Plantlife

Identifying and conserving Important Plant Areas (IPAs) around the World

A guide for botanists, conservationists, site managers, community groups and policy makers

Plantlife

Royal Botanic Gardens Kew

Contents

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1 Context

1.1 Aims

Important Plant Areas (IPAs) are the most important places in the world for wild plant and fungal diversity that can be protected and managed as specific sites. The aim of the IPA programme is to identify these priority sites using three criteria – threatened species, exceptional botanical richness and threatened habitats – and to work towards their conservation and management.

Threats to wild plant and fungal species and their habitats are severe, widespread and show little sign of declining. Current estimates suggest that one in five of the world's plant species is threatened with global extinction. Only 5% of the world's plants have been assessed for their conservation status using IUCN criteria and there is currently no global list of threatened habitats (Bachman et al., 2016). Plant and fungi data are often unavailable or scattered in diverse places and formats, and for these reasons are poorly represented in national or international conservation planning. In the absence of plant data, bird or mammal data, such as the Important Bird Areas (IBA) programme, are often used as a proxy for all biodiversity. And while there are overlaps, there is wide variation in the level of the overlap between bird and plant sites. For example, there is only a 53% overlap between IPAs and IBAs in Europe and the Mediterranean region (Darbyshire et al., 2017). In addition, the sites identified for birds or mammals tend to be managed for those groups rather than for their plant interest. There is a clear and urgent need to improve the level of plant data used in conservation planning and management (Darbyshire et al., 2017).

The IPA programme is a tried and tested framework for bringing together all available plant data in a consistent format to make the selection of key plant sites. IPA criteria have been trialled in a variety of data-rich and data-poor countries for over 15 years and, after a global consultation process, the criteria were revised in 2015 to take into account the experiences of IPA practitioners, and to fine tune them for global application. The revised criteria also include a greater role for culturally and economically useful plants as a key means of encouraging wider participation in the identification and conservation of IPAs. The IPA criteria provide a robust, scientifically rigorous framework for identifying sites. The underlying ethos of the programme is a bottom up approach, which recognises the many benefits of national decision making in the long-term conservation of sites, and which encourages pragmatism, and transparent, peer-reviewed, expert opinion in the selection process. A national IPA team selects national IPAs from a range of potential IPAs which they consider will best prioritise conservation efforts. Complementarity of sites is one of the guiding principles in selecting a national IPA network.

Gathering together the available national data, and data from neighbouring countries where possible, provides key information which can support and underpin many other national and international conservation frameworks including protected area networks, Key Biodiversity Areas (KBAs), the CBD and Aichi Targets on Biodiversity, the IUCN Red Listing process and ultimately the Sustainable Development Goal 14: Life on Land. IPA identification begins at the national level which allows countries to start immediately without the necessity to wait for global assessment to be completed beforehand.

Identification of sites is a vital tool for conservation but not an end in itself. This guide includes a range of examples where organisations are taking steps to bridge the gap between identification and effective conservation. These include site and species measures, engaging with national and international policy frameworks, and community conservation routes.

The aim of this booklet is to provide guidance on applying the IPA criteria, practical advice on decision making for IPA teams, and a range of case studies from around the world to illustrate key ways to identify and conserve IPAs. It is intended to provide relevant, accessible information to national IPA teams, botanists, conservationists, site managers, community groups and policy makers.

The IPA network is intended to be dynamic. Where possible, national IPA teams should develop a **monitoring system** and should aim to review their network at least once every 10 years.

This review should include:

- All relevant data on changes in the condition of existing sites, species or habitats.
- Proposals for new IPAs or IPA qualifying species or habitats.
- The proposed removal of sites, species or habitats from the network which no longer qualify under the IPA framework.

1.2 Ten good reasons to identify and conserve IPAs

- Highlighting and conserving key plant sites can lead to improved livelihoods and community benefits through better awareness and management of key plant resources for materials, food and medicine, ecosystem services, greater recognition of the value of spiritual or religious groves, or sustainable eco-tourism.
- All nationally available plant, fungi and habitat data are brought together in an accessible and consistent format for a range of national and international audiences.
- Identifying priority plant and fungi sites allows local, national and international stakeholders to target conservation resources and action.
- Participation in IPA national teams provides a framework for co-operation, sharing skills and data, and developing expertise at the national level and beyond.
- IPA data provide an independent review of existing protected area networks in relation to their wild plant, fungi and habitat features. This review can highlight gaps, add to the network's biodiversity value, and provide information for future management planning.
- Easily accessible IPA data and maps can ensure that the importance of key plant and fungi sites are taken into account in local, regional and national planning and land management decisions.
- Easily accessible IPA data and maps can ensure that national and international developers, funders and financiers take account of priority plant sites in the mitigation hierarchy (Avoidance, Minimisation, Restoration and Offsetting).
- IPA data help to fulfil international reporting obligations on biodiversity including the Global Strategy for Plant Conservation, the CBD and Aichi Targets, and the Sustainable Development Goals. IPA data also enable participation in other international frameworks such as the IUCN Red Listing of species and of Ecosystems, and the Key Biodiversity Areas (KBA) programme.
- IPAs can highlight the high plant and fungi value of a particular country, and provides easily accessible information on plants and fungi to national and international scientists, policy makers, funders and tourists.
- Knowledge of the global value of key plant sites can be a source of pride which helps to encourage a wide range of individuals, organisations and communities to take part in the long-term conservation of sites.

1.3 Historical perspective of the IPA programme

1.3a Legislative drivers

Important Plant Areas were formally recognised as a key tool for conserving plant and fungi diversity in 2001 under the European Plant Conservation Strategy (EPCS), co-ordinated by the Planta Europa Network and the Council of Europe. The EPCS was part of global efforts to develop the Global Strategy for Plant Conservation (GSPC) which was adopted by the Convention on Biological Diversity (CBD) in 2002.

Target 5 of the updated GSPC (2011 to 2020) asks governments around the world to ensure that "*at least 75 per cent of the most important areas for plant diversity of each ecological region are protected with effective management in place for conserving plants and their genetic diversity*".

Plants and fungi are the basis of global, terrestrial ecosystems and the ultimate success of the CBD and the Sustainable Development Goals will depend in large part on the successful delivery of the Global Strategy for Plant Conserving, including Target 5. Important Plant Area identification and conservation programmes are a means for the 168 signatory governments to fulfil their commitments to deliver the targets and objectives of the CBD.

IPA programmes also provide data and encourage conservation action which supports and underpins other international conservation legislative frameworks including the European Union Habitats Directive, the Council of Europe's Berne Convention, CITES, and the RAMSAR Convention. The IPA programme was inspired by the success of the Important Bird Area (now Important Bird and Biodiversity Area) Programme, developed by Birdlife International, in influencing conservation legislation and action.

Training women in herbal medicine
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1.3b **IPA criteria review**

The first IPA criteria were developed through extensive consultation with the botanical community and recognised the basis for all IPA identification as the presence of threatened species, exceptional botanical richness and threatened habitats (Palmer & Smart, 2001).

In 2002 an IPA site selection manual identified accepted sources and methods for recognising threatened species, botanical richness and threatened habitat in the European context (Anderson, 2002). The sources included the IUCN Global Red List, appendices of the European Union Habitats Directive and the Council of Europe's Berne Convention, and national and sub-national endemics recognised as threatened on national Red Lists.

In 2004 global identification criteria were published and by 2010 69 countries across the world had initiated or completed IPA identification projects (Plantlife, 2004, 2010a). In 2015 the launch of the Tropical Important Plant Areas (TIPAs) Programme by the Royal Botanic Gardens Kew, and the accumulated experience of more than a decade of IPA identification and conservation projects precipitated a global consultation process enabling a formal revision of IPA criteria to fine tune them for a range of global contexts. The criteria revision process has been published in detail (Darbyshire et al., 2017) and this publication describes how to apply these revised criteria in practice.

1.3c **IPA projects around the world**

Europe was the first region to begin IPA identification projects in the early 2000s, and since then almost 70 countries around the world have been involved in IPA identification, documentation and ongoing conservation efforts. Information on many of these IPAs is held in the IPA database (*http://www.plantlifeipa.org/home*) and reports detailing these identification and conservation projects are included in the reference section of this publication.

IPA identification projects have been carried out on small islands, large diverse countries and in both data-rich and data-poor regions. These different contexts are highlighted in a series of case studies throughout this publication. An innovative approach of focusing IPA identification around medicinal plants was trialled in a cross-border project in five countries of the Himalaya (see 2.7). The many benefits of co-operation across national boundaries in the identification and ongoing conservation of IPAs have been evident in the work carried out to date. The three case studies that follow illustrate different regional contexts where IPA projects have been implemented or are planned.

1.3ci CASE STUDY: **European IPAs**

Europe has a rich mosaic of plants, fungi and habitats across a range of ecological zones. There are over 20,000 vascular plants and in the most recent European Red List of 1,826 selected species, 467 were threatened with extinction (Bilz et al., 2011). In comparison with many parts of the world, much of Europe has well-documented plant and habitat data including national Red Lists, regional threat lists for species and habitats, and Global Red List assessments for plant species. Fungi, lichen, algae and bryophyte data are also available in many European countries and were used in the identification of IPAs (see 2.6).

IPA identification began in Turkey and currently 1994 IPAs have been identified in 27 European countries (Anderson, Kušik & Radford, 2005; Blasi et al., 2011; Byfield et al., 2010; Plantlife 2010b, 2015, 2016; Radford & Odé, 2009). From 2002 to 2009, 11 countries were part of joint identification projects which helped to foster regional data and skill sharing. In addition, IPA information sessions were held at European regional workshops and through the Planta Europa Network.

Analysis of the IPA database and the World Database of Protected Areas revealed that 85% of IPAs in Europe and the Mediterranean region have formal protection in at least some part of the site. In Croatia, the level of protection rose from 19% in 2010 to 93% due in part to the inclusion of IPAs within the European Union's Natura 2000 Network (Darbyshire et al, 2017). Analysis of threats to European IPAs in 2010 highlighted poor forestry practices, land abandonment, tourism development and lack of site management plans as main conservation issues (Plantlife 2010b).

