watson, L.M. 2005. How is your MPA doing? A methodology for evaluating the management effectiveness of marine protected areas. IUCN, Gland, Switzerland, and Cambridge, United Kingdom. • Chape, S.; Spalding, M.; and Jenkins; M.D. 2008. <i>The World's Protected Areas: Status,</i>

	<p><i>Values and Prospects in the 21st Century</i>. Prepared by the UNEP World Conservation Monitoring Centre, University of California Press, Berkeley, USA.</p> <ul style="list-style-type: none"> • Mallarach, J.M.; Germain, J.; Sabaté, X.; y Basora, X. 2008. <i>Protegits de fet o de dret? Primera avaluació del sistema d'espais naturals protegits de Catalunya</i>. Institució Catalana d'Història Natural. Available from: http://ichn.iec.cat/Avaluaci%C3%B3%20d%27espais.htm • Rodríguez Rodríguez, D. y Martínez Vega, J. 2013. <i>Evaluación de la eficacia de las áreas protegidas: el Sistema de Evaluación integrada de áreas protegidas. Resultados de la primera evaluación integrada de los espacios naturales protegidos de la Comunidad de Madrid</i>. FBBVA, Madrid. Available from: http://www.fbbva.es/TLFU/tlfu/esp/publicaciones/informes/fichainforme/index.jsp?codigo=722 • IUCN. 2014. <i>The Green List for Protected Areas Global Standard Approved by IUCN GLPA Steering Group 2014-05-15</i>. Available from: http://cmsdata.iucn.org/downloads/pilot_phase_iucnglpastandard20140515_.pdf
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2.3. EXISTENCE OF UPDATED SOCIOECONOMIC PLAN	
Category	Planning
Type	Response
Description	This indicator evaluates the existence of updated documents on the social and economic aspects of the protected area, such as a socioeconomic or sustainable development plan
Rationale	The social and economic plans are normative documents derived from participative approaches which seek to improve the quality of life of residents inside protected areas or in their influence areas by promoting valorisation of the protected area and the goods and services it provides to stimulate economic growth and human well-being (Pinilla, 2007)
Data source	National Parks' administration's website; National Parks' administrations
Data availability	Medium
Data collection frequency	
Suggested update	Every four years
Scale	Ordinal scale, from 0 to 2 points
Calculation and	The existence of updated documents on social and economic development will be considered

interpretation	<p>and valued as follows:</p> <ul style="list-style-type: none"> • Adequate: If there are updated¹ socioeconomic planning documents in force for the protected area → 2 points. • Moderate: If there are socioeconomic planning documents for the protected area, but they are not updated or not in force → 1 point. • Deficient: If there are not socioeconomic planning documents for the protected area → 0 points. <p><i>Explanatory notes</i></p> <p>¹A document is considered ‘outdated’ when it is older than its stipulated validity period or, if that period is not specified, the document or plan is over 10 years old.</p> <p>If the plan is included as detailed specifications in another plan, such as a natural resources or management plan, it will be valued as if it were an independent plan.</p>
Trend	<p>The trend will be <i>positive</i> if the value of the indicator is higher than in the previous assessment, <i>stable</i> if the value is the same in the two assessments, and <i>negative</i> if the most recent value is lower than the previous one</p>
Applicable legislation	<ul style="list-style-type: none"> • Ley 42/2007, de 13 de diciembre, del Patrimonio Natural y de la Biodiversidad. Arts. 2, 15 y 38. • Ley 30/2014, de 3 de diciembre, de Parques Nacionales. Título VIII. • Real Decreto 1803/1999, de 26 de noviembre, por el que se aprueba el plan director de la red de parques nacionales.
References	<ul style="list-style-type: none"> • Pinilla, R. (Coord.). 2007. <i>Plan de Desarrollo Sostenible. Parque Natural Sierra de Huétor</i>. Consejería de Medio Ambiente. Junta de Andalucía. • Rodríguez Rodríguez, D. y Martínez Vega, J. 2013. <i>Evaluación de la eficacia de las áreas protegidas: el Sistema de Evaluación integrada de áreas protegidas. Resultados de la primera evaluación integrada de los espacios naturales protegidos de la Comunidad de Madrid</i>. FBBVA, Madrid. Available from: http://www.fbbva.es/TLFU/tlfu/esp/publicaciones/informes/fichainforme/index.jsp?codigo=722 • IUCN. 2014. <i>The Green List for Protected Areas. Global Standard Approved by IUCN GLPA Steering Group 2014-05-15</i>. Available from: http://cmsdata.iucn.org/downloads/pilot_phase_iucn_glpa_standard20140515_.pdf

III. MANAGEMENT: 4 indicators

3.1. DEGREE OF FULFILMENT OF MANAGEMENT OBJECTIVES	
Category	Management
Type	Response
Description	This indicator evaluates the degree in which the objectives programmed in the management documents in force in the protected area (annual workplan or similar) were achieved
Rationale	Global change poses important challenges to protected areas, which necessitate active management to anticipate, prevent, mitigate or erase some pressures and threats to these areas. In order for management to be really effective and adaptable to the changing needs of protected areas (Chape <i>et al.</i> , 2008), it is essential to assess whether, during a defined period, the established management objectives have been fulfilled and to analyse the causes of partial or total non-fulfilment (Múgica and Gómez-Limón, 2002; Mulero, 2002; Atauri <i>et al.</i> , 2005; Hockings <i>et al.</i> , 2006). The establishment and modification of clearly defined, adaptable objectives allow managers to detect uncertainties and irregularities, manage complex situations in a simple way with the support of science, support and decentralize their decisions and learn from their mistakes (Chape <i>et al.</i> , 2008)
Data source	Protected area's managers
Data availability	Medium
Data collection frequency	
Suggested update	Annual
Scale	Ordinal scale, from 0 to 2 points
Calculation and interpretation	<p>If management objectives are measurable, the percentage of fulfilment will be measured against achieved outcomes. A weighted mean in which conservation objectives (Xc) will be weight double than the rest (Xg) will be done for the whole protected area.</p> <p>If management objectives are not measurable, the main protected area manager (director or similar) will be interviewed about the degree of fulfilment for a defined period (e.g. last year).</p> <p>The degree of fulfilment of management objectives (X) will be considered and valued as follows:</p> <ul style="list-style-type: none"> • Adequate: $X \geq 75\%$ for the year of assessment → 2 points • Moderate: $50\% \leq X < 75\%$ for the year of assessment → 1 point

	<ul style="list-style-type: none"> • Deficient: $X < 50\%$ for the year of assessment → 0 points <p><i>Explanatory notes</i></p> <p>‘Management objectives’ should be included in a written document, whether public or internal.</p> <p>If such document does not exist (workplan or similar, with a maximum validity period of 3 years), or when the PA has no appointed manager (director or similar) who can estimate globally the annual degree of fulfilment of its management objectives, the indicator will be valued 0 points.</p>
Trend	The trend will be <i>positive</i> if the value of the indicator is higher than in the previous assessment, <i>stable</i> if it is the same in both assessments, and <i>negative</i> if it is smaller than in the previous assessment
Applicable legislation	<ul style="list-style-type: none"> • Convention on Biological Diversity. Aichi Target 11
References	<ul style="list-style-type: none"> • Múgica, M. y Gómez-Limón, J. (Coords.). 2002. <i>Plan de Acción para los espacios naturales protegidos del Estado español</i>. Fundación Fernando González Bernáldez. Madrid. • Mulero, A. 2002. <i>La protección de espacios naturales en España (Antecedentes, contrastes territoriales, conflictos y perspectivas)</i>. Mundi-Prensa. Madrid. • Atauri, J.A.; Múgica, M.; De Lucio, J.V.; Castell, C. 2005. <i>Diseño de planes de seguimiento en espacios naturales protegidos</i>. Serie Manuales Europarc-España Nº 2. Fundación Fernando González Bernáldez. Barcelona. • Hockings, M.; Stolton, S.; Leverington, F.; Dudley, N.; and Courrau, J. 2006. <i>Evaluating effectiveness: A framework for assessing management effectiveness of protected areas</i>. 2nd Edition. IUCN. Gland, Switzerland y Cambridge, R.U. • Chape, S.; Spalding, M.; and Jenkins, M.D. 2008. <i>The World's Protected Areas: Status, Values and Prospects in the 21st Century</i>. Prepared by the UNEP World Conservation Monitoring Centre, University of California Press, Berkeley, USA. • De Lucio, J.V., Atauri, J.A.; Muñoz-Santos, M.; Múgica, M. y Puertas, J. 2010. <i>Herramientas para la Evaluación de las Áreas Protegidas: Modelo de Memoria de Gestión</i>. Fundación Interuniversitaria Fernando González Bernáldez para los Espacios Naturales. Madrid. • Rodríguez Rodríguez, D. y Martínez Vega, J. 2013. <i>Evaluación de la eficacia de las áreas protegidas: el Sistema de Evaluación integrada de áreas protegidas. Resultados de la primera evaluación integrada de los espacios naturales protegidos de la Comunidad de Madrid</i>. FBBVA, Madrid. Available from: http://www.fbbva.es/TLFU/tlfu/esp/publicaciones/informes/fichainforme/index.jsp?codigo=722 • IUCN. 2014. <i>The Green List for Protected Areas Global Standard Approved by IUCN GLPA Steering Group 2014-05-15</i>. Available from:

