Global Ecology and Conservation xxx (xxxx) xxx

Contents lists available at ScienceDirect

Global Ecology and Conservation

journal homepage: www.elsevier.com/locate/gecco

The extent and effectiveness of protected areas in the UK

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ARTICLE INFO

Keywords:
Protected area
Aichi Target 11
Common standards monitoring
Protected area management effectiveness

ABSTRACT

The Convention on Biological Diversity (CBD), to which 196 countries including the UK are contracting parties, set out 20 Aichi Biodiversity Targets to be met by 2020. Elements of Aichi Target 11 call for at least 17% of terrestrial land and inland water to be protected and effectively managed by 2020. Each national government is requested to report progress against this goal in national reports submitted at intervals to the CBD, and these are used as the basis of reporting towards the 17% target. Figures reported for the UK's protected area coverage are inclusive of a wide range of levels of designation, management and condition. Here, we examine the protection given to sites under UK legislation and designations as a case study. We find that although 28% of UK land is reported by the UK government to be protected, only 11.4% of land area falls within protected areas designated primarily for nature conservation. Condition monitoring indicates that at most 43–51% of protected areas in the UK are currently in favourable condition, which suggests as little as 4.9% of UK land area may be effectively protected for nature. However, estimates of protected area coverage vary greatly depending on the types of protected areas considered 'effectively protected' as measured by management category and site condition. Taking the UK as an example of a country that has reportedly met the target, we suggest that global progress may have been overestimated, and that future targets and indicators need to focus on the quality as well as quantity of protected areas.

1. Introduction

Protected areas are the cornerstone of international site-based conservation (Di Minin and Toivonen, 2015; Hockings, 2003; Leroux et al., 2010; Schulze et al., 2018), formed a key pillar of the Convention on Biological Diversity (CBD) Strategic Plan for Biodiversity 2011–2020 (Convention on Biological Diversity (CBD), 2010) and are mentioned within Article 8 of the convention itself (CBD, 1992). However, protected areas vary substantially in the degree of protection they afford species and ecosystems (Craigie et al., 2010; Geldmann et al., 2013), in the effectiveness of their management (Coad et al., 2015; Geldmann et al., 2018) and in the priority they

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https://doi.org/10.1016/j.gecco.2021.e01745
Received 25 March 2021; Received in revised form 4 August 2021; Accepted 4 August 2021
Available online 5 August 2021
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afford biodiversity conservation versus other land uses (Coetzer et al., 2014). It is important to understand these nuances in order to avoid generalised national statistics impeding international comparison and scrutiny of national commitments to conservation goals.

To implement the Strategic Plan for Biodiversity, Aichi Target 11 states that "By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes" (CBD, 2010). Target 11 is one of only five targets that have been partially achieved (none were fully achieved) by 2020, with only the elements related to total coverage (protecting 17% of land and 10% of coastal and marine areas) being achieved (Secretariat of the Convention on Biological Diversity, 2020). It has been argued, however, that this is due to a focus on increasing the protected area estate, without increasing genuine protection status (so-called 'paper parks') (Di Minin and Toivonen, 2015) and while ignoring biodiversity decline within it (Brooks, 2014; Watson et al., 2016). Progress towards Target 11 has itself been highly variable between countries (Leadley et al., 2014) and a recent assessment revealed that approximately half of countries showed little or no progress towards achieving 17% terrestrial area coverage (Buchanan et al., 2020). Furthermore, 86.5% of countries for which data were available showed little or no progress towards assessing protected area management effectiveness (Buchanan et al., 2020).

National governments report on their progress towards achieving Aichi Target 11 directly to the Convention on Biological Diversity, but they also provide data to the World Database on Protected Areas (WDPA). The WDPA an open and accessible database which is used by many diverse end users for measuring progress against Aichi Target 11, with thousands of views and data downloads each month (Bingham et al., 2019). The Protected Planet website which hosts the database includes an Aichi Target 11 dashboard with indicators representing all of the elements of the target (UNEP-WCMC and IUCN, 2020). Spatial data on site boundaries form an important part of this database, not least because designated sites often overlap, with around a quarter of all protected area extent having multiple designations (Deguignet et al., 2017). The WDPA method of calculating protected area coverage involves some filtering of sites based on their status, and then dissolving the site boundaries to form a single protected area layer with no overlaps, from which coverage statistics are calculated (UNEP-WCMC, 2019). However, this method does not account for differences between overlapping protected area management categories, governance types and effectiveness, which makes it more difficult to accurately measure progress against these other elements of Aichi Target 11.