IPA conservation projects are well developed in several European countries. In the UK, Plantlife uses the IPA network as the basis for its plant conservation programme, including the targeting of species, habitat and site management, public awareness raising, land manager engagement and influencing legislation and policy. In Turkey, Macedonia, Romania, Bulgaria and Montenegro, networks of individuals and community organisations are engaged in skills training and the ongoing conservation and management of IPAs (IPAMed Network Website, OBANET Website, Plantlife 2013).

1.3cii CASE STUDY: **IPAs in the south and east Mediterranean**

The Mediterranean region contains 10% of the world's higher plants in an area representing 1.6% of the Earth's surface, with 13,000 plant species occurring nowhere else. Large-scale hotspots including 10 mini-hotspots have been identified, but at too large a scale for site-based action. Plant data from the south and east of the region are often poor, out of date or unavailable altogether and only 176 species were assessed for inclusion in the IUCN Global Red List by 2010. The lack of suitable base-line data at the national, regional and global level prompted the first revision of the IPA criteria to include species with very limited range but which had no formal Red List assessment. These were Aiii (species with an extent of occurrence <100km²) and Aiv (species with an extent of occurrence <5,000km²). This experience of working with very low base-line data informed the revision of the IPA criteria in 2015 to accommodate other data-poor regions (Radford, Catullo & de Montmollin 2011).

A project to bring together scientists from the south and east Mediterranean to identify IPAs was initiated in 2010 and co-ordinated jointly by the IUCN Mediterranean Office, Plantlife International and WWF. 207 IPAs were identified in 11 countries. This was the first regional, systematic assessment of threatened plant species and their key sites, and an opportunity for botanists from Albania, Algeria, Egypt, Israel, Lebanon, Libya, Jordan, Morocco, the Occupied Palestinian Territories, Tunisia and Syria to work together to identify regional problems and solutions. The project also produced a draft list of threatened species to act as a priority list of plants which should undergo formal IUCN Red List assessment.

Since the first pilot identification work, there has been a follow-up programme to ground truth desk data, to develop species monitoring and management plans, to include habitat data, and to improve site management processes for plants and habitats. Project information is included in the IPAMed Network Website (*http://www.medplantsnetwork.net/*).

An analysis of IPAs in Europe and the Mediterranean highlighted that there was a 53% overlap between IPAs and Important Bird and Biodiversity Areas, indicating the need to ensure data from a range of organisms are used to identify priority global sites for all biodiversity (Darbyshire et al, 2017).

1.3ciii CASE STUDY: **Tropical Important Plant Areas**

The Sampled Red List Index (SRLI) indicates that as many as one in five of the world's plants are threatened with extinction, and many of these plants live in the Tropics (Bachman et al., 2016). Plant and habitat data for the diverse tropical regions are often scattered, in diverse formats, or unavailable and consequently little used in conservation planning or action at the national, regional or global level. The Royal Botanic Gardens, Kew (Kew) have identified the urgent need to work with national teams to identify Important Plants Areas in these regions to prioritise plant conservation needs. Kew included the target of identifying IPAs in seven countries (Bolivia, Cameroon, the Caribbean UK Overseas Territories, Guinea, Mozambique, Indonesian New Guinea and Uganda) by 2020 as part of their Science Strategy 2015 to 2020 (RBG Kew, 2015).

Kew worked together with Plantlife to revise the IPA criteria through a global consultation in 2015 to apply the lessons learned over the past sixteen years, and to make the criteria more applicable at the global level (Darbyshire et al., 2017). The first site assessments under the tropical IPA programme have been made in 2017 in the British Virgin Islands (*https://www.kew.org/science/projects/tropical-important-plant-areas-in-the-british-virgin-islands-bvi-tipas*).

Campo-Ma'an National Park, Cameroon ©Xander van der Burgt

Rare shrub *Dissotis leonensis* on the Benna Plateau, Guinea ©Xander van der Burgt

1.3d Key dates for IPAs

2001	• First IPA criteria published for Europe (Palmer & Smart, 2001) and IPAs included in the European Plant Conservation Strategy (2001-2007)
2002	• IPAs included as Target 5 in the CBD Global Strategy for Plant Conservation of the CBD • IPAs in Central and Eastern Europe project (Plantlife and national partners) • IPA online database launched • IPA Site Selection Manual for Europe published (Anderson, 2002)
2004	• First Global IPA guidelines published by Plantlife
2006	• IPAs in South East Europe project launched (Plantlife and national partners) • IPAs in the South & East Mediterranean project launched (IUCN Mediterranean Office, Plantlife, national partners)
2007	• Medicinal Plant IPAs in five countries of the Himalaya report published (Plantlife and national partners, Hamilton & Radford 2007)
2010	• IPAs Projects around the World (69 countries), and 10 years of the IPA Project in Europe compiled for the CBD COP in Nagoya (Plantlife, 2010a)
2011	• IPAs retained as Target 5 of new CBD Global Strategy for Plant Conservation (2011-2020) • Publication of IPAs in the Mediterranean (IUCN Med, Plantlife, national partners) (Radford et al., 2011) • IPA conservation programmes in Turkey and south-east Europe include networks of site volunteers, site management planning and the preparation of the WildFlower Europe project for ecotourism
2015	• Royal Botanic Gardens Kew includes the Tropical IPA programme in seven tropical countries in its Science Strategy (2015-2020) • Kew and Plantlife undertake a joint consultation and review of the global IPA criteria and published revised criteria
2017	• Revised IPA Criteria, Rationale and Aims published in Biodiversity & Conservation (Darbyshire et al., 2017) • First tropical Important Plant Area formally identified as the island of Anegada in the British Virgin Islands

1.4 IPAs and conservation legislation and frameworks

Governments around the world have signed up to deliver a series of biodiversity targets under international agreements and legislation and the IPA programme can provide essential information to report on and deliver these targets. Other conservation frameworks such as the IUCN Red Listing Process provide respected scientific evidence for identifying conservation needs.

Frameworks/legislation	Target(s)	Notes and links
Global		
Convention on Biological Diversity (CBD)	*196 countries around the world are signatories of the CBD and have committed to delivering its targets*	*https://www.cbd.int/convention/*
• Global Strategy for Plant Conservation (2011 to 2020)	Target 5: *At least 75% of the most important areas for plant diversity of each ecological region protected with effective management in place for conserving plants and their genetic diversity*	*https://www.cbd.int/gspc/* Identifying and conserving IPAs are a key route to delivering Target 5, and can also contribute to delivering targets 2, 3, 4, 7, 9, 10, 13, 14 and 16
• Aichi Biodiversity Targets	Target 11: *By 2020, at least 17% of terrestrial and inland water, and 10% 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 landscape and seascapes*	*https://www.cbd.int/sp/targets/* IPAs can help deliver Target 11 but are also relevant to other targets including 1, 2, 9, 12, 13, 14, 16, 18, and 19
• Nagoya Protocol	The Nagoya Protocol provides a legal framework for implementation of the fair and equitable sharing of benefits arising out of the utlilisation of genetic resources. The Protocol also covers traditional knowledge associated with genetic resources	*https://www.cbd.int/abs/* The principles of IPA identification and conservation, especially of useful plants should comply with this protocol
• Ecosystem Approach	The Ecosystem Approach is the primary framework for action under the CBD. It is a strategy for the integrated management of land, water, and living resources that promotes conservation and sustainable use in an equitable way. There are 12 principles and case studies available on the CBD site	*https://www.cbd.int/ecosystem/* IPA selection and conservation should take account of the wider ecosystems elements and services

United Nations		
Sustainable Development Goals (SDGs)	Goal 15 Life on Land: Sustainably manage forests, combat desertification, halt and reverse land degradation, halt biodiversity loss	*http://www.un.org/sustainabledevelopment/sustainable-development-goals/* On 1 January 2016, the 17 Sustainable Development Goals (SDGs) of the 2030 Agenda for Sustainable Development — adopted by world leaders in September 2015 at an historic UN Summit — officially came into force. By 2030, with these new Goals that universally apply to all, countries will mobilise efforts to end all forms of poverty, fight inequalities and tackle climate change, while ensuring that no one is left behind. IPA identification will contribute to several goals and Goal 15 in particular
IUCN, the World Conservation Union and the KBA Partnership		
IUCN Red List Programme for Species	The IUCN Red List of Threatened Species provides a widely recognised global threat list of plant and animal species using standardised criteria. The 2017-3 release listed 91,522 species, of which 24,230 are plants. The aim is to increase the total number of species on the red list to 160,000.	IPA identification can help prioritise species to go forward for Red Listing. Global Red Listed Species are Ai in IPA criteria
IUCN Red List of Ecosystems	The IUCN Red List of Ecosystems is a global standard to assess the conservation status of ecosystems. Objectives: A global assessment of ecosystems by 2025; technical support for assessments; Red List criteria can be applied to ecosystems of particular interest.	*http://iucnrle.org/about-rle/rle/* When Ecosystem Red Lists become available, they can be incorporated in Criterion Ci. IPA identification can provide base-line data for Ecosystem assessment
Key Biodiversity Areas KBAs Global Standard	The criteria for selection of global KBAs were published by IUCN in 2016 with the aim of locating and highlighting sites that make significant contributions to the global persistence of biodiversity. The KBA database is managed by Birdlife International on behalf of the KBA Partnership *http://www.keybiodiversityareas.org/home*	*https://portals.iucn.org/union/sites/union/files/doc/a_global_standard_for_the_identification_of_key_biodiversity_areas_final_web.pdf* IPA criteria overlap with some of the KBA criteria and IPA programmes can provide essential information for the inclusion of plants in KBAs
Other international frameworks and programmes		
The Mitigation Hierarchy	The Mitigation Hierarchy is a decision-making framework to address impacts on biodiversity and ecosystem services by applying the principles of avoiding impact where possible, minimising or restoring impacts, and as a last resort using biodiversity offsetting. It is widely promoted by international banks and companies but the Cambridge Conservation Forum has highlighted the tendency for avoidance and minimisation to be neglected and have published guidelines for good practice. (see section 1.5.c for details)	*http://www.conservation.cam.ac.uk/collaboration/strengthening-mitigation-hierarchy-greater-conservation-gains* (Phalan et al., 2017) Identifying and disseminating information about IPAs ensures that key plant sites can be considered in impact assessments and are priority sites for avoidance and minimisation actions
ICCA Registry (Indigenous and Community Conservation Areas Registry, ICCA)	The defining characteristics of an ICCA is that a people or community are closely connected with an area or species and take the major role in their management, governance and conservation. ICCAs do not have to be protected areas	*ICCA Consortium http://www.iccaconsortium.org/* ICCA Registry and Toolkits *http://www.iccaregistry.org/*
RAMSAR Convention	The Ramsar Convention on Wetlands is an intergovernmental treaty to promote the conservation and wise use of wetlands and their resources	*http://www.ramsar.org/* IPAs that include wetland features are potential Ramsar sites and IPA data could feed into the qualifying features and management plans of existing RAMSAR sites
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	CITES is an international agreement between countries to ensure that international trade in plants and animals does not threaten their survival. There are 189 signatories to the convention.	*https://www.cites.org/* Any information or issues relation to CITES plant species on IPAs should be shared with national CITES representatives and the CITES secretariat