	<p>http://cmsdata.iucn.org/downloads/pilot_phase_iucnlpastandard20140515_.pdf</p> <ul style="list-style-type: none"> Rodríguez-Rodríguez, D. & Martínez-Vega, J. 2016. What should be evaluated from a manager's perspective? Developing a salient protected area effectiveness evaluation system for managers and scientists in Spain. <i>Ecological Indicators</i>, 64: 289-296.
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3.2. EFFECTIVENESS OF PUBLIC PARTICIPATION BODIES	
Category	Management
Type	Response
Description	This indicator evaluates the existence of a public participation body for the protected area and its effectiveness
Rationale	Adequate social representation and participation in the management of protected areas entails deeper implication of society and easier acceptance of management decisions. This influences the effectiveness of management measures notably and positively and thus, the effective conservation of protected areas (Pomeroy <i>et al.</i> , 2005). Moreover, public participation is one of the minimum international standards for individual protected areas (Carabias <i>et al.</i> , 2004)
Data source	Protected area managers; Protected area administrations' websites
Data availability	High
Data collection frequency	Annual
Suggested update	Annual
Scale	Ordinal scale, from 0 to 2 points
Calculation and interpretation	<p>The effectiveness of the public participation bodies (PPB) will be considered and valued according to the simple addition of the scores of its two constituent variables as follows:</p> <p>-Regarding the <i>existence</i> of the PPB:</p> <ul style="list-style-type: none"> Non-existent: There is no PPB for the protected area → 0 points. Existent: There is a PPB for the protected area → its effectiveness will be evaluated <p>-Regarding its <i>effectiveness</i>:</p> <p><u>For non-zoned or small¹ protected areas:</u></p> <ul style="list-style-type: none"> Adequate: More than one meeting every two years since the creation of the PPB or since

	<p>the last assessment → 2 points</p> <ul style="list-style-type: none"> • Moderate: One meeting every two years since the creation of the PPB or since the last assessment → 1 point • Deficient: Less than one meeting every two years since the creation of the PPB or since the last assessment → 0 points <p><u>For zoned or big² protected areas:</u></p> <ul style="list-style-type: none"> • Adequate: More than one meeting per year since the creation of the PPB or since the last assessment → 2 points • Moderate: One meeting per year since the creation of the PPB or since the last assessment → 1 point • Deficient: Less than one meeting per year since the creation of the PPB or since the last assessment → 0 points <p><i>Explanatory notes</i></p> <p>¹A protected area is considered ‘small’ if it smaller than 5,000ha.</p> <p>² A protected area is considered ‘big’ if it is equal to or bigger than 5,000 ha.</p>
Trend	<p>The trend will be considered <i>positive</i> if a PPB has been created or if the meeting frequency has increased since the last date analysed. The trend will be <i>stable</i> if both the existence and the meeting frequency are the same, and it will be <i>negative</i> if the PPB is eliminated or if the meeting frequency has decreased since the last date analysed</p>
Applicable legislation	<ul style="list-style-type: none"> • Ley 42/2007, de 13 de diciembre, del Patrimonio Natural y de la Biodiversidad. Arts. 2, 4 y 5. • Ley 30/2014, de 3 de diciembre, de Parques Nacionales. Arts. 6, 24, 35 y 36.
References	<ul style="list-style-type: none"> • Carabias, J.; Boness, M.; De la Maza, J.; and Cadena, R. 2004. <i>Building capacity to manage protected areas in an era of global change</i>. In Barber, C.V.; Miller, K.R.; and Bones, M. (Eds.). <i>Securing Protected Areas in the Face of Global Change: Issues and Strategies</i>. IUCN. Gland, Switzerland and Cambridge, UK. • Pomeroy, R.S., Parks, J.E.; and Watson, L.M. 2005. How is your MPA doing? A methodology for evaluating the management effectiveness of marine protected areas. IUCN, Gland, Switzerland, and Cambridge, United Kingdom. • Mallarach, J.M.; Germain, J.; Sabaté, X.; y Basora, X. 2008. <i>Protegits de fet o de dret? Primera avaluació del sistema d'espais naturals protegits de Catalunya</i>. Institució Catalana d'Història Natural. Available from: http://ichn.iec.cat/Avaluaci%C3%B3%20d%27espais.htm • Rodríguez Rodríguez, D. y Martínez Vega, J. 2013. <i>Evaluación de la eficacia de las áreas</i>

	<p><i>protegidas: el Sistema de Evaluación integrada de áreas protegidas. Resultados de la primera evaluación integrada de los espacios naturales protegidos de la Comunidad de Madrid.</i> FBBVA, Madrid. Available from: http://www.fbbva.es/TLFU/tlfu/esp/publicaciones/informes/fichainforme/index.jsp?codigo=722</p> <ul style="list-style-type: none"> IUCN. 2014. <i>The Green List for Protected Areas Global Standard Approved by IUCN GLPA Steering Group 2014-05-15</i>. Available from: http://cmsdata.iucn.org/downloads/pilot_phase_iucnlpastandard20140515_.pdf Rodríguez-Rodríguez, D. & Martínez-Vega, J. 2016. What should be evaluated from a manager's perspective? Developing a salient protected area effectiveness evaluation system for managers and scientists in Spain. <i>Ecological Indicators</i>, 64: 289-296.
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3.3. EXISTENCE OF SUFFICIENT MANAGEMENT STAFF	
Category	Management
Type	Response
Description	This indicator evaluates whether there is enough staff to manage the ordinary needs of the protected area adequately
Rationale	The existence of a legally established management body allows professional, effective, responsible management of a protected area (Pomeroy <i>et al.</i> , 2005). Management requires complete, continuous dedication that enables rapid action to prevent sudden contingencies (Chape <i>et al.</i> , 2008) and to ensure compliance with regulations (Pomeroy <i>et al.</i> , 2005). Thus, the existence of sufficient staff is considered a basis for the effective management of protected areas (Música and Gómez-Limón, 2002; Carabias <i>et al.</i> , 2004). Lack of sufficient staff is considered to be the commonest weakness of protected areas around the world (Leverington <i>et al.</i> , 2010; Nolte <i>et al.</i> , 2010)
Data source	Protected area administrations
Data availability	Medium
Data collection frequency	Annual
Suggested update	Biennial
Scale	Ordinal scale, from 0 to 2 points
Calculation and	The existence of permanent staff (independent of the type of contract) necessary for the effective management of the protected area, developing their jobs in the same protected area in the long term

<p>interpretation</p>	<p>(not to cover temporal projects or needs) will be specified.</p> <p>a) <u>For unzoned or small¹ protected areas:</u></p> <ul style="list-style-type: none"> ▪ The density of workers in the protected area (X) will be analysed and valued as follows: <ul style="list-style-type: none"> -Staff average of, at least, 1 person/2.250ha² → 1 point -Staff average between 1person/2.250ha and 1person/5.000ha → 0,5 points -Fewer staff than described in the previous option → 0 points ▪ The score on surveillance of the protected area (Y) will be added to the previous score as follows <ul style="list-style-type: none"> - Regular surveillance service³ → 1 point - Irregular surveillance service⁴ → 0,5 points - Sporadic surveillance or no surveillance → 0 points <p>Both scores will be added up, so the existence of sufficient management staff (Z= X + Y) will be considered and valued as follows:</p> <ul style="list-style-type: none"> • Adequate: $2 \geq Z \geq 1.5 \rightarrow 2$ points • Moderate: $1.5 > Z \geq 1 \rightarrow 1$ point • Deficient: $Z < 1 \rightarrow 0$ points <p>b) <u>For zoned or big⁵ protected areas:</u></p> <ul style="list-style-type: none"> ▪ The existence of a main manager (e.g. Director) for and staff density in the protected area (X) will be valued as follows: <ul style="list-style-type: none"> - One Director, and staff average of, at least, 1 person/255ha² → 1 point - One Director and staff average between 1person/256ha and 1person/1.125ha²→ 0,5 points - Fewer staff tan described in the previous option → 0 points ▪ The existence of regular surveillance staff (Y) will be assessed and scored as follows: <ul style="list-style-type: none"> - Regular surveillance service⁵ → 1 point - Irregular surveillance service⁶ → 0.5 points - Sporadic surveillance or no surveillance → 0 points <p>Both scores will be added, so the existence of sufficient management staff (Z = X + Y) will be</p>
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	<p>considered and valued as follows:</p> <ul style="list-style-type: none"> • Adequate: $Z > 1.5 \rightarrow 2$ points • Moderate: $1.5 \geq Z \geq 1 \rightarrow 1$ point • Deficient: $Z < 1 \rightarrow 0$ points <p><i>Explanatory notes (unzoned or small protected areas):</i></p> <p>¹A protected area is considered ‘small’ if it smaller than 5,000ha.</p> <p>²Staff density thresholds are based on average staff numbers for national parks and nature parks in 2005 and 2006 (de Lucio et al., 2008). Those pre-economic crisis figures are considered to be the closest ones to protected areas’ real needs.</p> <p>³It is considered ‘regular surveillance’ the patrolling of the protected area at least 5 days per week.</p> <p>⁴It is considered ‘irregular surveillance’ a sparser patrolling frequency than that of the previous point, but at least of 3 days per week.</p> <p><i>Explanatory note (for zoned or big protected areas):</i></p> <p>⁵A protected area is considered ‘big’ if it is equal to or bigger than 5,000 ha.</p> <p>⁵It is considered ‘regular surveillance’ the patrolling of the protected area 7 days a week.</p> <p>⁶It is considered ‘irregular surveillance’ the patrolling of the protected area at least 5 days per week.</p>
Trend	The trend will be <i>positive</i> if Z increases between both analysed periods, <i>stable</i> if Z remains the same, and <i>negative</i> if Z decreases
Applicable legislation	<ul style="list-style-type: none"> • Convention on Biological Diversity. Aichi Target 11
References	<ul style="list-style-type: none"> • Múgica, M. y Gómez-Limón, J. (Coords.). 2002. <i>Plan de Acción para los espacios naturales protegidos del Estado español</i>. Fundación Fernando González Bernáldez. Madrid. • Carabias, J.; Boness, M.; De la Maza, J.; and Cadena, R. 2004. <i>Building capacity to manage protected areas in an era of global change</i>. In Barber, C.V.; Miller, K.R.; and Bones, M. (Eds.). <i>Securing Protected Areas in the Face of Global Change: Issues and Strategies</i>. IUCN. Gland, Switzerland and Cambridge, UK. • Pomeroy, R.S., Parks, J.E.; and Watson, L.M. 2005. <i>How is your MPA doing? A methodology for evaluating the management effectiveness of marine protected areas</i>. IUCN, Gland, Switzerland, and Cambridge, United Kingdom. • Chape, S.; Spalding, M.; and Jenkins, M.D. 2008. <i>The World’s Protected Areas: Status, Values and Prospects in the 21st Century</i>. Prepared by the UNEP World Conservation