To track progress towards site-based conservation targets such as Aichi Target 11, it is essential to have a globally consistent definition of what constitutes a protected area. The CBD adopts the IUCN definition of a protected area (CBD, 2008) as "a clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values" (Dudley, 2008; Lopoukhine, 2012). Within this definition, there is scope for significant variation in factors such as management, governance and human use of sites. As such, the IUCN Protected Area Management Categories (hereafter IUCN categories) were established as a global framework, recognised by the CBD, for categorizing the variety of protected area management types and conservation objectives encompassed by the broader definition (Dudley, 2008; Dudley et al., 2010).

Although not intended to be hierarchical, the IUCN typology spans sites ranging from the largely natural to the more heavily modified, with category Ia (Strict Nature Reserve) and category Ib (Wilderness Area) the most natural, followed by category II (National Park) and category III (Natural Monument or Feature), then category IV (Habitat/Species Management Area) and VI (Protected Area with Sustainable use of Natural Resources) through to category V (Protected Landscape/Seascape) sites which have the least natural conditions of all (Dudley, 2008). There is also variation in how strictly sites are protected, with category I-IV sites more strictly protected than those in categories V and VI (Dudley, 2008). Note, importantly, that UK 'National Parks' (below) do not correspond to IUCN category II National Parks above, rather they are currently considered to come under category V (Protected Landscape/Seascape). In all cases however, nature conservation must be the primary management objective in order to qualify as an IUCN Protected Area (Dudley, 2008). The Programme of Work on Protected Areas (PoWPA), called on Parties to the CBD to apply the IUCN definitions and categories to their protected areas (Dudley et al., 2010).

The UK was one of the first countries to systematically assess its designated sites against the IUCN protected area definition, through the Putting Nature on the Map (PNOTM) project (Crofts et al., 2014; IUCN NCUK, 2012). At that time, there were 14 nationally recognised terrestrial designation types in the UK, of which only 6 were considered to meet the IUCN protected area definition (Crofts et al., 2014). Those meeting the definition were Areas of Outstanding Natural Beauty (England and Wales only), Areas of Special Scientific Interest, National Parks, National Nature Reserves, Sites of Special Scientific Interest, and Privately Protected Areas managed by NGOs, whilst Areas of Outstanding Natural Beauty (Northern Ireland), Forest Parks, Heritage Coasts, Local Nature Reserves, National Scenic Areas, Regional Parks, Local Wildlife Sites and Privately Protected Areas managed by individuals or Voluntary Reserves were not considered to qualify. In addition, seven international designations were recognised, of which six met the IUCN definition. These were Wetlands of International Importance, designated under the Ramsar Convention, UNESCO Biosphere Reserves and World Heritage Sites (natural and mixed) and Special Areas of Conservation (SACs), Sites of Community Importance (SCIs) and Special Protection Areas (SPAs), designated under the European Habitats (Council Directive 92/43/EEC) and Birds (Directive 2009/147/EC) Directives respectively and collectively known as Natura 2000 sites. Sites of Community Importance (SCIs) are equivalent to SACs but approved and designated at the EU-level, usually as a precursor to being formally designated by the government of each country. UNESCO Geoparks, although internationally designated, were not considered to meet the IUCN protected area definition.

Although assessed against the IUCN protected area definition, some designations were not assigned IUCN categories as part of the PNOTM, including those which were missing from the WDPA at the time. Natura 2000 sites have subsequently been added to the WDPA with an IUCN category of "not reported", although in a review of protected area approaches across the European Union, Natura 2000 designations in the UK are listed as category IV (Underwood et al., 2014). Underwood et al. (2014) also assigned IUCN categories

to other designations that were present in the WDPA at the time, but which were not classified as part of the PNOTM project. These include Wetlands of International Importance (Ramsar Sites) as category IV, World Heritage Sites (natural and mixed) as category III and Biosphere Reserves as category VI. The majority of sites assessed by PNOTM were classified as either category IV or V, with a small number of sites classed as category Ia, II or III.

In reporting to the CBD on Aichi target 11, the Joint Nature Conservation Committee (JNCC), on behalf of the UK Government, states that 28% of UK land area is protected (JNCC, 2019a, 2019b). However, that figure is based on a particular interpretation of designations as highlighted above and may overestimate the area of land currently protected. The reported UK figure of 28% also does not take account of the effectiveness of the protection and includes large areas of land which may not meet the IUCN definition of a protected area because nature conservation is not the management priority. Here, we reassess UK terrestrial protected area coverage following PNOTM guidance and consider the make-up of the UK protected area estate in terms of the areas of land under different IUCN categories, before incorporating an assessment of the effectiveness of protection based on standardised condition monitoring data. In addition to enabling an assessment of the robustness of the reported 28% figure quoted for protection of UK land, we can use the UK, for which there are relatively abundant data on extent and efficacy of protection, as a case study to assess how well the figures on areal protection reported to CBD may reflect the level of protection of land for nature conservation globally.