European		
Bern Convention	The Council of Europe's Bern Convention (1979) was the first international treaty to protect both species and habitats and now covers most of the European Continent and some African States.	*http://www.coe.int/en/web/bern-convention* IPA criteria use Bern Convention species and habitats in Europe, and IPAs can provide data for the Emerald Network
EU Habitats Directive	The Birds and Habitats Directive and the Natura 2000 Network are the main legal instruments for conserving species and habitats in the EU 28 member states. Over 1,000 species and 200 habitat types are listed for protection	*http://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm* IPA criteria in Europe use Habitats Directives species and habitats and IPAs can provide data for the Natura 2000 Network
European Plant Conservation Strategies (2001-2007 and 2008-2014)	The identification and conservation of Important Plant Areas was included as Target 5 of both European Plant Conservation Strategies and the European work helped to develop and promote the concept of IPAs with the CBD Global Strategy for Plant Conservation	*http://www.plantlife.org.uk/uk/our-work/publications/european-plant-conservation-strategy* *http://www.plantlife.org.uk/uk/our-work/publications/sustainable-future-europe-european-strategy-plant-conservation-20082014*

1.5 Moving from identification to conservation of IPAs

Identifying key sites is a fundamental process but it is only one step in the long-term conservation of sites, species and habitats. Ongoing conservation of IPAs includes a much wider range of stakeholders than the IPA identification process and can seem an overwhelming task for small teams of botanists. One of the aims of this guide is to engage others in the process and adopt low-cost and effective ways to disseminate IPA data to key audiences so that IPAs are integrated into the local and national conservation network. Existing information and toolkits on site, species and habitat management is provided, as well as examples of successful IUPA strategies which could be replicated in other countries and regions.

IPA national network

The team of individuals and organisations who identify the national IPA list should involve a wide range of botanical and conservation specialists either as core team members, providers of data or individual site experts. However, botanists alone will never be able to conserve IPAs. Involving other key stakeholders including protected area managers, local and national government representatives, community groups and individuals living in or around IPAs, and school and college teachers, from the very beginning of the process is one model for increasing the effectiveness of long term IPA conservation (see section 2.1).

IPA data management

Disseminating key information on IPAs to a wide range of audiences at the local, national and international level is a vital route to long-term conservation. The more people who know where IPAs are, why they are important, and how best to manage, protect and conserve them, the better the chances of their long-term survival. There are many digital methods for quickly, cheaply and safely disseminating key IPA information and they are discussed in section 1.4c and section 3.

Engaging support by demonstrating wider benefit

If IPAs are only thought of as interesting to a few botanists and mycologists, with little relevance for anyone else, they will not succeed in halting the decline of plant species or habitats. Raising awareness of the benefits and potential benefits of IPAs is as important as identifying the sites themselves. These include:

- **Social and economic benefits**
  - Ecosystem services (clean air and water, flood prevention, carbon capture, habitats to support other forms of biodiversity)
  - Plants for food, medicines and materials
  - Increased awareness of culturally important sites
  - Well-managed areas which balance the needs of nature and the needs of leisure and tourism
- **Political benefits**
  - Increased ability for specialists, individuals and communities to engage in land management discussions and decisions
  - Increased ability for national governments to fulfil commitments under international frameworks such as the CBD

1.5a IPAs and protected areas

IPAs are not a legal site designation. This decision was taken at the beginning of the IPA process in the early 2000s in order to provide a thorough, scientific assessment of key plant sites irrespective of their current or future legal status. Many IPAs will already be included (all or in part) within existing protected areas. For unprotected IPAs there are a range of possible conservation routes. Increased protection status may be the best solution for some IPAs, but in other cases community or landscape management strategies, or recognition under international frameworks may be the most viable option for conservation.

Making an assessment of IPAs both inside and outside of protected area systems provides an independent check on the botanical and mycological value of a country's existing network of protected sites. This IPA 'plant proofing' should highlight the main gaps where species or habitats have no current protected sites within a particular country. Formal protection status does not necessarily mean that a site is managed to conserve or restore its wild plants, fungi or habitats. Even when IPAs are located within protected areas, their botanical value may not be well known by site managers or visitors, or be included in the management plan for the site.

Part of the ongoing process of IPA conservation could be to develop a national IPAs and protected area framework, preferably with a wide range of stakeholders including botanical specialists, protected area specialists, community groups, local and national government representatives. The framework could include:

- A list of IPA species and habitats which are not included in any protected area and recommendations for potential protected areas or other management strategies to conserve them.
- A list of protected areas where the boundaries could be enlarged to take account of IPA species and habitats.
- Disseminating information on key IPA plant species, fungi species and habitats for those IPAs which are within existing protected areas to site managers and stakeholders both for individual sites and the national network.
- Developing management guides for IPA species and habitats and disseminating these in appropriate formats to have maximum benefit on the ground.
- Ensuring that the IPA label and IPA data for existing protected areas are included in the descriptions of sites in international site databases and registers such as the World Database on Protected Areas (UNEP-WCMC), the UNESCO Man and Biosphere Database and the UNESCO World Heritage Site Database.

1.5b IPA management

In Europe and the Mediterranean, 85% of IPAs have some formal protection in at least a portion of the site (Darbyshire et al., 2017). However, the lack of any management plan or the effective implementation of existing management plans was identified as an issue of concern for a significant proportion of these IPAs. Capacity and funding to develop and implement management plans is an issue in many parts of the world but there is a wide range of available advice and best practice on species, habitat and protected area and community management planning. IPA teams in some countries may be in the position to develop management plans directly for IPAs, but in others it may be that they can provide species and habitat management advice which can be used by a range of site and land managers.

1.5bi Site management guidelines and advice

Ensuring plant and fungi species flourish within healthy and diverse ecosystems is one of the main aims of the IPA programme. IPAs inside and outside of protected networks need appropriate management by land managers and land users to achieve this aim. Monitoring of any changes in the site as a whole, or the condition of individual plants and habitats on a site, is fundamental to understanding the successes and challenges of the IPA network. It is not within the scope of this publication to provide detailed guidance on developing management plans for IPAs but advice on good practice and case studies from around the world can be accessed from the sources below.

- IUCN Protected Area Programme (*https://www.iucn.org/theme/protected-areas/publications/best-practice-guidelines*)
- RSPB (*https://www.rspb.org.uk/Images/managementplanguide_tcm9-223730.pdf*)
- The European Union's Natura 2000 Network (*http://ec.europa.eu/environment/nature/natura2000/management/gp/index.html*)

1.5bii Community conservation and management planning

Indigenous and Community Conservation Areas (**ICCAs**) are defined as areas where a people or community are closely connected to a defined territory, area or species, where the community is the main decision maker in governance and management of the area, and where the community management decisions and efforts lead to the conservation of the area or species and associated cultural values. The ICCA consortium estimates that about 13% of the earth's terrestrial surface is owned/administered by communities, a substantial proportion of which are effectively conserved. The ICCA consortium currently has 107 members and 240 honorary members in 73 countries. The consortium website provides toolkits and case studies for understanding and engaging with ICCAs including their photo stories (*http://www.iccaconsortium.org/*). Areas that has been recognised as ICCAs are described in the ICCA Registry. IPA national teams could work with any existing or potential ICCAs and raise awareness of the model where appropriate as part of the IPA conservation strategy.

CASE STUDY:
Community management plan for an IPA

Long Beach IPA on the East Adriatic Coast of Montenegro is important for its highly dynamic and threatened coastal habitats. The IPA represents the best remaining coastal habitat on the Montenegro coastline and is under increasing pressure from urbanisation and invasive non-native species.

In 2017, links with the local community were established to raise awareness of the importance of the site and with support from academics, local groups and business owners, a number of beach leaseholders were identified who were seeking or already had secured 'Blue Flag' accreditation. As part of the Blue Flag scheme, site managers/leaseholders are required to undertake management to enhance the local environment. By working with these leaseholders and local community groups, training was delivered to enable species monitoring and removal of key invasive species by the beach leaseholders, as well as raising awareness of the impacts of inappropriate development on Long Beach IPA. By incorporating conservation management of the IPA into the Blue Flag award, long-term conservation efforts will be sustained.

Montenegro ©Biggunsband/www.iStockphoto.com

1.5biii Species and habitat management and monitoring

The success of the IPA programme will be determined on whether or not it leads to the conservation of plant and habitats into the future. The list of IPA criteria species and habitat establishes a priority list for conservation action within a country. IPA selection highlights where those plants and habitat occur, but management measures and monitoring are needed to prioritise actions and determine if there is positive or negative change for IPAs over time.

Species and habitats management plans have been used in many countries for decades and 189 signatory countries of the CBD have developed national biodiversity strategies and action plans. Information and existing action plans are available at *https://www.cbd.int/nbsap/*. Birdlife International has a range of tools and strategies for monitoring the IBA, now IBBA, network (Birdlife, 2006).

CASE STUDY:
Gouraya National Park IPA, Algeria.