	<p>Monitoring Centre, University of California Press, Berkeley, USA.</p> <ul style="list-style-type: none"> De Lucio, J.V.; Múgica, M.; Gómez-Limón, J.; Martínez, C.; Puertas, J.; y Atauri, J.A. 2008. <i>Anuario EUROPARC-España del estado de los espacios naturales protegidos 2007</i>. Fundación Fernando González Bernáldez, Madrid. Mallarach, J.M.; Germain, J.; Sabaté, X.; y Basora, X. 2008. <i>Protegits de fet o de dret? Primera avaluació del sistema d'espais naturals protegits de Catalunya</i>. Institució Catalana d'Història Natural. Available from: http://ichn.iec.cat/Avaluaci%C3%B3%20d%27espais.htm Leverington, F.; Lemos, K.; Courrau, J.; Pavese, H.; Nolte, C.; Marr, M.; Coad, L.; Burgess, N.; Bomhard, B.; & Hockings, M. 2010. <i>Management effectiveness evaluation in protected areas – a global study. Second Edition 2010</i>. University of Queensland. Brisbane. Nolte, C.; Leverington, F.; Kettner, A.; Marr, M.; Nielsen, G.; Bomhard, B.; Stolton, S.; Stoll-Kleemann, S.; & Hockings, M. 2010. <i>Protected Area Management Effectiveness Assessments in Europe. A review of application, methods and results</i>. University of Greifswald. Greifswald, Germany. Rodríguez Rodríguez, D. y Martínez Vega, J. 2013. <i>Evaluación de la eficacia de las áreas protegidas: el Sistema de Evaluación integrada de áreas protegidas. Resultados de la primera evaluación integrada de los espacios naturales protegidos de la Comunidad de Madrid</i>. FBBVA, Madrid. Available from: http://www.fbbva.es/TLFU/tlfu/esp/publicaciones/informes/fichainforme/index.jsp?codigo=722 IUCN. 2014. <i>The Green List for Protected Areas Global Standard Approved by IUCN GLPA Steering Group 2014-05-15</i>. Available from: http://cmsdata.iucn.org/downloads/pilot_phase_iucn_glpa_standard20140515 .pdf
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3.4. EXISTENCE OF ENVIRONMENTAL EDUCATION AND VOLUNTEERING ACTIVITIES	
Category	Management
Type	Response
Description	This indicator evaluates the existence of environmental education and environmental volunteering programmes and/or activities in the protected area, and their regularity
Rationale	Environmental education and volunteering in protected areas are very effective activities to increase public environmental awareness and to promote social knowledge and valuation of protected areas and their resources (Pullin, 2002). They make one of the minimum international standards for individual protected areas (Carabias <i>et al.</i> , 2004)

Data source	Protected area administrations; Protected area websites
Data availability	Medium
Data collection frequency	Annual
Suggested update	Annual
Scale	Ordinal scale, from 0 to 2 points
Calculation and interpretation	<p>The indicator will be calculated as follows:</p> <p>Regarding <u>environmental education (EE)</u>:</p> <ul style="list-style-type: none"> • If regular¹ EE activities included in a plan or program are performed → 1 point • If sporadic² EE activities not included in a plan or program are performed → 0.5 points • If no EE activities are performed → 0 points <p>Regarding <u>environmental volunteering (EV)</u>:</p> <ul style="list-style-type: none"> • If regular¹ EV activities included in a plan or program are performed → 1 point • If sporadic² EV activities not included in a plan or program are performed → 0.5 points • If no EV activities are performed → 0 points <p>The total value of the indicator will be the simple addition (X) of the values out of both variables (X = EE + EV). Thus, the existence of environmental education and volunteering activities will be considered and valued as follows:</p> <ul style="list-style-type: none"> ▪ Adequate: $1.5 \leq X \leq 2 \rightarrow 2$ points ▪ Moderate: $0.5 \leq X < 1.5 \rightarrow 1$ point ▪ Deficient: $X < 0.5 \rightarrow 0$ points <p><i>Explanatory notes</i></p> <p>¹It is considered ‘regular activity’ the annual performance of, at least, one EE or EV activity a year.</p> <p>²It is considered ‘sporadic activity’ the performance of one EE or EV activity between less than once per year and once every three years.</p> <p>If no EE or EV activity has been performed in the last 3 years, the indicator will be considered as</p>

	'Deficient'.
Trend	The trend will be <i>positive</i> if the value of the indicator is higher than in the previous assessment, <i>stable</i> if it is the same in both assessments, and <i>negative</i> if the most recent value of the indicator is lower than the previous one
Applicable legislation	<ul style="list-style-type: none"> • Ley 42/2007, de 13 de diciembre, del Patrimonio Natural y de la Biodiversidad. • Real Decreto 1803/1999, de 26 de noviembre, por el que se aprueba el plan director de la red de parques nacionales.
References	<ul style="list-style-type: none"> • Pullin, A. 2002. <i>Conservation Biology</i>. Cambridge University Press. Cambridge, UK. • Carabias, J.; Boness, M.; De la Maza, J.; and Cadena, R. 2004. <i>Building capacity to manage protected areas in an era of global change</i>. In Barber, C.V.; Miller, K.R.; and Bones, M. (Eds.). <i>Securing Protected Areas in the Face of Global Change: Issues and Strategies</i>. IUCN. Gland, Switzerland and Cambridge, UK. • Mallarach, J.M.; Germain, J.; Sabaté, X.; y Basora, X. 2008. <i>Protegits de fet o de dret? Primera avaluació del sistema d'espais naturals protegits de Catalunya</i>. Institució Catalana d'Història Natural. Available from: http://ichn.iec.cat/Avaluaci%C3%B3%20d%27espais.htm • Rodríguez Rodríguez, D. y Martínez Vega, J. 2013. <i>Evaluación de la eficacia de las áreas protegidas: el Sistema de Evaluación integrada de áreas protegidas. Resultados de la primera evaluación integrada de los espacios naturales protegidos de la Comunidad de Madrid</i>. FBBVA, Madrid. Available from: http://www.fbbva.es/TLFU/tlfu/esp/publicaciones/informes/fichainforme/index.jsp?codigo=722