2. Materials and methods

2.1. Protected area coverage

Protected area boundaries were downloaded from www.protectedplanet.net (UNEP-WCMC and IUCN, 2020). Polygons were generalised using a tolerance of 100 m to reduce the spatial complexity of the analysis. This was considered appropriate given the varying levels of detail and accuracy with which the sites were originally digitised. Terrestrial (n = 10,278) and coastal (n = 1 082) protected areas were included in the analysis, 'clipped' to the UK coastline based on the GADM database (Global Administrative Areas, 2012) and re-projected to Mollweide equal area projection. Marine designations (n = 477) were excluded from the analysis, with the assumption that parts of marine protected areas crossing above the mean high-water line do not confer terrestrial protection.

Designations identified in the PNOTM report as not meeting the IUCN definition of a protected area were removed from the analysis and IUCN category entries of "not reported", "not assigned" or "not applicable" replaced with values following Underwood et al. (2014) such that SPAs, SACs and Ramsar sites were assigned to category IV, World Heritage Sites (natural or mixed) to category III, UNESCO-MAB Biosphere Reserves to category VI and any National Nature Reserves without a category assigned to category IV. All other sites retained the IUCN category assigned to them in the WDPA.

Polygons were then dissolved according to their IUCN category to create a single polygon feature per category and clipped such that in cases of overlapping areas, the 'highest' category was given priority, with categories ordered Ia ('highest'), II, III, IV, VI, V ('lowest'). Although the IUCN categories are not strictly hierarchical in this way, this was considered appropriate to avoid double-counting of areas and ensure that 'higher' categories, generally indicative of stricter protection and more natural conditions and less common within the UK, were not masked by more widespread, less strict designations. Total coverage, and coverage within each IUCN category, were then calculated as percentages of the total terrestrial area of the UK, as measured from the GADM administrative boundary.

2.2. Effectiveness of protection

As a measure of the effectiveness of protection, we used condition monitoring data collated for the UK for SSSIs/ASSIs, SACs/SCIs and SPAs by JNCC, downloaded from JNCC Resource Hub (2020). Condition monitoring follows a Common Standards Monitoring protocol, originally based on a six-year monitoring cycle (JNCC, 2003) and uses a standard condition typology, with condition classed as 'favourable', 'unfavourable', 'partially destroyed' or 'destroyed'. Additionally, a trend indicator of 'maintained', 'recovered', 'recovering', 'no change' or 'declining' may be applied (JNCC (on behalf of the Common Standards Monitoring Inter-agency Working Group), 2019). In England, condition is reported based on mapped management units whereas in Scotland, Wales and Northern Ireland, it is reported against the unmapped 'features' (i.e. habitats or species) for which a site is designated. In reporting to the CBD, JNCC combines these condition assessments using an area-weighted method to give overall figures for the UK (JNCC, 2019).

To estimate the area of UK land effectively protected, we used data from the UK Biodiversity Indicator C1c (JNCC, 2020) on the percentages of SSSIs/ASSIs, SACs and SPAs reported as 'favourable' or 'unfavourable recovering' and multiplied these by the total area covered by protected area designations in UK. We did this both for all designations meeting the IUCN definition of a protected area (categories I-VI) and for the more strictly protected designations (categories I-IV only).

Additionally, SSSI condition assessment data for Scotland were downloaded from Scotland's Environment Web (SEPA, 2020). SSSIs in Scotland comprise a mixture of category III (n = 339) and category IV (n = 1 083) sites, in contrast with the rest of the UK where SSSIs and ASSIs are all listed as category IV. This allowed us to use the Scottish SSSI condition data to investigate whether condition of sites varied between categories, by calculating the percentage of features within each category belonging to each condition type.

3. Results

3.1. Protected area coverage

As of December 2020, there were 10,278 terrestrial and 1 082 partially terrestrial (coastal) protected areas in the UK recorded in

the WDPA. Together, these covered a terrestrial area of 70,054 km^2 or 28.54% of UK land area. However, when designations not meeting the IUCN definition of a protected area were excluded, coverage was reduced to 61,147 km^2 or 24.96% of UK land area. This difference was largely due to exclusion of National Scenic Areas in Scotland and Areas of Outstanding Natural Beauty in Northern Ireland (Table 1; Fig. 2).