One of the aims in the IPA Mediterranean Project is to develop species monitoring and action plans at pilot IPAs in the region. Eight plant species have been selected for monitoring and action plans at Gouraya. *Erodium battandieranum* is recognised as an IPA criteria Aiv species (area of occurrence <5000km²) and is not currently Red Listed. Monitoring measures identified the high threat from grazing, and regeneration areas within fenced enclosures have been set up to improve the outcome for this species. Monitoring and action plan methodologies and case studies from this project will become available via the IPA Med Net website (*http://www.medplantsnetwork.net/*)

Gouraya, Algeria ©Khellaf Rebbas

Gouraya, Algeria ©Khellaf Rebbas

CASE STUDY:
Oceanic heath, Scotland

Oceanic heath is a globally important but little known habitat in Scotland. It is characterised by heathland with a diverse ground layer of mosses, including globally restricted leafy liverworts, which only thrive in the oceanic climate. There is lack of awareness of this habitat, even among protected area managers, which is threatened by annual burning of vegetation for game birds and overgrazing. To tackle this issue, an advice leaflet was developed highlighting why this habitat is important, five key ways landowners can check if they have this habitat on their land, including photographs of indicator moss species, key threats and management suggestions. The guidance document is aimed at both protected area professionals and landowners who might have oceanic heath on their land. *http://www.plantlife.org.uk/application/files/3914/8233/7598/PLINKS_OceanicHeathLRes.pdf*

Steall waterfall, Glen Nevis, Scotland ©Liliaen/www.iStockphoto.com

2 Identifying Important Plant Areas

2.1 IPA national teams and how to begin an IPA project

The suggestions below have been developed from experience gathered from across the world and may not all be relevant in all countries. There are different ways to establish an IPA national team constituency. The options will depend on many factors including specialist capacity, funding support, and communication methods for working with a dispersed team, or individuals and communities in rural areas.

The IPA national team can be split into different roles such as:

- National Coordination Group (NCG)
- Technical Advisory Group (TAG)
- Wider Consultative Stakeholder Group (WCSG)

The National Coordination Group typically would be responsible for activities including:

- Identifying key roles in the IPA programme.
- Identifying and engaging a technical advisory group and a wider consultation stakeholder group, including a stakeholder analysis.
- Carrying out a botanical audit and gap analysis.
- Preparing draft criteria lists for A, B and C.
- Identifying routes for individuals and organisations to contribute data and participate in IPA reviews and consultations.
- Preparing a draft list of IPAs for consultation.
- Preparing an IPA methodology publication and collating IPA site documentation.
- Disseminating key IPA data and maps to national and international audiences via the IPA database and other data dissemination routes.
- Preparing a draft conservation, monitoring and awareness strategy for IPAs.

The Technical Advisory Group typically would be responsible for activities including:

- Providing expert advice on subjects relevant to IPA identification and conservation.
- Assisting with advice and sources for the botanical audit and stakeholder analysis.
- Reviewing the draft criteria lists for A, B and C.
- Reviewing the draft list of IPAs.
- Reviewing the IPA methodology publication and IPA site accounts.
- Reviewing the IPA conservation, monitoring and awareness strategy.
- Assisting with IPA data dissemination and awareness raising.

The Wider Consultative Stakeholder Group typically would be responsible for activities including:

- Highlighting concerns about, and suggestions for a national IPA network.
- Highlighting information relevant to the selection or conservation of IPAs.
- Reviewing draft IPA lists and providing information for site accounts.
- Providing input into the IPA conservation and monitoring strategy.
- Assisting with the identification of key areas for skills training and capacity building among IPA supporters.
- Assisting with IPA awareness raising.

2.1.1 Stakeholder engagement

It is vital to ensure good engagement with the communities who influence the management and ultimate conservation of priority plant sites. Such stakeholders will likely include a range of interest groups including botanical and conservation experts as well as local community representatives such as local farmers, land users or landowners and managers. Ensuring early and active engagement with such a broad range of stakeholders will be important in securing sustainable management and conservation of the IPAs. Maintaining this engagement with relevant stakeholders accords with the Ecosystem Approach, an underpinning principle of the CBD and the GSPC. (*https://www.cbd.int/ecosystem/sourcebook/default.shtml*)

Plantlife's experience over the previous decades has shown that it is important to establish a national co-ordination group to oversee the planning, co-ordination and delivery of an IPA identification process and ultimately, the *in situ* conservation of these areas. One of the first tasks of the national co-ordination group is to identify potential members of a technical advisory group and to carry out a stakeholder analysis to identify potential members of a wider consultative stakeholder group.

2.1.2 Botanical audit and data verification systems

An initial stage of an IPA programme is to establish a national botanical audit and gap analysis.

This audit and gap analysis could include:

- A list of individuals and organisations who have relevant skills or data.
- Collating a detailed list of relevant data sources, including both digitised and relevant written data sources.
- Consultations with other biological or conservation interest groups such as bird and mammal specialists, or protected area managers.
- Establishing contact with plant experts outside of the scientific community, such as medicinal plant collectors or healers.

Cross-border, regional and international botanical specialists can provide data, advice and a more global context for the identification and prioritisation of sites. Regional input can strengthen an IPA national programme greatly, particularly where data availability is starting from a low baseline, or where the major conservation problems require cross-border or regional solutions. Specialist Groups (SG) with IUCN's Species Survival Commission such as the Crop Wild Relative SG, Global Trees SG and the Orchid SG may be able to provide information on relevant international specialists or data sources.

IPA programmes bring together data from a range of national and international sources. Verifying the quality of these data is an important element of the assessment and should be included in all project documentation. A strong national technical advisory group and communication with regional and global experts can provide a check on the quality of the data used. Equally, national IPA data can also be used to verify or update the data used in international frameworks such as IUCN Red Listing, the World Database on Protected Areas (WDPA) and CBD national reports.

The National Coordination Group (NCG) and the Technical Advisory Group (TAG) are responsible for developing the IPA criteria lists of species and habitats which will form the basis of the IPA network.

2.1.3 Building capacity to conserve an IPA network

Botanists and mycologists alone will never be able to protect and conserve an IPA network. Identifying and enabling potential supporters is a vital part of establishing an effective IPA national programme.

Experience from other countries has shown that the earlier potential supporters are involved in the process, the greater is their ownership of the final IPA list, and the greater the potential for ongoing support. Providing mechanisms for individuals and organisations to share information, suggestions or concerns right from the beginning of IPA identification may provide a stronger response than using a finalised list of IPAs as the first point of contact with potential supporters. These supporters could include protected area or nature reserve managers, conservation NGOs (general or bird, mammal, marine specialists), government agencies (local government, environment, education, development), experts or collectors of medicinal plants, religious groups or leaders, community groups with a particular interest in or dependence on plant resources, national and local politicians, educators, journalists and eco-tourism groups.

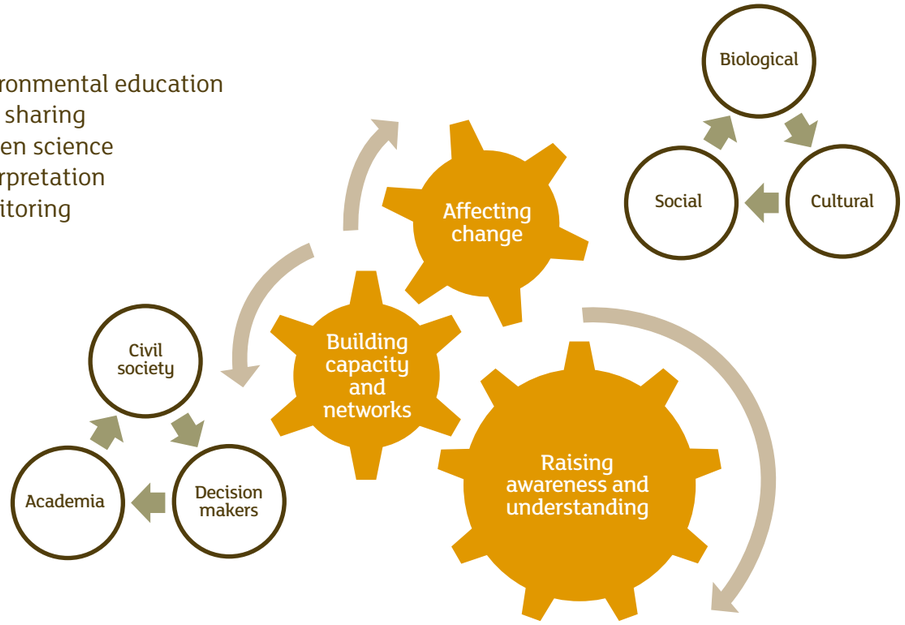
To develop this support will likely involve a number of related activities including:

- raising awareness of the botanical diversity of the country and its contribution to social wellbeing.
- increasing knowledge and skills to build increased capacity to support plant conservation and sustained conservation on the ground.

Conceptual model of capacity building

Tools

- Environmental education
- Skill sharing
- Citizen science
- Interpretation
- Monitoring



2.1.4 IPA kick-off meeting

An initial meeting to kick off a national IPA project could be split into a number of complementary sessions:

- Background information outlining the aims and methods of IPA identification for potential supporters and decision makers.
- A technical meeting with relevant specialists to collate, analyse and develop IPA criteria lists for IPA species and habitats.
- A stakeholder session to identify opportunities to conserve the national botanical wealth of IPAs, and to promote engagement with the IPA network by identifying key social benefits or potential benefits of the network.

2.2 Summary table of IPA criteria

Sub-criterion	Threshold
Criterion A (Threatened species)	
A(i) Site contains one or more **globally threatened** species	Site known, thought or inferred to contain **≥1%** of the global population AND/OR **≥5%** of the national population OR the **five "best sites"** for that species nationally, whichever is most appropriate
A(ii) Site contains one or more **regionally threatened** species	Site known, thought or inferred to contain **≥5%** of the national population, OR the **five "best sites"** for that species nationally, whichever is most appropriate
A(iii) Site contains one or more **highly restricted endemic** species that are potentially threatened	Site known, thought or inferred to contain **≥1% o**f the global population AND/OR **≥5%** of the national population OR the **five "best sites"** for that species nationally, whichever is most appropriate
A(iv) Site contains one or more **range restricted endemic** species that are potentially threatened	Site known, thought or inferred to contain **≥1%** of the global population AND/OR **≥5%** of the national population OR the **five "best sites"** for that species nationally, whichever is most appropriate
Criterion B (Botanical richness)	
B(i) Site contains a **high number of species** within **defined habitat or vegetation types**	For each habitat or vegetation type: up to **10%** of the national resource (area) can be selected within the whole national IPA network OR the **five "best sites"** nationally, whichever is the most appropriate
B(ii) Site contains an **exceptional number of species of high conservation importance**	Site known to contain **≥3%** of the selected national list of species of conservation importance OR the **15 richest sites** nationally, whichever is most appropriate
B(iii) Site contains an **exceptional number of socially, economically or culturally valuable species**	Site known to contain **≥3%** of the selected national list of species of conservation importance OR the **15** richest sites nationally, whichever is most appropriate
Criterion C (Threatened habitats)	
C(i) Site contains **globally threatened or restricted** habitat/ vegetation types	Site known, thought or inferred to contain **≥5%** of the national resource (area) of the threatened habitat type OR site is among the best quality examples required to collectively prioritise 20-60% of the national resource (area) OR the **5 "best sites"** for that habitat nationally, whichever is the most appropriate
C(ii) Site contains **regionally threatened or restricted** habitat/ vegetation types	Site known, thought or inferred to contain **≥5%** of the national resource (area) of the threatened habitat type OR site is among the best quality examples required to collectively prioritise **20-60%** of the national resource (area) OR the **5 "best sites"** for that habitat nationally, whichever is the most appropriate
C(iii) Site contains **nationally threatened or restricted** habitat/ vegetation types, AND/OR habitats that have **severely declined** in extent nationally	Site known, thought or inferred to contain **≥10%** of the national resource (area) of the threatened habitat type OR site is among the best quality examples required to collectively prioritise up to **20%** of the national resource OR the **five "best sites"** for that habitat nationally, whichever is most appropriate

2.3 Criterion A (Threatened species)

Goal: To identify and conserve populations of the most threatened plant and fungal species on a global or regional scale.