IV. SOCIOECONOMIC CONTEXT: 2 indicators

4.1 LOCAL POPULATION DENSITY	
Category	Socioeconomic Context
Type	Pressure
Description	This indicator evaluates the population density in the municipalities included in the protected area
Rationale	The higher the population density inside a protected area or in its surroundings is the bigger and more numerous pressures on the protected area or on its resources will be (Spellerberg, 1994; Pullin, 2002; Mora and Sale, 2011). A high population density can also imply a higher frequency of incidents (Chape <i>et al.</i> , 2008; Mora and Sale, 2011) and more difficulty in the implementation of law (Mora and Sale, 2011). On the other hand, depopulation processes in rural areas may also affect the environment negatively and result in higher management costs for protected areas as a result of the abandonment of traditional land management practices (EUROSTAT, 2017). Thus, it is a useful indicator of the interactions of the human beings with their environment (Ellis and Ramankutti, 2008)
Data source	National or regional statistic bodies
Data availability	High
Data collection frequency	Annual
Suggested update	Every four years
Scale	Ordinal scale, from 0 to 2 points
Calculation and interpretation	<p>The population residing in each of the municipalities included in the PA will be divided by the area of each municipality (km²) thus obtaining the population density in that municipality. If there is more than one municipality included totally or partially in the PA¹, the resident population and areas (in km²) for all municipalities will be added and local population density (X) will be calculated. It will be considered and valued as follows:</p> <p>a) For peri-urban protected areas²:</p> <ul style="list-style-type: none"> • Low: $0 < X < 150 \text{ inhab/km}^{2,3} \rightarrow 2 \text{ puntos}$ • Moderate: $150 \leq X < 500 \text{ hab/km}^2 \rightarrow 1 \text{ punto}$ • High: $X \geq 500 \text{ hab/km}^2 \rightarrow 0 \text{ puntos}$

	<p>b) For rural protected areas⁴:</p> <ul style="list-style-type: none"> • Low: $0 < X < 100 \text{ hab/km}^2 \rightarrow 0 \text{ puntos}$ • Moderate: $100 \leq X < 300 \text{ hab/km}^2 \rightarrow 2 \text{ puntos}$ • High: $X \geq 300 \text{ hab/km}^2 \rightarrow 1 \text{ punto}$ <p><i>Explanatory notes:</i></p> <p>¹Here, we considered both the national park and its peripheral protection zone as PA.</p> <p>²Peri-urban PAs are those within a 10km radius from a city of, at least, 10,000 inhabitants (INE).</p> <p>³Thresholds according to various OECD's and UE's rural and urban area definitions (Dijkstra and Poelman, 2014)</p> <p>⁴Rural PAs are those located further than 10km from a city of, at least, 10,000 inhabitants</p>
Trend	In peri-urban PAs, the indicator's trend will be <i>positive</i> if X is lower than in the previous year, <i>stable</i> if it is equal, and <i>negative</i> if it is higher. In rural PAs, the trend will be <i>positive</i> if X is higher than in the previous year, <i>stable</i> if it is equal, and <i>negative</i> if it is lower
Applicable legislation	
References	<ul style="list-style-type: none"> • Spellerberg, I.F. 1994. <i>Evaluation and Assessment for Conservation</i>. Chapman & Hall, London. • Pullin, A. 2002. <i>Conservation Biology</i>. Cambridge University Press. Cambridge, UK. • Chape, S.; Spalding, M.; and Jenkins, M.D. 2008. <i>The World's Protected Areas: Status, Values and Prospects in the 21st Century</i>. Prepared by the UNEP World Conservation Monitoring Centre, University of California Press, Berkeley, USA. • Ellis, E. C. and Ramankutty, N. 2008. <i>Putting people in the map: anthropogenic biomes of the world</i>. Frontiers in Ecology and the Environment 6 (8): 439-447. • Mallarach, J.M.; Germain, J.; Sabaté, X.; y Basora, X. 2008. <i>Protegits de fet o de dret? Primera avaluació del sistema d'espais naturals protegits de Catalunya</i>. Institució Catalana d'Història Natural. Available from: http://ichn.iec.cat/Avaluaci%C3%B3%20d%27espais.htm • Radeloff, V.C.; Stewart, S.I.; Hawbaker, T.J.; Gimmi, U.; Pidgeon, A.M.; Flather, C.H.; Hammer, R.B. and Helmers, D.P. 2010. Housing growth in and near United States protected areas limits their conservation value. <i>PNAS</i>, 107(2): 940-945. • Mora, C. and Sale, P.F. 2011. <i>Ongoing global biodiversity loss and the need to move beyond protected areas: a review of the technical and practical shortcomings of protected areas on land and sea</i>. Marine Ecology Progress Series, 434: 251-266.

	<ul style="list-style-type: none"> • Rodríguez Rodríguez, D. y Martínez Vega, J. 2013. <i>Evaluación de la eficacia de las áreas protegidas: el Sistema de Evaluación integrada de áreas protegidas. Resultados de la primera evaluación integrada de los espacios naturales protegidos de la Comunidad de Madrid</i>. FBBVA, Madrid. Available from: http://www.fbbva.es/TLFU/tlfu/esp/publicaciones/informes/fichainforme/index.jsp?codigo=722 • Dijkstra, L. and Poelman, H. 2014. Regional Working Paper 01/2014. A harmonised definition of cities and rural areas: the new degree of urbanisation. European Commission. Available from: http://ec.europa.eu/regional_policy/sources/docgener/work/2014_01_new_urban.pdf • Rodríguez-Rodríguez, D. & Martínez-Vega, J. 2016. What should be evaluated from a manager's perspective? Developing a salient protected area effectiveness evaluation system for managers and scientists in Spain. <i>Ecological Indicators</i>, 64: 289-296. • EUROSTAT. 2017. <i>Statistics explained. Agriculture, forestry and fisheries. Agriculture. Farm structure. Risk of land abandonment</i>. Available from: http://ec.europa.eu/eurostat/statistics-explained/index.php/Agri-environmental_indicator_-_risk_of_land_abandonment
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4.2 LAND USE CHANGES	
Category	Socioeconomic Context
Type	Pressure
Description	This indicator evaluates the changes in land uses/land covers inside and in the surroundings of the protected area between two time points
Rationale	Human-made land transformation towards artificial uses and trends towards natural afforestation in industrialised countries determine, among other biogeochemical fluxes, the trends of biodiversity (Fernández-González, 2002). The impacts of these transformations on protected areas and their resources make it advisable to analyse the land use changes which have occurred inside and near protected areas (Spellerberg, 1994; Radeloff <i>et al.</i> , 2010)
Data source	Copernicus website
Data availability	High
Data collection frequency	Variable (~6 years)
Suggested update	Every five years

Scale	Ordinal scale, from 0 to 2 points
Calculation and interpretation	<p>The different zones of the protected area (if it is zoned) and its surroundings (1 km perimeter) will be discriminated to value changes:</p> <ul style="list-style-type: none"> In <u>un-zoned protected areas</u>, 2 zones will be considered: protected area and its surroundings. <p>The <i>total value of the land use changes in the protected area</i> (%) will be calculated as follows: $\sum \pm$ protected area (x 2) \pm surroundings.</p> <ul style="list-style-type: none"> In <u>zoned protected areas</u>: general zones are ordered according to their conservation value: <p>Zone 1: Core/Reserve zone (score of land use change x 3)</p> <p>Zone 2: Sustainable activity zone/s (score of land use change x 2)</p> <p>Zone 3: Buffer zone</p> <p>Zone 4: Surroundings</p> <p>The <i>total value of the land use changes in the protected area</i> (%) will be calculated as follows: $\sum \pm^1$ Zone 1(x 3) \pm Zone 2 (x 2) \pm Zone 3 \pm surroundings.</p> <p>Land use changes in the protected area and its surroundings will be considered and valued as follows:</p> <ul style="list-style-type: none"> Positive: If the increase in the natural or ecological value of the integrated area (protected area + surroundings): 0→1; 1→2, is $\geq 1\%$. 2 points will be given Null: If no substantial positive or negative changes have occurred ($< 1\%$ of the area of the protected area + surroundings). 1 point will be given Negative: If the decrease in the natural or ecological value of the integrated area (protected area + surroundings): 2→1; 1→0, is $\geq 1\%$. 0 points will be given <p><i>Explanatory notes</i></p> <p>¹The sign of each addend is determined by the type of change in that zone: positive (+) or negative (-).</p> <p>If changes of different sign take place, the result will be the addition of the positive changes and the subtraction of the negative changes, previously weighted according to the zone where they occurred.</p> <p>The general criterion is that the evolution from natural-seminatural-artificial area (2→1→0) is negative and if it occurs inversely is positive (0→1→2).</p>