The UK contains sites belonging to all IUCN categories except category Ib (Wilderness Areas). However, categories Ia, II, III and VI together make up less than 1% of UK land area; the remainder comprising category IV (Habitat/Species Management Area) and V (Protected Landscape) sites accounting for 10.6% and 13.6% of UK land area respectively (Table 1; Fig. 2). Most of the areas assigned to category IV were designated SPAs and SCIs (Natura 2000 sites) and SSSIs/ASSIs, whilst AONBs (in England and Wales) and UK National Parks made up the majority of category V areas (Table 1). The total area covered by sites in categories I – IV, those in the stricter protection categories, is 27,806 km^2 or 11.35% of UK land area (Fig. 1).

3.2. Effectiveness of protection

Standardised assessments of the effectiveness of protected areas were available for SSSI/ASSI, SAC and SPA designations only. The percentage of areas reported by JNCC to be in 'favourable' condition, and hence assumed to be effectively protected, in March 2020 was 50.17% for SSSIs/ASSIs, 42.84% for SACs and 51.48% for SPAs. These figures do not account for overlap between designations, and so are not necessarily independent. Extrapolation of these condition assessments across the whole UK protected area estate (categories Ia-VI) suggests that 12.52%, 10.69% or 12.85% (based on SSSI/ASSI, SAC or SPA figures respectively) of UK land area is effectively protected. Extrapolation of the favourable condition figures for SSSI/ASSIs, SACs and SPAs only to sites in the stricter protection categories (categories Ia-IV) would further reduce these estimates to 5.69%, 4.86% or 5.84% of UK land effectively protected.

The percentage of areas reported by JNCC to be in 'unfavourable recovering' condition in March 2020 was 34.51% for SSSIs/ASSIs, 30.83% for SACs and 27.03% for SPAs. If a broader definition of effective management were applied, so as to additionally include these areas, then extrapolating to all designations (categories Ia-VI) as above would give estimates of 21.14%, 18.39% or 19.60% of UK land area effectively protected. Considering only sites in the stricter protection categories (categories Ia-IV) would give estimates of 9.61%, 8.36% or 8.91% of UK land area effectively protected.

The percentage of features assessed as in 'favourable' or 'unfavourable' condition on SSSIs in Scotland varied between category III

Table 1
UK protected area designations from the WDPA (World Database of Protected Areas) and their IUCN categories assigned following Crofts et al. (2014) and Underwood et al. (2014). Areas for individual designations do not take account of overlaps between designations. Total areas for IUCN categories account for overlaps both within and between categories. Where overlapping designations with different IUCN categories exist, the area was included in the 'highest' category, with categories ordered Ia ('highest'), II, III, IV, VI, V ('lowest') and lastly NA, where the designation does not meet the IUCN definition of a protected area. I to IV are designations in the stricter protection categories. Area statistics are given to the nearest km^2, while percentage of the UK's land area is given to 2 decimal places.

IUCN category	Designation	Area in km^2	Total category Area in km^2	% of UK Land Area
Ia	Nature Reserve	9	9	< 0.01
II	Nature Reserve	339	1305	0.53
II	National Nature Reserve	1243		
III	Nature Reserve	1	571	0.23
III	National Nature Reserve	12		
III	World Heritage Site (natural or mixed)	22		
III	Site of Special Scientific Interest	549		
IV	Wildland reserve	192	25,922	10.58
IV	National Nature Reserve	262		
IV	Nature Reserve	924		
IV	Area of Special Scientific Interest (NI)	999		
IV	National Nature Reserve	1097		
IV	Ramsar Site, Wetland of International Importance	4687		
IV	Site of Community Importance (Habitats Directive) (including Special Areas of Conservation)	13,007		
IV	Special Protection Area (Birds Directive)	16,151		
IV	Site of Special Scientific Interest	19,729		
VI	Nature Reserve	30	27	0.01
VI	UNESCO-MAB Biosphere Reserve	226		
V	Nature Reserve	1338	33 315	13.60
V	Area of Outstanding Natural Beauty (England and Wales)	19,714		
V	National Park	23,038		
NA	Voluntary Reserve	1	8759	3.58
NA	Local Nature Reserve	442		
NA	Regional Park	438		
NA	Heritage Coast	1550		
NA	Area of Outstanding Natural Beauty (NI)	3142		
NA	National Scenic Area (Scotland)	10,076		