General principles for applying Criterion A

- Vascular plants, bryophytes, lichens, fungi and algae can be included in Criterion A list.
- The national IPA network should represent the full range of species on the national Criterion A list.
- Where possible, the genetic diversity of a species should be considered in the selection of an IPA national network.
- Any Criterion A species which are socially, economically or culturally valuable, should be tagged as such so that they can be highlighted in any assessment or conservation plan.
- Where data are available, sites that contain a significant proportion of the global or regional population of a species should be included in the IPA network.
- Where possible, both the global and national importance of the site should be documented by applying the % population for each threatened species. This assists with selecting IPAs and with alignment to other programmes, notably KBAs.
- If an IPA contains a single-site, threatened (CR or EN) endemic species, i.e. the site effectively holds the entire global population of that species, this should be included in site documentation to assist with alignment to KBA criteria.
- Up to five sites can be selected for each Criterion A species, based either on population data or on expert opinion of the "best sites". In exceptional cases, such as when there are only five to 10 known sites for a species, up to 10 sites can be selected in each country. The population thresholds are set necessarily low as in certain cases even relatively small populations can be of high conservation importance, particularly where they are geographically or genetically isolated, or edge of range populations, or in secure, well-protected sites.
- The selection of "best sites" should only be applied where population data are not available and cannot be inferred.
- For particularly dispersed species with no obvious population centres, separate IPAs should not be selected for those sites alone when it is possible to include them in IPAs selected primarily for others species or criteria.
- The degree of threat to the population and the need for protection should be taken into account in the IPA assessment and should be fully documented.
- IPAs should only be selected for population that are viable or for which there is the hope that ameliorative measures could return the population to viability.
- **It is not the intention that every site that meets the population threshold for every Criterion A species should qualify as an IPA.**

Notes on the application of the sub-criteria under Criterion A

A(i) Site contains one or more **globally threatened** species

Site known, thought or inferred to contain **≥1%** of the global population

AND/OR

≥5% of the national population OR the **five "best sites"** for that species nationally, whichever is most appropriate

- Qualifying species must be listed as threatened [vulnerable (VU), endangered (EN) or critically endangered (CR), IUCN 2012] on the IUCN Global Red List (*www.iucnredlist.org*) or, if relevant or appropriate, the 1997 IUCN Red List of Threatened Plants (Walter and Gillett, 1997).
- It is acceptable to include those species assessed as threatened and accepted by the IUCN review process but awaiting upload onto the IUCN Red List. For example, species awaiting upload from the IUCN Species Information Service (SIS) following review can be included, as can species with assessments that have been reviewed by an IUCN-approved reviewer but have not yet been entered into SIS.
- This sub-criterion is almost identical to the 2002 European IPA criteria, with two changes – the acceptance of assessed but not published Global Red List species, and the inclusion of a global population threshold.
- This sub-criterion is closely aligned with KBA Criterion A1 (Threatened species) and it is important to document the global population data to assist with alignment.

A(ii) Site contains one or more **regionally threatened** species

Site known, thought or inferred to contain **≥5%** of the national population,

OR

the **five "best sites"** for that species nationally, whichever is most appropriate

- Qualifying species must be listed as threatened on an IUCN Regional Red List OR another regionally approved, peer-reviewed threat list – for example the threatened medicinal plants of the Himalaya (Hamilton and Radford, 2007).
- This sub-criterion is virtually identical to the regional approach in the 2002 European IPA criteria. It may not be appropriate in all regions but it could be used for particular groups such as socio-economic species or particular plant families, where regional data is available and conservation issues require regional solutions.
- This sub-criterion does not currently align with the KBA criteria.

A(iii) Site contains one or more **highly restricted endemic** species that are potentially threatened

Site known, thought or inferred to contain **≥1%** of the global population

AND/OR

≥5% of the national population OR the **five "best sites"** for that species nationally, whichever is most appropriate

A(iv) Site contains one or more **range restricted endemic** species that are potentially threatened

Site known, thought or inferred to contain **≥1%** of the global population

AND/OR

≥5% of the national population OR the **five "best sites"** for that species nationally, whichever is most appropriate

- A "Highly Restricted Endemic" (**HRE**) is defined as a species with a total range of <100 km². A "Range Restricted Endemic" (**RRE**) is defined as a species with a total range of <5,000 km² but >100 km². These definitions of "highly restricted" and "range restricted" are aligned respectively to the CR and EN range (EOO) thresholds for IUCN threat assessment under criterion

B (2012). Hence in effect, the species are defined through partial assessment against IUCN Criterion B but without the need to determine fully the threat status; it is a step towards improving the information on threatened species in regions with low levels of data.

- Endemism is defined by ecological range size rather than by political borders, and thus A(iii) and A(iv) species can have trans-border ranges.
- A(iii) and A(iv) share the same thresholds but the species are recorded separately to allow for more detailed analysis of sites and species.
- Species should be listed as **HREs** or **RREs** on a recognised national or regional list that can be developed, peer-reviewed and published as part of the IPA identification process.
- **HREs** and **RREs** that have been assessed on the IUCN Red List are excluded from these sub-criteria except where listed as Data Deficient. If they have been assessed (VU, EN or CR), they should be considered under sub-criterion A(i); if assessed as least concern or near threatened, they can be included in the species lists for Criterion B.
- The concept of **HREs** (then called Site Restricted Species SRS) and **RREs** (then called Range Restricted Species RRS) were first introduced into the IPA methodology in a project in North Africa and the Middle East (Radford et al. 2011). They are formally adopted here. We have replaced "Site Restricted" with "Highly Restricted" as we acknowledge that not all species with a range of <100 km² are restricted to a single site.
- Sub-criteria A(iii) and A(iv) are defined differently from those used in European criteria (2002). The corresponding European IPA sub-criteria focus on threatened national endemics and national near-endemics respectively, using political boundaries because countries are typically smaller and suitable threat data, in the form of national red lists, are often available within Europe. Beyond Europe, countries are often larger (although we acknowledge that there are also small countries in the tropics) and national red lists do not often exist.
- Sub-criterion A(iii) is aligned with KBA Criterion B1 (Individually Geographically Restricted Species), and A(iv) is aligned with KBA Criterion B1 (Individually Geographically Restricted Species) and potentially with KBA Criterion B3 (Geographically Restricted Assemblages). It is important to document where the population is **≥10%** of the global population to assist with alignment.

2.4 Criterion B (Botanical richness)

Goal: To identify and conserve sites of exceptional plant and fungal diversity, focusing on high-quality species assemblages, irrespective of threat.

Sites that contain high concentrations of species that either indicate high-quality habitat and/or species-rich sites can qualify as IPAs under Criterion B.

In data-rich countries where there is a strong understanding of the full range of habitat types and their species assemblages, the richest sites per habitat can be selected. For example, the richest peat bogs, or the richest dry grasslands or the richest montane scrub. This method is used to enable species-poor habitats to be compared with each other rather than with species-rich habitats.

Where species data for habitats are not systematically available, such as in many parts of the Tropics, the richest sites are chosen on the basis of high concentrations of important/valuable species. Sub-criteria B(ii) and B(iii) have been separated because they reflect different value systems for important plants. B(ii) emphasises the value of rare or irreplaceable species or species that indicate important habitats or sites. B(iii) emphasises species of socio-economic value to humans including those that have cultural or spiritual value. These two species lists are not mutually exclusive.

Guiding principles for Criterion B

- The concept of complementarity should be applied wherever possible and practical: sites selected under Criterion B should attempt to include the greatest number of different species rather than selecting multiple sites that contain largely the same species assemblages.
- Developing indicator lists of species for each of the sub-criteria in B, rather than using the full range of available species data in any particular country, is an effective way of identifying high-quality or rare/irreplaceable assemblages.
- Vascular plants, fungi, lichen, algae and bryophytes can be used as indicator species under Criterion B.
- We strongly recommend that IPA assessor apply EITHER sub-criterion B(i) OR sub-criterion B(ii), not both. Sub-criterion B(iii) can be applied in all cases.

Notes of the application of sub-criteria under Criterion B

B(i) Site contains a **high number of species** within **defined habitat or vegetation types**

For each habitat or vegetation type: up to **10%** of the national resource (area) can be selected within the whole national IPA network

OR

the **five "best sites"** nationally, whichever is the most appropriate

- The development and use of national indicator species for each habitat/vegetation type is encouraged given sufficient data. Indicator species chosen for B(i) should be characteristic species that indicate good quality habitat: axiophytes (see Lockton 2005, Botanical Society of Britain and Ireland 2016).
- Botanical richness is linked to habitats in this sub-criterion to give an indication of habitat quality by comparing like with like, the best peat bogs, the best dunes, the best chalk grasslands. Sites that have exceptional richness because they hold a mosaic of habitat within a small area should be identified using B(ii).
- This sub-criterion should only be applied for defined habitats where there is a sufficient level of information on species composition in order to determine habitat quality. It is likely to be difficult to apply systematically in many tropical countries, where habitat classifications at an appropriately fine scale and lists of indicator species for habitat quality often do not exist. In these cases, sub-criterion B(ii) is more likely to be more appropriate.
- Assessors should apply either B(i) or B(ii), not both.
- The sub-criterion is the same as Criterion B as defined in the European IPA Criteria (2002)

CASE STUDY:
Criterion B(i) in practice, the UK example

In 2007, a list of 150 Important Plant Areas for the UK was published. Data were collated from different botanical taxonomic fields and assessed using the three IPA criteria: Criterion A (Threatened species), Criterion B (Botanical richness) and Criterion C (Threatened habitats). The use of vascular plant data for Criterion B assessments was identified as a key data gap in 2007. In 2009, Plantlife was given access to the 9.8 million records of 6,669 taxa contained in the Vascular Plant Database (VPDB) owned by the Botanical Society of the British Isles (BSBI). These data allowed for a full Criterion B assessment.