	<p>It is considered ‘natural areas’ (2): forests, riversides, forested meadows, scrubland, rocky habitats, river courses and masses, and natural meadows and pastures. They are valued 2 points.</p> <p>It is considered ‘semi-natural areas’ (1): Urban or artificial green zones, golf courses, agricultural land, meadows and pastures. They are valued 1 point.</p> <p>It is considered ‘artificial areas’ (0): urban, commercial, industrial, transport, mining, and rubbish dumping zones. They are valued 0 points.</p>
Trend	The trend will be considered <i>positive</i> , if the total value of land use changes is greater than in the previous assessment. The trend will be <i>stable</i> if that value is the same, and it will be <i>negative</i> if that value is smaller than in the previous assessment
Applicable legislation	<ul style="list-style-type: none"> • Ley 30/2014, de 3 de diciembre, de Parques Nacionales • Ley 42/2007, de 13 de diciembre, del Patrimonio Natural y de la Biodiversidad
References	<ul style="list-style-type: none"> • Instituto Geográfico Nacional. Coberturas y Usos del Suelo. Corine Land Cover. Nomenclatura del CORINE LAND COVER al nivel 5º (CLC2000). En: http://www.ign.es/ign/layoutIn/coberturaUsoSuelo.do • Spellerberg, I.F. 1994. <i>Evaluation and Assessment for Conservation</i>. Chapman & Hall, London. • Fernández-González, F. 2002. <i>Indicadores de biodiversidad. El estado actual de la investigación</i>. En Ramírez, L. (Coord.). <i>Indicadores ambientales. Situación actual y perspectivas</i>. Organismo Autónomo Parques Nacionales. Madrid. • Mallarach, J.M.; Germain, J.; Sabaté, X.; y Basora, X. 2008. <i>Protegits de fet o de dret? Primera avaluació del sistema d'espais naturals protegits de Catalunya</i>. Institució Catalana d'Història Natural. Available from: http://ichn.iec.cat/Avaluaci%C3%B3%20d%27espais.htm • Radeloff, V.C., Stewart, S.I., Hawbaker, T.J., Gimmi, U., Pidgeon, A.M., Flather, C.H., Hammer, R.B., and Helmers, D.P. 2010. <i>Housing growth in and near United States protected areas limits their conservation value</i>. PNAS, 107: 940-945. • Rodríguez Rodríguez, D. y Martínez Vega, J. 2013. <i>Evaluación de la eficacia de las áreas protegidas: el Sistema de Evaluación integrada de áreas protegidas. Resultados de la primera evaluación integrada de los espacios naturales protegidos de la Comunidad de Madrid</i>. FBBVA, Madrid. Available from: http://www.fbbva.es/TLFU/tlfu/esp/publicaciones/informes/fichainforme/index.jsp?codigo=722

V. SOCIAL PERCEPTION AND VALUATION: 2 indicators

5.1. DEGREE OF KNOWLEDGE ON THE PROTECTED AREA	
Category	Social Perception and Valuation
Type	State
Description	This indicator assesses the degree of knowledge on the protected area by the local populations most directly affected by its designation
Rationale	The degree of knowledge on protected areas by local populations has a positive effect on their valuation, making their management easier (Borrini-Feyerabend <i>et al.</i> , 2004). The degree of knowledge on protected areas also allows estimating the effectiveness of the information and communication measures by protected area managers
Data source	Survey among residents
Data availability	Medium
Data collection frequency	Non-stipulated
Suggested update	Every five years
Scale	Ordinal scale, from 0 to 2 points
Calculation and interpretation	<p>A random, systematic phone survey using the phone directory will be done to a sample of residents who live in the municipality(ies) included in the protected area. The sample size will be stratified according to the total population of the municipalities in the protected area, for a confidence level of 90% and a standard error of 5% of the whole sample.</p> <p>They will be asked <i>if they know the protected area X (full name), be it physically (because they have visited it), be it culturally (because they know it exists, and are able to place its limits approximately).</i></p> <p>The degree of knowledge on the protected area will be considered and valued accordingly to the percentage of positive responses over the total number of responses (Y) as it follows:</p> <ul style="list-style-type: none"> • High: $Y \geq 75\%$ → 2 points • Moderate: $75\% > Y \geq 50\%$ → 1 point • Low: $Y < 50\%$ → 0 points
Trend	The trend will be <i>positive</i> if Y is higher than in the previous assessment, <i>stable</i> if Y is the same in both assessments, and <i>negative</i> if Y is lower than its previous value

Applicable legislation	
References	<ul style="list-style-type: none"> Borrini-Feyerabend, G.; Kothary, A.; and Oviedo, G. (2004) <i>Indigenous and Local Communities and Protected Areas: Towards Equity and Enhanced Conservation</i>. Gland, Switzerland and Cambridge, UK: IUCN. Rodríguez Rodríguez, D. y Martínez Vega, J. 2013. <i>Evaluación de la eficacia de las áreas protegidas: el Sistema de Evaluación integrada de áreas protegidas. Resultados de la primera evaluación integrada de los espacios naturales protegidos de la Comunidad de Madrid</i>. FBBVA, Madrid. Available from: http://www.fbbva.es/TLFU/tlfu/esp/publicaciones/informes/fichainforme/index.jsp?codigo=722

5.2. IMPORTANCIA PERSONAL DEL AP	
Category	Social Perception and Valuation
Type	State
Description	This indicator evaluates the importance given by residents to nearby protected areas
Rationale	The greater the importance given by local populations to protected areas, the more positive attitude and behaviour towards them those populations are likely to have, thus facilitating management (Pomeroy <i>et al.</i> , 2005)
Data source	Survey to residents
Data availability	Medium
Data collection frequency	Non-stipulated
Suggested update	Every five years
Scale	Ordinal scale, from 0 to 2 points
Calculation and interpretation	<p>A random, systematic phone survey using the phone directory will be done to a sample of residents who live in the municipality(ies) included in the protected area. The sample size will be stratified according to the total population of the municipalities in the protected area, for a confidence level of 90% and a standard error of 5% of the whole sample.</p> <p>They will be asked <i>how important the PA X (full name) is for them</i>. The following response options will be given: ‘Very important’; ‘Important’; ‘Not very important’; or ‘Unimportant’.</p> <p>The personal importance will be calculated by adding the percentages of responses corresponding</p>

	<p>to the categories ‘Very important’ and ‘Important’ over the total number of responses (Y). It will be considered and valued as follows:</p> <ul style="list-style-type: none"> • High: $Y \geq 75\%$ → 2 points • Moderate: $75 > Y \geq 50\%$ → 1 point • Low: $Y < 50\%$ → 0 points
Trend	The trend will be <i>positive</i> if Y is higher than in the previous assessment, <i>stable</i> if Y is the same in both assessments, and <i>negative</i> if Y is lower than its previous value
Applicable legislation	
References	<ul style="list-style-type: none"> • Pomeroy, R.S., Parks, J.E.; and Watson, L.M. 2005. <i>How is your MPA doing? A methodology for evaluating the management effectiveness of marine protected areas</i>. IUCN, Gland, Switzerland, and Cambridge, United Kingdom. • Rodríguez Rodríguez, D. y Martínez Vega, J. 2013. <i>Evaluación de la eficacia de las áreas protegidas: el Sistema de Evaluación integrada de áreas protegidas. Resultados de la primera evaluación integrada de los espacios naturales protegidos de la Comunidad de Madrid</i>. FBBVA, Madrid. Available from: http://www.fbbva.es/TLFU/tlfu/esp/publicaciones/informes/fichainforme/index.jsp?codigo=722 • IUCN. 2014. <i>The Green List for Protected Areas Global Standard Approved by IUCN GLPA Steering Group 2014-05-15</i>. Available from: http://cmsdata.iucn.org/downloads/pilot_phase_iucn_glpa_standard20140515 .pdf

VI. THREATS TO CONSERVATION: 5 indicators

6.1. FRAGMENTATION	
Category	Threats to Conservation
Type	Pressure
Description	This indicator evaluates the degree of fragmentation of the natural habitats ¹ in the protected area
Rationale	Fragmentation of natural habitats is one of the main global causes of biodiversity loss due to its impacts on the loss of habitats and on the loss of quality of habitats (Fernández-González, 2002; Pullin, 2002; Chape <i>et al.</i> , 2008; Nolte <i>et al.</i> , 2010)
Data source	Copernicus website
Data availability	High
Data collection frequency	
Suggested update	Every four years
Scale	Ordinal scale, from 0 to 2 points
Calculation and interpretation	<p>The border length of artificial land covers inside the protected area will be computed (Contagion Edge Proportion²; Erwin & Bockstael, 2007). The artificial perimeter will be calculated as the addition (in km) of inner artificial land covers³.</p> <p>This inner artificial perimeter (Ap) value will be divided by its value plus the external perimeter of the protected area (Ep), and the result will be multiplied by one hundred: $F = [Ap / (Ap + Ep)] \times 10^2$.</p> <p>Thus, a non-artificially fragmented protected area will have $F = 0$, and F's value will increase up to a theoretical maximum of 1 as the inner artificial perimeter rises.</p> <p>Protected area fragmentation (F) will be considered and valued as follows:</p> <ul style="list-style-type: none"> • Low: $F \leq 0,03^4 \rightarrow 0$ puntos • Moderate: $0,03 < F \leq 0,05 \rightarrow 1$ punto • High: $F > 0,05 \rightarrow 2$ puntos <p><i>Explanatory notes</i></p>