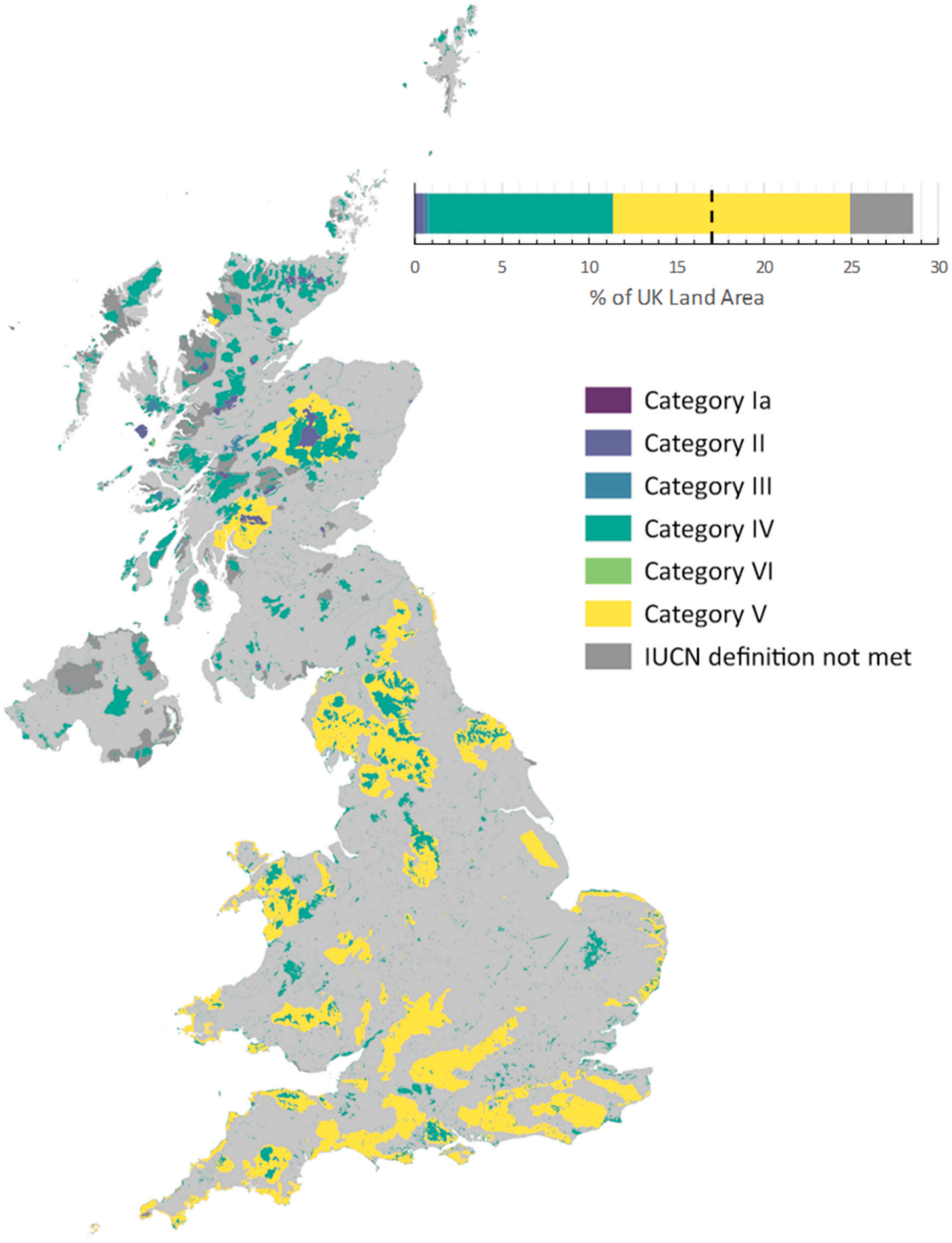

Fig. 1. Designated sites in the UK with IUCN categories assigned following Crofts et al. (2014) and Underwood et al. (2014). Dark grey areas indicate sites recorded in the WDPA (World Database of Protected Areas) but with designations assessed as not meeting the IUCN definition of a protected area. Where overlapping designations with different IUCN categories exist, the 'highest' category is shown, with categories ordered Ia ('highest'), II, III, IV, VI, V ('lowest'). The dashed line on the inset bar indicates the 17% coverage target from Aichi Target 11.