A list of 500 rare and threatened species for the UK was developed and then assigned to different EUNIS level 2 habitat classifications, e.g. G1 broadleaved woodland, as indicator species lists. Data on these 500 species were downloaded from the VPDB via the National Biodiversity Network (NBN) Gateway and were cleaned to remove pre-1987 records, and reduced in resolution to be compatible with 10km squares. Hotspots for each EUNIS level 2 habitat were mapped based on the number of unique species in each 10km square.

Hotspots maps for 35 EUNIS level 2 habitats were produced. Of these, 14 level 2 habitats were selected for further analysis and reviewed at a workshop of botanical experts in 2010. The maps of hotspots, with annotations by experts, were then assessed at a higher level of GIS detail to see if they could become a new IPA or if they could become an additional feature of an existing IPA. A second workshop took place in 2011 to identify which of the proposed hotspots should be included as the representative top five sites for each EUNIS level 2 habitat.

The results of these Bi analyses were that 16 new IPAs were identified under Criterion B and 44 new Criterion B species richness features were added to existing IPAs. When hotspots were identified but not selected as one of the top five sites, the information was recorded in the additional supporting data in the relevant site accounts held in the IPA database (Plantlife, 2012).

B(ii) Site contains an **exceptional number of species of high conservation importance**

Site known to contain **≥3%** of the selected national list of species of conservation importance

OR

the **15 richest sites** nationally, whichever is most appropriate

- B(ii) species can be selected from the following categories: (a) restricted range species, defined as those with a total range of <10,000 km² (note species also qualifying under IPA Criterion A are not excluded), (b) (national endemic species, (c) national Red List species not covered by Criterion A. It is not obligatory to include all of the categories (a-c). The possible inclusion here of national endemics, defined by political borders, is not without controversy, but we recognised that national endemics often have higher data availability than other species and are often important in conservation planning, and so should be recognised as species of high conservation importance. The decision as to which species groups from (a) to (c) are chosen for applying this sub-criterion should by made by the national IPA team/constituency.
- List of species used to identify sites under Criterion B should be published and justified as part of the IPA identification process.
- The species list can comprise qualifying species from the total flora or mycota of the country, or the qualifying species from one or more taxonomic groups (for example, a plant family), that is/are representative of the wider flora or mycota and so can be used as proxy group(s) for measuring exceptional richness.
- There is no prescriptive minimum number of species for a site to qualify as this will depend in part on the richness of the national flora or mycota and of its species of high conservation importance, but the site should be exceptional at a national scale: this judgement should be made by the national IPA team/constituency.
- Sites selected should have reasonable ecological and geographical integrity, whether a habitat mosaic or otherwise, and should not be greater than 1% of the area of the country or 50,000 km², whichever is the smaller.
- This is a new sub-criterion, not previously applied in any IPA context.
- This sub-criterion is potentially aligned with KBA Criterion B2 (Co-occurring Geographically Restricted Species).

B(iii) Site contains an **exceptional number of socially, economically or culturally valuable species**

Site known to contain **≥3%** of the selected national list of species of conservation importance

OR

the **15 richest sites** nationally, whichever is most appropriate

- B(iii) species can be selected from the following categories and should focus on those species that would benefit from site-based conservation measures: (a) socio-economically important wild-harvested species, including medicinal plants, food plants, resin/dye plants, timber species, (b) crop wild relatives (CWRs), (c) other culturally or spiritually important plants, (d) CITES species listed on Appendix 1 or Appendix 2 (excluding plant groups, where whole families/genera are listed on Appendix 2 such as orchids, *Aloe spp., succulent Euphorbia spp.).*
- A list of B(iii) species should be published and justified as part of the IPA identification process. Naturalised alien species should not be included on this list except where a strong case can be made for their inclusion (e.g. thoroughly naturalised archaeophytes); this is a decision for the national IPA team/constituency.
- The collection of data and the application of Criterion B(iii) should be carried out with respect and cultural sensitivity, and in line with the guidance and principles of the CBD with regard to equitable sharing of benefits and the use of traditional knowledge. (*https://www.cbd.int/traditional/*)
- This sub-criterion was not included in the IPA European Criteria (2002), and although not formally recognised as a sub-criterion it was one of the guiding principles of the Medicinal IPAs in the Himalaya project (see section 2.7).
- This sub-criterion is not aligned with KBA criteria.

2.5 Criterion C (Threatened habitats)

Goal: To identify and conserve the largest, most intact areas of threatened and/or extremely restricted (and thus highly likely to be threatened) natural or semi-natural habitats, and severely declining habitats that may once have been common. This is regardless of how botanically rich they are.

Guiding principles for Criterion C

- The national IPA network should represent the full range of national Criterion C habitats.
- The threshold for selecting IPAs is based on area in order to preserve the largest, continuous extents of each habitat. However, factors such as land management history, habitat quality (health and integrity) and species diversity can also be considered in site selection. The thresholds apply to the remaining extent of the habitat type as opposed to the potential extent.
- It is important to note that sub-criteria C(i)-C(iii) do not distinguish between threatened and restricted habitats. This is a pragmatic (not a theoretical) decision because in many countries outside Europe there are no official threatened habitat lists and a habitat may be referred to as threatened because it is restricted and/or infrequent and/or declining. Within Europe the distinction is clearer but as fragmentation of habitats is so much more acute, restricted and infrequent habitats are more likely to be threatened, and regional lists of threatened habitats are available. Where limited habitat/vegetation data exist, IPA identification can begin the process of developing habitat data resources in each country based on expert opinion, using sub-criterion C(iii). In cases where it is possible to identify globally restricted habitats, these should be captured under sub-criterion C(i).

CASE STUDY: Threatened habitats in the south and east Mediterranean

Scientists working on the IPAs in the south and east Mediterranean project, co-ordinated by IUCN Mediterranean Office and Plantlife, had much more experience in data collection for species than in the classification and documentation of habitats. Part of the ongoing development work has been to provide training in basic habitat mapping techniques, including the use of satellite imagery and GIS mapping. The training materials, developed by the Centre for Middle Eastern Plants (Royal Botanic Gardens, Edinburgh) have been made available for download at the Mediterranean IPA Net website. (*http://www.medplantsnetwork.net/wp-content/uploads/2017/03/IUCN_Habitat_Mapping_HANDBOOK_EN.pdf*)

CASE STUDY: Developing a national Threatened habitats list in Armenia

IPA identification began in Armenia in 2003 with 32 sites being identified. From 2006 to 2016, a series of small grants were provided by the Rufford Foundation to gain more detailed knowledge of the IPAs, provide community engagement opportunities and to prepare habitat classification and threat lists for Armenia. A habitat classification system for Armenia, based on literature searches and fieldwork, was developed and 16 threatened habitats were identified. All of the habitats had a limited distribution nationally, estimated to be less than 5sq km. Some were represented at only one or two sites and were declining in area. The threatened habitats were also assessed for their genetic diversity.
The threatened habitats included sand deserts with *Calligonum polygonoides,* saline deserts, semi-deserts with *Salsola dendroides,* tragacanth heaths with *Gypsophila aretioides,* pomegranate-pistachio open forests, open pear forests, grass steppes with wild wheats, grass-forbe steppe with *Asphodeline taurica,* hazelnut forests, aspen forest, riverine plane forests, mixed yew forests, pine forests, rhododendron sub-alpine heaths, eutrophic meadow lakes, and saline marshes. Illustrated publications on the habitat classification scheme and the threatened habitats were published in Armenian, Russian and English (Asatryan and Fayvush, 2013).

Notes on the application of sub-criteria under Criterion C

C(i) Site contains **globally threatened or restricted** habitat/vegetation types

Site known, thought or inferred to contain **≥5%** of the national resource (area) of the threatened habitat type

OR

site is among the best quality examples required to collectively prioritise 20-60% of the national resource (area)

OR

the **five "best sites"** for that habitat nationally, whichever is the most appropriate

- C(i) threatened or restricted habitat/vegetation types are taken from a globally recognised list, potentially following the categories and criteria of the IUCN Red List of Ecosystems (Bland et al. 2015). This list does not exist at present but may do in the future so is included to 'future-proof' the criteria.
- The 20-60% threshold is derived from the EU Habitats Directive for priority threatened habitats and so may not be appropriate for use outside Europe, where the **≥5%** threshold may be more appropriate.
- Where possible, the national importance of the site should be documented by applying the threshold for the % of the national resource: the selection of "best sites" should only be applied where quantitative data are not available and cannot be inferred.

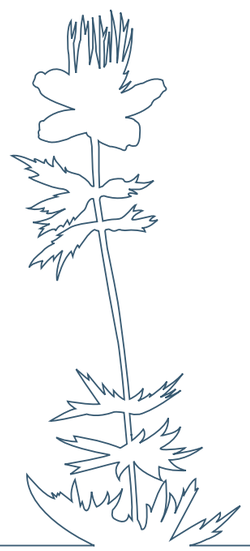
- In addition to meeting the national thresholds, if the site is known or inferred to contain **≥5%** of the global extent of a globally Endangered or Critically Endangered habitat/vegetation type, **≥10%** of the global extent of a globally Vulnerable habitat/vegetation type, or **≥20%** of the global extent of a geographically-restricted habitat/vegetation type regardless of threat status, then this should be recorded in the site documentation to assist with the alignment to KBA criteria.
- In the European IPA criteria (2002), C(i) refers to priority threatened habitats listed on the EU Habitats Directive.

Globally threatened or restricted habitats were not considered, hence this is an additional sub-criterion, albeit one that cannot be applied systematically until an appropriate list is developed.