	<p>¹ It is considered ‘natural habitats’ those habitats entirely natural and also semi-natural habitats (Dir. 92/43/CEE) and, specifically, the classes 2, 3, 4 and 5 of CORINE Land Cover.</p> <p>² CEP is used as an indicator of fragmentation to avoid interpretation errors as a result of protected area’s shape. CEP standardises inner fragmentation values according to each protected area’s shape.</p> <p>³ The following artificial Corine Land Cover sub-classes that cause fragmentation will be considered: 111, 112, 121, 122, 123, 124, 131, 132 y 133.</p> <p>⁴ The value of the mean divides protected areas that are very little fragmented from those moderately fragmented in Spain (Rodríguez-Rodríguez y Martínez-Vega, under review).</p>
Trend	The trend will be considered as <i>positive</i> if the value of F decreases compared to the previous assessment. It will be considered <i>stable</i> , if it remains equal, and it will be considered <i>negative</i> , if F increases with regard to the previous assessment
Applicable legislation	<ul style="list-style-type: none"> • Directiva 92/43/CEE del Consejo, de 21 de mayo de 1992, relativa a la conservación de los hábitats naturales y de la fauna y flora silvestres. Art. 1.b. • Ley 42/2007, de 13 de diciembre, del Patrimonio Natural y de la Biodiversidad. Arts. 17.g, 19.g, 20 y 46.
References	<ul style="list-style-type: none"> • Fernández-González, F. 2002. <i>Indicadores de biodiversidad. El estado actual de la investigación</i>. En Ramírez, L. (Coord.). <i>Indicadores ambientales. Situación actual y perspectivas</i>. Organismo Autónomo Parques Nacionales. Madrid. • Pullin, A. 2002. <i>Conservation Biology</i>. Cambridge University Press. Cambridge. • Irwin, E.G. & Bockstael, N.E. 2007. The evolution of urban sprawl: Evidence of spatial heterogeneity and increasing land fragmentation. <i>PNAS</i>, 104(52): 20672-20677. • Chape, S.; Spalding, M.; and Jenkins, M.D. 2008. <i>The World’s Protected Areas: Status, Values and Prospects in the 21st Century</i>. Prepared by the UNEP World Conservation Monitoring Centre, University of California Press, Berkeley, USA. • Mallarach, J.M.; Germain, J.; Sabaté, X.; y Basora, X. 2008. <i>Protegits de fet o de dret? Primera avaluació del sistema d’espais naturals protegits de Catalunya</i>. Institució Catalana d’Història Natural. Available from: http://ichn.iec.cat/Avaluaci%C3%B3%20d%27espais.htm • Nolte, C.; Leverington, F.; Kettner, A.; Marr, M.; Nielsen, G.; Bomhard, B.; Stolton, S.; Stoll-Kleemann, S.; and Hockings, M. 2010. <i>Protected Area Management Effectiveness Assessments in Europe. A review of application, methods and results</i>. University of Greifswald. Greifswald, Germany. • Rodríguez Rodríguez, D. y Martínez Vega, J. 2013. <i>Evaluación de la eficacia de las áreas protegidas: el Sistema de Evaluación integrada de áreas protegidas. Resultados de la primera evaluación integrada de los espacios naturales protegidos de la Comunidad de Madrid</i>. FBBVA, Madrid. Available from: http://www.fbbva.es/TLFU/tlfu/esp/publicaciones/informes/fichainforme/index.jsp?codigo=722

	<ul style="list-style-type: none"> IUCN. 2014. <i>The Green List for Protected Areas Global Standard Approved by IUCN GLPA Steering Group 2014-05-15</i>. Available from: http://cmsdata.iucn.org/downloads/pilot_phase_iucnlpastandard20140515_.pdf Rodríguez-Rodríguez, D. & Martínez-Vega, J. 2016. What should be evaluated from a manager's perspective? Developing a salient protected area effectiveness evaluation system for managers and scientists in Spain. <i>Ecological Indicators</i>, 64: 289-296. Rodríguez-Rodríguez, D. & Martínez-Vega, J. Under review. Analysing subtle threats to conservation: a nineteen year assessment of fragmentation and isolation of Spanish protected areas. <i>Landscape and Urban Planning</i>.
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6.2. DENSITY OF ALIEN INVASIVE SPECIES	
Category	Threats to Conservation
Type	Pressure
Description	This indicator evaluates the density of alien invasive species (AIS) in the protected area
Rationale	AIS are one of the most serious global threats to the conservation of biodiversity (Pullin, 2002; Pressey <i>et al.</i> , 2007; Chape <i>et al.</i> , 2008). The most serious impacts on native biodiversity are related to inter-specific interactions such as predation, parasitism, competence for resources, disease transmission, or to ecosystem's modification (Díaz-Esteban, 2002)
Data source	Protected area administrations; rangers; bibliography; visits
Data availability	Medium
Data collection frequency	
Suggested update	Annual
Scale	Ordinal scale, from 0 to 2 points
Calculation and interpretation	<p>All AIS¹ with proved signs of presence² in the protected area in the past three years will be added (X). AIS of special concern³ (Y) will be weighted double. Then, the weighted sum will be divided by the extent of the protected area (in ha), so that a comparable AIS density index is created (AISI)</p> $= \sum X_{n1} + Y_{n2} (x2) / \text{ha}$ <p>The density of alien invasive species will be considered and valued as follows:</p> <ul style="list-style-type: none"> Low: $\text{AISI} \leq 0,04^4 \rightarrow 0$ puntos Moderate: $0,04 \leq \text{AISI} \leq 0,4 \rightarrow 1$ punto

	<ul style="list-style-type: none"> • High: AISI > 0,4 → 2 puntos <p><i>Explanatory notes</i></p> <p>¹ It will be considered ‘AIS’ the species included in the DAISIE European project as they are, by specialist consensus, the most dangerous to European biodiversity.</p> <p>² It will be considered ‘proved signs’ the sightseeing of individuals, the unmistakable discovery of marks or footprints inside the protected area, and the inclusion of AIS in specialised bibliography on the protected area.</p> <p>³ It is considered ‘AIS of special concern’ those AIS that according to the literature, experts or protected area’s managers have a special impact on the focal features of the protected area.</p> <p>⁴ The thresholds correspond to percentiles 33 y 66 of the AISI of the study by Rodríguez-Rodríguez & Martínez-Vega (2013) in the Region of Madrid, divided by ten</p>
Trend	The trend will be considered <i>positive</i> if the value of AISI is smaller than in the previous assessment. The trend will be considered <i>stable</i> if the value of AISI is the same in both assessments, and it will be considered <i>negative</i> if the value of AISI is greater than in the previous assessment
Applicable legislation	<ul style="list-style-type: none"> • Ley 42/2007, de 13 de diciembre, del Patrimonio Natural y de la Biodiversidad. Arts., 3.13, 61, 76.f, y 77. • Ley 2/1991, de 14 de febrero, para la Protección de la Fauna y la Flora Silvestres en la Comunidad de Madrid. Arts. 1, 2, 22 y 45.4.i. • Ley 7/1990, de 28 de junio, de Protección de embalses y Zonas húmedas de la Comunidad Autónoma de Madrid. Art. 16.
References	<ul style="list-style-type: none"> • VVAA. 1997. <i>Plan Rector de Uso y Gestión del Parque Regional de la Cuenca Alta del Manzanares</i>. Dirección General de Educación y Prevención Ambiental. Consejería de Medio Ambiente y Desarrollo Regional. Comunidad de Madrid. • Notario, A. (Coord.). 1998. <i>Plan Forestal de la Comunidad de Madrid. Programa de Protección y Manejo de la Fauna. Tomo III</i>. Consejería de Medio Ambiente y Desarrollo Regional. Comunidad de Madrid. Doc. Int. • VVAA. 2004. <i>Inventario piscícola para la gestión de los cotos trucheros de la Comunidad de Madrid</i>. Servicio de Protección de Flora y Fauna. Dirección General del Medio Natural. Consejería de Medio Ambiente y Ordenación del Territorio. CAM. Doc. Int. • Delibes, M. 2001. <i>Vida. La naturaleza en peligro</i>. Temas de hoy. Madrid. • Díaz-Esteban, M. 2002. <i>Elementos y procesos clave para el funcionamiento de los sistemas naturales: las medidas con significado funcional como alternativa a los indicadores clásicos</i>. En Ramírez, L. (Coord.). <i>Indicadores ambientales. Situación actual y perspectivas</i>. Organismo Autónomo Parques Nacionales. Madrid. • Pullin, A. 2002. <i>Conservation Biology</i>. Cambridge University Press. Cambridge, UK.