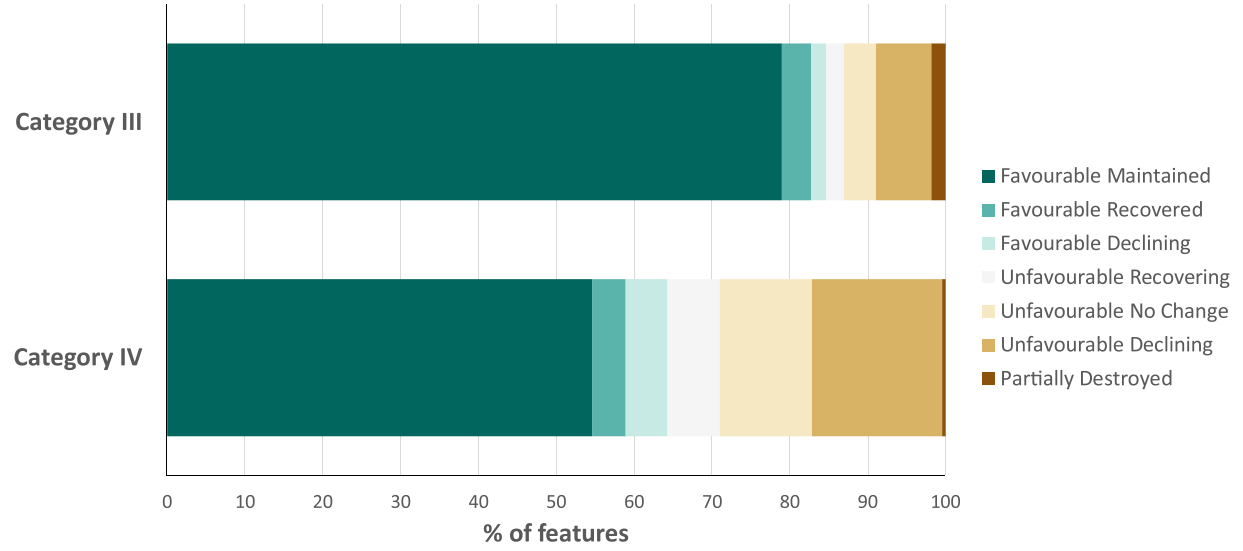

Fig. 2. Condition of features on category III and category IV SSSIs in Scotland.

and category IV sites (Fig. 2). On category III sites, 418 out of 505 features assessed (82.8%) were recorded as either 'favourable recovered' or 'favourable maintained', compared to 1 876 out of 3 182 features assessed (59.0%) on category IV sites (Fig. 2). Some 66 out of 505 features assessed (13.1%) on category III sites, and 923 out of 3 182 features assessed (29.0%) on category IV sites, were recorded as 'unfavourable no change', 'unfavourable declining' or 'partially destroyed' (Fig. 2).

4. Discussion

Our assessment of the extent of land effectively protected for nature conservation in the UK varied greatly depending on the types of protected areas considered and the definition of 'effectively protected', as measured by the condition of sites. The most conservative estimate, considering only more strictly protected and more natural areas (categories Ia-IV), and estimating effective protection based on the percentage of features in 'favourable' condition, suggests that as little as 4.9% of UK land area could be considered effectively protected. However, including all IUCN categories and estimating effectiveness based on features in both 'favourable' and 'unfavourable recovering' condition, would suggest up to 21.1% of UK land cover may be effectively protected. This latter assessment was the only one in which the UK was found to meet the 17% coverage target set out in Aichi Target 11. We suggest that this latter figure is at best optimistic, as it assumes that 'unfavourable recovering' areas are all recovering and that the condition of these Category IV protected areas which are monitored is a suitable proxy for condition of unmonitored Category V protected areas.

Calculations of protected area extent within different categories were complicated by the high level of spatial overlap between protected areas with differing designations. For example, many areas designated as National Parks and AONBs (category V) are also designated as SPAs or SACs as part of the European Natura 2000 network (category IV), which in turn are usually nationally designated as SSSIs/ASSIs (Categories III and IV). Overlapping protected area designations are not unique to the UK, but occur across the world (Deguignet et al., 2017). It is essential to take these spatial overlaps into account in order to avoid double counting and over-estimation of the coverage of protected areas, but moreover to understand management objectives and effectiveness across a complex protected area network. This presents a particular challenge in countries where not all protected area boundaries are mapped. As of December 2020, 7.81% of sites in the WDPA were represented by single point locations only (UNEP-WCMC and IUCN, 2020).