- Existing European IPAs identified on the basis of C(i) in the 2002 criteria, which do not subsequently go on to be identified as C(i) under a recognised global list, can be reclassified as C(ii) in a future iteration of the IPA database.
- This sub-criterion is aligned with KBA Criterion A2 (Threatened Ecosystem Types) and B4 (Geographically Restricted Ecosystem Types).

The IUCN Red List of Ecosystems

The Red List of Ecosystems is similar to the Red List for Species in that it applies criteria to assess the threat status of a particular ecosystem/habitat/vegetation unit. There are eight threat categories from Collapsed, Threatened (Critical, Endangered, Vulnerable), Near Threatened, Least Concern, to Data Deficient and Not Evaluated. The ecosystem is assessed against five criteria: 1) reduction in geographic distribution, 2) restricted geographic distribution, 3) environmental degradation, 4) distribution of biotic processes or interactions, and 5) quantitative analysis that estimates the probability of ecosystem collapse. Ecosystem assessments can be produced at the national, regional or global level and will be quality assessed by a cross-disciplinary committee. KBA assessment requires a global level ecosystem assessment for Threatened Ecosystem Types (A2).



The preparation of a Global Red List of Ecosystems is estimated by 2025, and assessments are currently being published. At present there are 11 globally assessed ecosystems from Australia, Antarctica, Europe, Venezuela, China and North and South Korea, Madagascar, America, Senegal and Mauritania. There are 21 regional assessments from across the world.

Nationally threatened or severely declining habitats identified under IPA Criterion C(iii) can go on to be assessed against the Red List of Ecosystem criteria as part of efforts to define regional and global threat lists.

Information on applying the criteria and published assessments are available at the Red List of Ecosystems website (*https://iucnrle.org/*)

C(ii) Site contains **regionally threatened or restricted** habitat/vegetation type

Site known, thought or inferred to contain **≥5%** of the national resource (area) of the threatened habitat type

OR

site is among the best-quality examples required to collectively prioritise **20-60%** of the national resource (area)

OR

the **five "best sites"** for that habitat nationally, whichever is the most appropriate

C(ii) restricted or threatened habitats or vegetation types are taken from a regionally recognised list. This list can be developed, peer-reviewed and published as part of the IPA identification process, if neighbouring countries are involved.

- This sub-criterion is identical to Criterion C in the European IPA Criteria (2002), which was split into C(i) (EU Habitats Directive priority habitats), and C(ii) (remaining EU Habitats Directive habitats or Bern Convention Habitats).
- Regionally threatened habitats identified under IPA projects can go on to be assessed under IUCN Red List of Ecosystem regional criteria.
- This sub-criterion is not currently aligned with KBA Criteria.

C(iii) Site contains **nationally threatened or restricted** habitat/vegetation type, AND/OR habitats that have **severely declined** in extent nationally

Site known, thought or inferred to contain **≥10%** of the national resource (area) of the threatened habitat type

OR

site is among the best-quality examples required to collectively prioritise up to **20%** of the national resource

OR

the **five "best sites"** for that habitat nationally, whichever is most appropriate

- C(iii) restricted or threatened habitats or vegetation types are taken from a nationally recognised list. This list can be developed, published and peer-reviewed as part of the IPA identification process. A good example of this is the nationally threatened habitat list of Armenia (Asatryan and Fayvush 2013).
- Habitats that have "severely declined in extent" are defined as those that have declined in extent by 50% or more nationally since 1900.
- This sub-criterion will capture the most intact examples of those habitats that are threatened or highly restricted or severely declining within the country (and potentially more widely). It can also capture those habitats that have a nationally restricted range, even though they are more common elsewhere, if they are an important national resource, and/or they are important as 'edge of range' examples.
- This sub-criterion is more appropriate to use in larger and/or data-poor countries where data are held at the national level – in time it will help countries obtain a greater understanding of threatened/restricted habitats in their countries and how they relate to the wider regional and/or global picture.
- Nationally threatened or severely declining habitats identified under IPA projects can go on to be assessed against IUCN Red List of Ecosystem criteria.
- This is a new sub-criterion, not previously applied in any IPA context.
- This sub-criterion is not currently aligned with KBA criteria.

2.6 Fungi, bryophytes, lichens and algae

If vascular plants are often poorly represented in national and international conservation frameworks, then lower plants and fungi are evenly more poorly represented, poorly documented and rarely included in conservation management activities. These groups are among the most diverse on our planet. They are essential, if often little understood, elements of healthy, functioning ecosystems, and provide a range of foods and medicines for many cultures.

Fungi, bryophytes, lichen and algae can and should be used in IPA identification where data are available. There have been two main approaches so far. One is to include them together with vascular plants within a national IPA network such as in Belarus, the Czech Republic, Estonia, Italy and Slovakia, and the second is to consider particular groups separately such as the Important Fungus Areas, Important Stonewort Areas and Important Algal Areas of the United Kingdom Projects (Evans et al., 2001; Stewart 2004, Brodie et al., 2007). Fungi and lower plants were also included in many of the Criterion B assessments in the UK IPA network.

The problems with including fungi and lower plants in IPA identification in the past has been the lack of basic data on localities, populations and conservation status, and the problems of assessing regional or global conservation status. A lack of knowledge on best practice management techniques for these groups has also been highlighted as a problem in the ongoing conservation of species and habitats. An assessment of the inclusion of fungi species in European IPA networks is described in Perini et al., 2011.

Information on projects including the Global Fungal Red List Initiative and experts can be found at the IUCN Specialist Groups for fungi (*https://www.iucn.org/theme/species/our-work/fungi*), bryophytes (*http://www.slu.se/en/collaborative-centres-and-projects/bryoconservation/*) and freshwater plants (*http://www.ardeola-environmental.com/iucn-ssc-freshwater-plant-specialist-group/tag/algae*)

Where possible, including fungi and lower plants adds greatly to the biodiversity value and ecosystem services of an IPA network. There are different options for including these groups in IPA identification projects.

Criterion A (threatened species): Where Global Red List assessments are available, species can be included in Ai, where range data are available, species of restricted range can be included in Aiii or Aiv.

Criterion B (botanical richness): Fungi, algae, bryophyte and lichen species can be included in lists of indicator species in Bi (indicator lists linked to habitats), in Bii (sites that contain over 3% of national indicator lists), or Biii (sites that contain over 3% of national indicator lists for culturally or economically useful plants).

Criterion C (threatened habitats): Habitats rich in fungi, bryophytes, lichens and algae can be included in lists of threatened, rare or declining habitats under Criterion Cii and Ciii and where there is an IUCN Red List of Ecosystem global assessment, they can be included under Ci. Habitats rich in these groups should be clearly defined in national IPA information and in the management advice given to land managers (see the example of Scottish oceanic heath, in section 1.5bii).

2.7 Socially, economically or culturally valuable plants

Culturally important and useful plants have a higher profile in the revised IPA criteria because their conservation has a direct relevance for many communities and individuals who depend or place a high cultural value on particular plants, habitats or places. These plants are often the Cinderellas of the conservation world, with low inclusion in national and international priority setting, and low priority in the allocation of resources. If IPAs are to be conserved into the future their continued existence as diverse ecosystems must have relevance for those who live in or near them.

Examples of these plants include important wild-harvested species for medicines, foods, resins and dyes, timber plants, crop wild relatives, land races and plants which have a high cultural or spiritual value. The majority of these plants will be collected for domestic use or small scale trade and the conservation issues may be habitat loss, over-collection, problems with access to land or ownership, or lack of awareness of their actual or potential cultural value. For those plant or fungi species which are the subject of more widespread or international trade the conservation pressures may be over-collection, land rights, as well as habitat loss. The IPA programme is primarily focused on the *in situ* conservation of wild plants and their habitats, including socio-economic plants.

The Fair Wild Standard provides guidelines on sustainable collection of wild harvested plant resources (*http://www.fairwild.org/*). Examples of community based conservation motivated by medicinal plants in East Africa and the Himalaya are highlighted in Hamilton 2008.

Conserving genetic diversity is particularly important for useful plants including crop wild relatives (CWR), land races. Information on documenting and conserving CWRs, and relevant experts is providing through the IUCN Crop Wild Relative Specialist Group (*http://www.cwrsg.org*).

There are many different ways to go about including socio-economic plants within an IPA assessment but they should all be carried out with respect and cultural sensitivity, and in line with the guidance and principles of the CBD's commitment to equitable sharing of benefits and preservation of traditional knowledge. The most basic requirement is that there is prior informed consent from those sharing information on sites, species, habitats or traditional knowledge on how the data will be used within the IPA project and beyond. Information on best practise is provided through the CBD website (*https://www.cbd.int/traditional/*), IUCN (*https://www.iucn.org/theme/social-policy/our-work/indigenous-and-traditional-peoples*), and the Indigenous and Community Conserved Areas (ICCA) Consortium (*https://www.iccaconsortium.org/*).

Options for inclusion in the IPA criteria

Criterion A (threatened plants): Some useful plants will also qualify as threatened species, Ai for any which have a global threat assessment, Aii (for any with a regional threat) assessment, as was used in the Himalaya IPA project, A(iii) and A(iv) for any range restricted useful species. Any Criterion A species which are also socio-economic plants should be highlighted as such in the IPA site documentation.

Criterion B(iii) Site contains an **exceptional number of socially, economically or culturally valuable species**. The inclusion of useful or culturally valuable plants is the focus of this sub-criterion. The species list can be developed from current and historical research, and/or through consultation with medicinal plants experts, herbal medicine practitioners, traders, craft/technical specialists for textiles, dyes, materials, musical instruments etc, religious groups or spiritual leaders.

Criterion C (threatened habitats): Some threatened or restricted habitats may also be important for useful or culturally valuable plants, or the provision of wider ecosystem services. Where the information is available this should be included in the IPA methodology and site documentation.

Any useful species included in the IPA criteria should be those which would benefit from site based conservation. Where possible, when communities and individuals have collaborated to help identify IPAs with high numbers of useful plants, those sites should be given priority in any ongoing conservation planning by the IPA national team to ensure that links between IPA identification and subsequent conservation and community benefit are clearly demonstrated.