	<ul style="list-style-type: none"> • Pressey, R.L.; Cabeza, M.; Watts, M.E.; Cowling, R.M.; and Wilson, K.A. 2007. <i>Conservation planning in a changing world</i>. Trends in Ecology and Evolution 22 (11): 583-592. • Chape, S.; Spalding, M.; and Jenkins, M.D. 2008. <i>The World's Protected Areas: Status, Values and Prospects in the 21st Century</i>. Prepared by the UNEP World Conservation Monitoring Centre, University of California Press, Berkeley, USA. • DAISIE European Invasive Alien Species Gateway (http://www.europe-aliens.org/) Available from: http://www.europe-aliens.org/index.jsp • Rodríguez Rodríguez, D. y Martínez Vega, J. 2013. <i>Evaluación de la eficacia de las áreas protegidas: el Sistema de Evaluación integrada de áreas protegidas. Resultados de la primera evaluación integrada de los espacios naturales protegidos de la Comunidad de Madrid</i>. FBBVA, Madrid. Available from: http://www.fbbva.es/TLFU/tlfu/esp/publicaciones/informes/fichainforme/index.jsp?codigo=722 • IUCN. 2014. <i>The Green List for Protected Areas Global Standard Approved by IUCN GLPA Steering Group 2014-05-15</i>. Available from: http://cmsdata.iucn.org/downloads/pilot_phase_iucnlpastandard20140515 .pdf
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6.3. DENSITY OF VISITORS	
Category	Threats to Conservation
Type	Pressure
Description	The indicator evaluates the density of visitors to the protected area by year
Rationale	High numbers of visitors amplify the number of impacts that visitors can have on protected areas and their resources (Chape <i>et al.</i> , 2008). The most relevant impacts are: noise and disturbance to fauna; trampling, mutilation and uprooting of plants; collapse and degradation of public use infrastructures; littering; habitat destruction as a result of new visitors infrastructures; or higher risk of forest fires (Chape <i>et al.</i> , 2008)
Data source	Protected area administrations; Protected area websites
Data availability	High
Data collection frequency	
Suggested update	Annual

Scale	Ordinal scale, from 0 to 2 points
Calculation and interpretation	<p>In absence of exact figures on visitors to the protected area, the annual figures from visitors centres (VCs) and information points (IPs) will be considered. It was estimated that the percentage of total visitors to national parks in Spain who visit visitor centres ranges from 7% and 90% (OAPN, 2012). Consequently, to estimate the total number of visitors to a protected area, the following formula should be used:</p> <p>[Total number of visitors (VCs + IPs) x 100 / average visits to VCs + IPs).</p> <p>To compare data among protected areas, the number of visitors from direct count or estimation will be divided by the area of the protected area (in ha), thus obtaining the density of visitors to the protected area (X).</p> <p>The density of visitors for the last available year will be considered and valued as follows:</p> <ul style="list-style-type: none"> • Low: $X < 14 \text{ vis / ha. x year}^1 \rightarrow 0 \text{ points}$ • Moderate: $85 \geq X \geq 14 \text{ vis / ha. x year} \rightarrow 1 \text{ point}$ • Excessive: $X > 85 \text{ vis / ha. x year}^2 \rightarrow 2 \text{ points}$ <p><i>Explanatory notes.</i></p> <p>¹ Fifty per cent of parks in Spain receive less than 14 vis./ha (Múgica <i>et al.</i>, 2006).</p> <p>² The upper threshold for visitor carrying capacity (CC) was taken from the average visitation (1997-2008) to the only protected area in the Region of Madrid with limited visits and exhaustive control of public use: Montejo Beech Forest. That figure was then divided by the size of the protected area (in ha.) $CC_{AveMontejo} = 85 \text{ vis./ ha. x year}$ (Rodríguez-Rodríguez y Martínez-Vega, 2013)</p>
Trend	The trend will be <i>positive</i> if X is lower than in the previous assessment, <i>stable</i> if X is the same in both assessments, and <i>negative</i> if X is greater than its previous value
Applicable legislation	
References	<ul style="list-style-type: none"> • Múgica, M.; Gómez-Limón, J.; de Lucio, J.V.; y Puertas, J. 2006. <i>Anuario EUROPARC-España del estado de los espacios naturales protegidos 2005</i>. Fundación Fernando González Bernáldez. Madrid. • Ortega, J.; Gómez-Limón, J.; Rovira, P.; López-Claramunt, A.; y Gabaldón, J.E. 2006. <i>Evaluación del papel que cumplen los equipamientos de uso publico en los espacios naturales protegidos</i>. Fundación Fernando González Bernáldez. Madrid. • De Lucio, J.V.; Múgica, M.; Gómez-Limón, J.; Martínez-Alandi, C.; Puertas, J.; y Atauri, J.A. 2008. <i>Anuario EUROPARC-España del estado de los espacios naturales protegidos 2007</i>. Fundación Fernando González Bernáldez. Madrid. • Chape, S.; Spalding, M.; and Jenkins, M.D. 2008. <i>The World's Protected Areas: Status, Values and Prospects in the 21st Century</i>. Prepared by the UNEP World Conservation

	<p>Monitoring Centre, University of California Press, Berkeley, USA.</p> <ul style="list-style-type: none"> • Mallarach, J.M.; Germain, J.; Sabaté, X.; y Basora, X. 2008. <i>Protegits de fet o de dret? Primera avaluació del sistema d'espais naturals protegits de Catalunya</i>. Institució Catalana d'Història Natural. Available from: http://ichn.iec.cat/Avaluaci%C3%B3%20d%27espais.htm • OAPN, Organismo Autónomo Parques Nacionales. 2012. <i>Segundo informe de situación de la Red de Parques Nacionales (2007-2010). I. Estado de la Red</i>. MAGRAMA. • Rodríguez-Rodríguez, D. 2012. Littering in protected areas: a conservation and management challenge- a case study from the Autonomous Region of Madrid, Spain. <i>Journal of Sustainable Tourism</i>, 20(7): 1011-1024. • Rodríguez Rodríguez, D. y Martínez Vega, J. 2013. <i>Evaluación de la eficacia de las áreas protegidas: el Sistema de Evaluación integrada de áreas protegidas. Resultados de la primera evaluación integrada de los espacios naturales protegidos de la Comunidad de Madrid</i>. FBBVA, Madrid. Available from: http://www.fbbva.es/TLFU/tlfu/esp/publicaciones/informes/fichainforme/index.jsp?codigo=722 • IUCN. 2014. <i>The Green List for Protected Areas Global Standard. Approved by IUCN GLPA Steering Group 2014-05-15</i>. Available from: http://cmsdata.iucn.org/downloads/pilot_phase_iucnlpastandard20140515_.pdf
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6.4. ACTIVITIES PERFORMED BY VISITORS	
Category	Threats to Conservation
Type	Pressure
Description	This indicator evaluates the main activities performed by visitors to protected areas according to the degree of threat these activities pose on the protected area or its features
Rationale	Recreational activities are the most frequent and serious threat to the protected areas in industrialised countries (Rodríguez-Rodríguez, 2008; Leverington <i>et al.</i> , 2010; Nolte <i>et al.</i> , 2010). The more recreational activities are performed, the higher the number of impacts inside protected areas (Chape <i>et al.</i> , 2008)
Data source	Protected area managers
Data availability	Medium
Data collection frequency	

Suggested update	Every three years
Scale	Ordinal scale, from 0 to 2 points
Calculation and interpretation	<p>The three main activities performed by visitors to the protected area will be considered.</p> <ul style="list-style-type: none"> It will be considered '<u>positive activities</u>' the following ones. They will be scored 0 points: <ul style="list-style-type: none"> -Walking/trekking, -Relax/contemplation, -Nature photography, -Cycling, -Horse riding, -Canoeing or non-motor sailing. It will be considered '<u>neutral activities</u>' the following ones. They will be scored 1 point: <ul style="list-style-type: none"> -Hunting (with licence), -Fishing (with licence), -Having lunch or playing in prepared zones, -Motor activities in accesses, parking lots or authorised zones, -Walking with dogs, conveniently tied up, in authorised zones. It will be considered '<u>negative activities</u>' the following ones. They will be scored 2 points: <ul style="list-style-type: none"> -Motor activities outside accesses, parking lots or authorised zones, -Collecting features of flora, fauna, geology, fungi or forest products, -Poaching, -Having lunch or playing in non-prepared zones, -Walking with unleashed dogs or outside authorised zones, -Littering or liquid waste spilling, -Degrading or destroying the patrimony, -Those activities prohibited by the legislation affecting the protected area.