A common criticism of the focus on areal coverage as the headline indicator for Aichi Target 11 is that it includes sites that are not well managed for nature and those that are in poor condition (Boitani et al., 2008; Leroux et al., 2010; Locke and Dearden, 2005). Progress may therefore be artificially inflated without delivering meaningful conservation outcomes i.e. 'paper parks' (Di Minin and Toivonen, 2015; Visconti et al., 2019; Watson et al., 2014). In our analysis, the greatest source of variation in our estimates of the extent of land effectively protected comes from the condition assessments, specifically whether sites in 'unfavourable recovering' condition indicate effective protection. 'Unfavourable recovering' condition status indicates that a site or feature fails to meet the standards but has appropriate management in place that will achieve those standards. Data from the UK Biodiversity Indicator C1c on the condition of protected areas shows little change in the percentage of sites recorded as in 'favourable' or 'unfavourable recovering' condition over the last 10 years (JNCC, 2020). This could call into question whether these sites have appropriate management in place for their recovery, or it may simply be a reflection of the infrequency of site monitoring.

The Common Standards Monitoring protocol originally set out a six-year monitoring cycle, but recent changes now allow less regular site checks (JNCC (on behalf of the Common Standards Monitoring Inter-agency Working Group), 2019). Indeed, some 78% of English SSSIs have not had a site visit to monitor their condition in the last six years (since 2015) (Pow, 2021) and 52% of Scottish SSSI features had not been monitored in the six year period between 2013 and 2019 (Gougeon, 2019).

In Scotland, we found evidence of differences in condition between sites in different IUCN categories, with features on category III SSSIs (natural monuments or features) more likely to be in 'favourable' condition than features on category IV SSSIs (habitat/species management areas) (Fig. 2). This is not to suggest causality, but points to a correlation between IUCN categories and site condition, and highlights the need for metrics of effectiveness that are representative of all types of protected areas.

Although the IUCN protected area categories are not strictly hierarchical, categories V and VI are described as less strictly protected than categories Ia-IV, and category V is described as representing the least natural conditions (Dudley, 2008). It is notable that over half of the area of land designated in the UK falls under category V designations only; the majority of this in National Parks and AONBs (in England and Wales). Without the contribution of these sites, coverage of UK land area would be just 11.35%. Category V protected areas have been shown to be under greater pressure than sites in any other category globally (Jones et al., 2018) and in England, the condition of SSSIs inside National Parks was found to be worse than those outside National Parks, with just 26% of the area of SSSIs inside National Parks in 'favourable' condition, compared to 44% outside (Cox et al., 2018). In 2015 the UK's National Parks, AONBs and World Heritage Sites were listed as 'downgraded' on the protected area downgrading, downsizing, and degazettement (PADDD) tracker following a government decision to authorise hydraulic fracturing ('fracking') for natural gas beneath them in England and Wales (Kroner et al., 2019), a decision which has since been overturned on safety grounds.

The term 'National Park' has been applied differently in different countries, spanning every IUCN category (Dudley, 2008; EEA, 2012). In order to provide a common format for critical review of the legislative and policy context, governance and management objectives of different designations in the UK, Statements of Compliance were adopted for each type of site considered at the time to meet the IUCN protected area definition (Crofts et al., 2014). The National Parks' Statement of Compliance from PNOTM states that 'nature conservation does not have sole priority', although it does recognise that 'there is much more that can be achieved in terms of conserving and enhancing biodiversity' and that 'IUCN can expect those National Parks who are a party to this Statement of Compliance to make sure that all future management plans give a high priority to the conservation of nature', reflecting the finding that National Parks have a significant contribution to make to the UK's protected area network (Defra, 2019; Lawton et al., 2010).

The character of the UK's 'National Parks' (in England, Wales and Scotland, noting that there are no National Parks in Northern Ireland) is such that it has been questioned whether they even constitute protected areas (Crofts et al., 2014; Locke and Dearden, 2005). Instead of large, mainly natural areas managed to protect ecosystems, these National Parks are very much lived-in, working landscapes (Crofts et al., 2014). We recognise the need for protected areas which are inclusive of communities and acknowledge the cultural heritage value of areas such as the National Parks in the UK. The 'Sandford Principle' in the UK stated that in cases of conflict between nature conservation and other management goals, nature conservation should take priority (Sandford, 1974) and this principle is commensurate with in the IUCN definition of protected areas (Dudley, 2008). However, this clause was removed under the 1995 Environment Act.

5. Conclusion

Although we have focussed on the UK as a case study, our analysis has global implications. The UK government is reporting to be on track towards achieving Aichi Target 11 and, taking unconditional protected area coverage alone, it is on the verge of fulfilling the proposed 2030 target of 30% protected land and seas (CBD, 2021). However, considering the evidence which we have presented here, it is arguable whether the UK is yet fulfilling Aichi Target 11 in terms of effective protection of nature. Protected area figures reported by Parties to the CBD under Aichi Target 11 will vary depending on the precise definition of 'protected area' that they choose to adopt. We would argue that there needs to be greater emphasis on site condition, management and representativeness when determining whether a country can be said to be meeting its targets. When we account for this in the UK, we see that it makes the difference between apparently meeting and failing to meet the target by some considerable margin.

Target 11 is one of only five of the 20 Aichi Targets for which, globally, there is evidence that the target has been partially achieved. This partial achievement is down to the meeting of the two elements linked to areal protection of at least 17% of land and 10% of seas (Secretariat of the Convention on Biological Diversity, 2020). Such progress has been attributed to elements of Target 11 being clearer than the other targets and SMART targets have been shown to deliver more substantive progress (Green et al., 2019). However, our analysis indicates that while one headline figure has been met, the overall target and its ambition have not been met in the UK. This might indicate that targets need to be more prescriptive about the details of protection required by the successor to Aichi Target 11, and be able to measure this progress in a transparent standardised way at the national scale (Buchanan et al., 2020).

We recognise that legal designation is not the only mechanism for site-based conservation and that Other Effective Area-Based Conservation Measures (OECMs) have a significant role to play in future site-based conservation networks (IUCN WCPA Task Force on OECMs, 2019). It is clear however that our current system of protected areas is not halting the loss of biodiversity globally (Secretariat of the Convention on Biological Diversity, 2020; WWF, 2018) or nationally in the UK (Hayhow et al., 2019) and there is mixed evidence for the effectiveness of protected areas in halting or reversing biodiversity declines (Coad et al., 2015; Geldmann et al., 2019). Simply designating an area is not enough to 'stop the rot', and equal attention needs to be given to ensuring that the conditions for success are met (Geldmann et al., 2020, 2019).

An effective global protected area estate will incorporate protected areas across all of the IUCN categories, and to this end there needs to be consistency with which IUCN categories are applied to national designations (Deguignet et al., 2017; Leroux et al., 2010). Critically, we strongly suggest that the less natural, more inclusive categories (V and VI) should not be used by governments to artificially inflate protected area coverage statistics (Locke and Dearden, 2005). Although the PNOTM project (Crofts et al., 2014) considered National Parks and AONBs (in England and Wales) to meet the definition of category V protected areas, it also stated that 'If the credibility of the protection offered by such areas is undermined, the case for their retaining IUCN recognition may need to be

re-visited'. The recent Landscapes review of National Parks and AONBs in England, commissioned by the UK government as part of its 25 Year Environment Plan (Glover, 2019), explicitly calls for these landscapes to have a new mission to become exemplars of IUCN Category V protected areas. We welcome this ambition, but we also note that, to our knowledge, there has as yet been no official government response to the review. If the UK government does not place greater priority on nature conservation in these areas, it calls into question whether they can legitimately be considered to contribute towards protected area coverage metrics against international targets.

In approach to the 15th Conference of the Parties to the Convention on Biological Diversity in Kunming, China, the existing Aichi Targets are being evaluated and ambitious new proposals are being discussed. The first draft text of the post-2020 Global Biodiversity Framework calls for 30% coverage of land and sea by 2030 (CBD, 2021). It also recommends that positive aspects of Aichi Target 11 should be built on, while negative aspects are learned from. Protected area management effectiveness, connectivity and representativeness are all mentioned as suggested elements to be monitored, and the importance of these elements cannot be overemphasized. As we have demonstrated in the UK, without proper scrutiny of these fundamental features and appropriate metrics with which to measure them, we risk securing a global agreement which rewards the designation of large areas of poor-quality land with little value for nature.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

CRediT authorship contribution statement

Thomas Starnes: Conceptualization, Methodology, Validation, Formal analysis, Data curation, Writing – original draft, Writing – review & editing. **Alison Beresford:** Conceptualization, Methodology, Formal analysis, Writing – review & editing, Visualization. **Graeme Buchanan:** Methodology, Writing – review & editing. **Matthew Lewis:** Formal analysis, Data curation, Visualization, Writing – review & editing. **Adrian Hughes:** Formal analysis, Writing, review & editing. **Richard Gregory:** Conceptualization, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

The authors would like to thank the following people for their contributions to the quality of manuscript: James Borrell, Georgina Chandler, Jane Clarke, Nigel Dudley, Stephen Grady, Alice Groom, David Hampson, Kate Jennings and Sue Stolton. We also thank an anonymous reviewer and David Stroud for detailed and insightful comments on an earlier version of this paper.

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