	<p>The final score of the indicator will be the simple addition of the scores of every main activity performed (X). Thus, the activities performed by visitors to the protected area will be considered and valued as follows:</p> <ul style="list-style-type: none"> • Positive: They do not imply the degradation of the natural or cultural resources of the protected area: $X \leq 1 \rightarrow 0$ points • Neutral: They imply a light degradation of the natural or cultural resources of the protected area which does not jeopardize their conservation: $1 < X \leq 3 \rightarrow 1$ point. Within this interval, if any of these activities were “negative”, the value of the indicator will descend one level. • Negative: They imply an important degradation of the natural or cultural resources of the protected area which jeopardizes their conservation: $X > 3 \rightarrow 2$ points <p><i>Explanatory notes</i></p> <p>If less than three activities are identified, the activities ‘not performed’ will be scored 0 points.</p>
Trend	<p>The trend will be <i>positive</i> if X is lower than in the previous assessment, <i>stable</i> if X is the same in both assessments, and <i>negative</i> if X is greater than its previous value</p>
Applicable legislation	<ul style="list-style-type: none"> • Management plans
References	<ul style="list-style-type: none"> • Barrado, D. 1999. <i>Actividades de ocio y recreativas en el medio natural de la Comunidad de Madrid. La ciudad a la búsqueda de la naturaleza</i>. Consejería de Medio Ambiente. Comunidad de Madrid. Madrid. • VVAA. <i>Cuadernos del Arboreto Luis Ceballos</i>. Nº 2. Consejería de Medio Ambiente, Vivienda y Ordenación del Territorio. Comunidad de Madrid. • Chape, S.; Spalding, M.; and Jenkins, M.D. 2008. <i>The World’s Protected Areas: Status, Values and Prospects in the 21st Century</i>. Prepared by the UNEP World Conservation Monitoring Centre, University of California Press, Berkeley, USA. • Mallarach, J.M.; Germain, J.; Sabaté, X.; y Basora, X. 2008. <i>Protegits de fet o de dret? Primera avaluació del sistema d’espais naturals protegits de Catalunya</i>. Institució Catalana d’Història Natural. Available from: http://ichn.iec.cat/Avaluaci%C3%B3%20d%27espais.htm • Rodríguez-Rodríguez, D. 2008. <i>Los espacios naturales protegidos de la Comunidad de Madrid. Principales amenazas para su conservación</i>. Editorial Complutense. Madrid. E-Book. Available at: http://www.ucm.es/BUCM/ecsa/36254.php?id=187 • Leverington, F.; Lemos, K.; Courrau, J.; Pavese, H.; Nolte, C.; Marr, M.; Coad, L.; Burgess, N.; Bomhard, B.; and Hockings, M. 2010. <i>Management effectiveness evaluation in protected areas – a global study. Second Edition 2010</i>. University of Queensland. Brisbane. • Nolte, C.; Leverington, F.; Kettner, A.; Marr, M.; Nielsen, G.; Bomhard, B.; Stolton, S.;

	<p>Stoll-Kleemann, S.; and Hockings, M. 2010. <i>Protected Area Management Effectiveness Assessments in Europe. A review of application, methods and results</i>. University of Greifswald. Greifswald, Germany.</p> <ul style="list-style-type: none"> • Rodríguez-Rodríguez, D. 2012. Littering in protected areas: a conservation and management challenge- a case study from the Autonomous Region of Madrid, Spain. <i>Journal of Sustainable Tourism</i>, 20(7): 1011-1024. • Rodríguez Rodríguez, D. y Martínez Vega, J. 2013. <i>Evaluación de la eficacia de las áreas protegidas: el Sistema de Evaluación integrada de áreas protegidas. Resultados de la primera evaluación integrada de los espacios naturales protegidos de la Comunidad de Madrid</i>. FBBVA, Madrid. Available from: http://www.fbbva.es/TLFU/tlfu/esp/publicaciones/informes/fichainforme/index.jsp?codigo=722 • IUCN. 2014. <i>The Green List for Protected Areas Global Standard Approved by IUCN GLPA Steering Group 2014-05-15</i>. Available from: http://cmsdata.iucn.org/downloads/pilot_phase_iucnglpastandard20140515_.pdf
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6.5. CLIMATE CHANGE	
Category	Threats to Conservation
Type	Pressure
Description	This indicator evaluates the variation in temperature and precipitation in the protected area as possible signs of climate change
Rationale	Climate change is a global threat which imposes rising direct and indirect pressures on protected areas and challenges to their management (Barber, 2004; Chape <i>et al.</i> , 2008; Nolte <i>et al.</i> , 2010; Araújo <i>et al.</i> , 2011). These pressures are linked to unusually rapid changes in environmental variables crucial for biodiversity to which some populations are not able to adapt leading to their extinction (Pullin, 2002; Mora and Sale, 2011)
Data source	Meteorological stations
Data availability	Medium-low
Data collection frequency	Daily
Suggested update	Every five years
Scale	Ordinal scale, from 0 to 2 points
Calculation	In order to have comparatively long time series for evaluation, the mean annual values of

<p>and interpretation</p>	<p>temperature and total precipitation of two consecutive periods of, at least, 10 years* will be compared. Data will be collected from the closest meteorological station/s to protected areas. Stations inside protected areas will be preferred. Should these not be available, the 2 or 3 nearest stations will be considered, and a mean will be done for the two variables.</p> <p>The indicator will be scored according to its two constituent variables: <i>variation in the mean annual temperature</i> for the two considered periods (X); and <i>mean percentage of variation in rainfall</i> for the two considered periods (Y), as follows:</p> <ul style="list-style-type: none"> • $X < \pm 0.33\text{ }^{\circ}\text{C} \rightarrow 0$ points. • $\pm 0.33\text{ }^{\circ}\text{C} \leq X \leq \pm 0.5\text{ }^{\circ}\text{C} \rightarrow 1$ point. • $X \geq \pm 0.5\text{ }^{\circ}\text{C} \rightarrow 2$ points. <ul style="list-style-type: none"> • $Y < \pm 5\% \rightarrow 0$ points. • $\pm 5\% \leq Y < \pm 10\% \rightarrow 1$ point. • $Y \geq \pm 10\% \rightarrow 2$ points. <p>Climate change in the protected area (Z) will be calculated by adding the scores of its two constituent variables $Z = (X+Y)$. It will be considered as follows:</p> <ul style="list-style-type: none"> • Unlikely: $Z = 0 \rightarrow 0$ points • Possible: $1 \leq Z < 3 \rightarrow 1$ point • Likely: $Z \geq 3 \rightarrow 2$ points <p><i>Explanatory notes</i></p> <p>*If more data are available, it is recommended to divide the whole series into two equal intervals as a means of comparison.</p>
<p>Trend</p>	<p>The trend will be considered <i>positive</i> if X and Y vary in an equal or inferior quantity than their lowest intervals (0 points) compared to the previous assessment. The trend will be considered <i>stable</i> if X and Y are within the intermediate intervals in both assessment periods, or if one of the variables increases its value (to an upper interval) and the other variable decreases (to a lower interval). The trend will be considered <i>negative</i> if X and Y vary in an equal or superior quantity than their upper intervals (2 points) compared to the previous assessment</p>
<p>Applicable legislation</p>	
<p>References</p>	<ul style="list-style-type: none"> • Montero, J.L. y González, J.L. 1974. <i>Diagramas bioclimáticos</i>. ICONA. Madrid. • García, L. y Reija, A. 1994. <i>Tiempo y clima en España. Meteorología de las Autonomías</i>. Dossat-2000. Madrid.

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6.6. PASTURE ENCROACHMENT BY WOODY VEGETATION

(specific indicator to Ordesa NP)

Category	Threats to Conservation
Type	Pressure
Description	The indicator evaluates land use changes of interest to the managers of Ordesa NP. Those changes include natural transitions from pastures and natural grasslands to other more advanced, woody stages of natural succession, such as sclerophyllous vegetation or transitional woodland scrub.

Rationale	Natural transitions from initial succession stages to intermediate ones can cause species and habitat of conservation interest to be lost. It may also increase the risk of forest fires due to increased woody biomass (EUROSTAT, 2017).
Data source	Copernicus website (Corine Land Cover)
Data availability	High
Data collection frequency	Variable (~6 years)
Suggested update	Every five years
Scale	Ordinal scale, from -1 ó 1 points
Calculation and interpretation	<p>Different zones in the protected area will be distinguished (when it is zoned) to value changes from sub-classes 231 and 321 to sub-classes 322, 323 and 324:</p> <ul style="list-style-type: none"> • In <u>zoned protected areas</u>: <ol style="list-style-type: none"> 1. Reserve / Maximal protection. (land use change value -% - x 3) 2. Various uses (land use change value -% - x 2) 3. Peripheral protection zone <p>The total value of changes leading to pasture encroachment by woody vegetation in the protected area will be =</p> $\sum *Zone 1(x 3) \pm Zone 2 (x 2) \pm Zone 3$ <ul style="list-style-type: none"> • In <u>un-zoned protected areas</u>, the total value of changes leading to pasture encroachment by woody vegetation in the protected area will be = $\sum \pm PA$. <p>Pasture encroachment by woody vegetation in the protected area (X) will be considered and valued as follows:</p> <ul style="list-style-type: none"> • Positive: when the area covered by CLC sub-classes 231 and 321 in the protected area remains stable ($\pm 1\%$) with regard to the previous evaluation → 1 point • Negative: when the area covered by CLC sub-classes 231 and 321 in the protected area increases or decreases more than 1% with regard to the previous evaluation → -1 point <p><i>Explanatory notes</i></p>

	<p>*The sign of each addend is determined by the positive or negative land use change.</p> <p>In case of land use changes of different sign, the result will be the sum of positive changes and negative changes, weighted according to the zone where they take place.</p>
Trend	NA
Applicable legislation	
References	<ul style="list-style-type: none"> • Instituto Geográfico Nacional. Coberturas y Usos del Suelo. Corine Land Cover. Nomenclatura del CORINE LAND COVER al nivel 5º (CLC2000). En: http://www.ign.es/ign/layoutIn/coberturaUsoSuelo.do • EUROSTAT. 2017. <i>Statistics explained. Agriculture, forestry and fisheries. Agriculture. Farm structure. Risk of land abandonment</i>. Available from: http://ec.europa.eu/eurostat/statistics-explained/index.php/Agri-environmental_indicator_-_risk_of_land_abandonment