CASE STUDY: Important medicinal plant areas in the Himalaya

Medicinal Plants were selected as the main element of IPA identification in the Himalaya for three main reasons: the large number of medicinal plants used in all five countries of the project (Bhutan, China, India, Nepal, Pakistan), the likelihood that the distribution and conservation status of these species would be relatively well known, and the motivating factor for conservation of focusing on plant resources which were important for economic, well-being and cultural reasons.

Five national teams from Bhutan, China, India, Nepal and Pakistan carried out national assessments and worked at the regional level to produce a Himalayan regional list of threatened medicinal plants. The national teams and coordinators shared experiences, skills and solutions at a regional meeting in Kathmandu.

The national teams identified the main threatened medicinal plants at the national level and collectively identified 51 regionally threatened medicinal plants. IPAs for medicinal plants were identified at four different scales from the 6 large Critical Regions in China to the small sites which were suitable for field-based management in all five countries. The report also highlights the mechanisms for conserving the plants and their sites including, both national and community level instruments and processes, culturally related processes, industry related processes and regional collaboration. The results are summarised in Hamilton and Radford 2007.

CASE STUDY: Sacred Groves and IPAs in the Western Ghats, India

AERF (Applied Environmental Research Foundation) devised a pilot study to test the applicability of global prioritisation criteria (IPAs and High Conservation Value Forest) in identifying local hotspots for biodiversity. The study area was the mountains and forests of the global biodiversity hotspot of the Western Ghats (Konkan) which have over 2,000 endemic plant species.

The study employed randomised surveying, purposive selection of survey sites based on expert and local knowledge, and a forest intactness ratio. All methods produced useful information but the use of local and expert knowledge proved most time effective in identifying potential sites and also highlighted the enormous value of sacred groves in the conservation of intact forest areas.

The AERF model can provide guidelines for integrating local and cultural knowledge in data collection strategies in IPA identification in other countries. The results are summarised in Plantlife (2010a). (*www.aerfindia.org*)

2.8 Selecting sites

One of the objectives of the IPA programme is to set priorities for the conservation of sites, species and habitats. Applying the IPA criteria will produce a list of potential IPAs within a particular country. Selecting IPAs requires a further assessment to select the priority sites within this list of potential IPAs. The reasons for this are to encourage a complementary, overall network for a country rather than selecting individual sites piecemeal, and to focus conservation action and funding on the most important sites.

The final selection of IPAs is a national decision reflecting a range of data, protection, conservation and community issues which are best decided on by those who will be part of their long-term conservation.

Not all populations of Criterion A species, or Criterion B richness assessments or areas of Criterion C habitats which meet the thresholds will necessarily be included within an IPA.

The final selection of IPAs for a national network should also take into account the conservation of the genetic diversity of IPA species, using any available data within species genetic diversity, or rare or edge of range lineages.

2.8.1 General principles

- IPAs can be identified on private, public, protected or unprotected land.
- An IPA can be identified if it satisfies one or more criteria, i.e. a site can qualify if it satisfies either Criterion A or B or C or any combination of the criteria.
- Consideration should be given to identifying IPAs on sites that qualify under multiple criteria and/or contain multiple qualifying species or habitats, in order to focus conservation action. However, where necessary an IPA can be identified for a single species or habitat in cases where, for example, the site contains the only known or best population of a species, or a rich assemblage, or area of a threatened habitat.
- Consideration should be given to complementarity of sites, species and habitats, and the potential for habitat restoration and linking sites through ecological corridors.
- Consideration should be given to the degree of threat and the level of existing protection.
- Conserving the range of genetic diversity of threatened species and/or those species of economic or cultural value, including crop wild relatives and land races, should be considered when selecting IPAs.
- IPA designation does not necessarily constitute a recommendation for site protection; it also serves as a mechanism to facilitate impact avoidance or improved management of important or vulnerable elements of plant diversity. Thus a comprehensive network of identified sites does not equate to a 'land-hungry' conservation framework.

Key things to consider

- Are all your IPA Criterion A species and Criterion C habitats represented on at least one site in your IPA network?
- Do your Criterion B selections for botanical richness represent the widest range of species from your indicator list, rather than 15 sites with largely the same groups of species?
- Which potential IPAs are the most threatened or least protected and do they also contain IPA species or habitats which are poorly represented on other sites?
- Which potential IPAs have the most potential for restoring habitats or linking with other IPAs or protected areas to provide ecological corridors.
- Which potential IPAs provide ecosystem services in addition to their botanical interest?
- Which potential IPAs have the highest potential for community or political support in their protection or conservation?
- Does the IPA network conserve genetic as well as species diversity?

2.8.2 Islands

Islands are often particularly valuable for their endemic species and unique vegetation assemblages. Conservation issues such as the spread of invasive alien species or coastal tourism development can be particularly pronounced on islands and it is helpful to have a clear framework of priority plants sites and their threats. The following examples demonstrate some of the ways IPA identification has been carried out in island situations.

CASE STUDY: The Seychelles

IPAs were identified by the Nature Protection Trust of Seychelles as part of a KBA identification project which was published in 2008. The KBA assessment was reviewed and published in 2013. Endemism is approximately 45% for plants including endemic genera and one endemic tree family (*Medusagynaceae*) in the 115 Seychelles islands.

In the 2008 project, 29 IPAs were identified using the three IPA criteria. Fifteen critically endangered taxa and seven endangered taxa were used in Criterion A. Five habitats (montane forest, sub-montane forest, lowland forest, marsh and glacis rock) with five sub-habitats were used in species richness assessments. Four habitats, considered as nationally threatened in the Seychelles, were used in Criterion C (montane forest, high altitude marsh, lowland marsh, mangroves).

In the 2013 review of KBAs, 152 vascular plant species were used in the analysis and 2,169ha were proposed for an extension to the national protected area network (Gerlach, 2008; Senterre et al., 2013).

2.8.3 Large diverse countries

CASE STUDY: Turkey

Turkey was the first country in the world to identify its IPAs, identifying 122 sites from 1992 to 2003 co-ordinated by WWF Turkey (formerly DHKD), Flora and Fauna International and Istanbul University Faculty of Pharmacy (ISTE). A further 22 IPAs were identified along the Baku-Tblisi-Ceyhan pipeline by ISTE between 2003 and 2006. Turkey has a land area of over 800,000 square kilometres, with over 8,897 vascular plant species, 3,022 of which are endemic. 4,500 species were listed as nationally rare in the two national Red data books, and there is a high number of natural and semi-natural habitats.

A pilot project was launched in 1994 to determine the feasibility of an IPA network, and a workshop was held for the Turkish botanical community in 1998 to outline the criteria and to brainstorm the best process for identifying sites. Potential sites were proposed along with a preliminary gap analysis of key sites. Botanists were asked to adopt individual sites to carry out literature reviews, survey work and to write site accounts. Forty botanists from 20 institutions across Turkey took part in the process.

The Criterion A list was based on globally threatened species, some species threatened on Turkish Red Lists, and species on the EU Habitats Directive and Council of Europe's Bern Convention. For Criterion B, the three richest examples of a range of habitats within each of the three biogeographic zones (Euro-Siberian zone, Mediterranean zone, Irano-Turanian zone) were chosen. The threatened habitats for Criterion C were selected from the EU Habitats Directive and the Council of Europe's Bern Convention (Özhatay, 2006; Byfield, Atay and Özhatay, 2010).

CASE STUDY: The Falkland Islands

The Falkland Islands are botanically important because of their 14 endemic species, their position between the Antarctic and South American continents, and the fact that they contain many species at their eastern and southern range limits. The identification process was co-ordinated by Falkland Conservation and is an integral part of their Native Plants Programme (http://www.falklandsconservation.com/wildlife/plants).

Seventeen IPAs were identified ranging from 26ha to 25,625ha. Two sites were national nature reserves, two were government owned and the rest were in private ownership. Only three of the 17 IPAs overlapped with the Important Bird Areas of the Falklands. Soil erosion and over-grazing were key threats, as were invasive species, small isolated populations and development. The assessment was based mainly on species data because of the limited data on threatened species. Further habitat mapping was one of the recommendations of the project.

Six globally threatened species were used to identify sites under Criterion A.
Five threatened habitats were identified as a preliminary Criterion C list. These were bluegrass acid grassland, bluegrass dune grassland, native boxwood scrub, fachine scrub and mainland tussac (Upson, 2012).

CASE STUDY: Cameroon

As part of the Tropical IPAs programme, the Royal Botanic Gardens, Kew are working with the National Herbarium and other key stakeholders in Cameroon to document IPAs. With 7,500 vascular plant species (Onana 2011), Cameroon is the fourth richest country in continental Africa botanically (Beentje 2016). The rich forest and montane ecosystems that harbour much of this diversity are under increasing pressure from a range of human threats, most notably destruction for subsistence and commercial agriculture, timber trade and mineral extraction.

The Red List of globally threatened plants in Cameroon, completed in 2011, documents 815 plant taxa in Cameroon threatened with extinction, over 10% of the flora (Onana & Cheek 2011). Marked concentrations in the distribution of these threatened species, notably in the Cameroon Highlands chain and the Atlantic coastal forests, reveal the highest priority candidate IPAs where protection is vital to safeguard these species that will otherwise face extinction.

The urgent need for conservation action at many of Cameroon's candidate IPAs is well exemplified by Mont de l'Elephant. This small (c. 8 km^2) hill site supports Atlantic coastal rainforest with a rich diversity of tree species including the globally Vulnerable legume *Gilbertiodendron scutatum,* and its cliffs are the only known site for the Critically Endangered *Begonia montis-elephantis*. This site is unprotected and is threatened by the expansion of oil palm plantation, subsistence agriculture and charcoal production.

Protection status of the highest priority sites is mixed; whilst the single two richest areas for threatened species, Mount Cameroon and the Bakossi Mountains, are partially protected as National Parks, the third richest site, the Bipinde forests, is not protected and is being severely impacted by forest destruction. Intensive survey work in the Bakossi Mountains in the 1990s and 2000s revealed that the area contained over 200 globally threatened plant species. These new plant data were prime drivers in the gazetting of the National Park in 2008. Through the IPA programme, awareness of the botanical wealth of such sites and their threats can be highlighted, enabling conservation action to be directed where it is most needed.

2.8.4 Data-rich countries

CASE STUDY: Italy

A network of 100 experts from across Italy co-ordinated by the Inter-university Research Centre for Biodiversity, Plant Sociology and Land Ecology of the Sapienza University of Rome, worked as an IPA team in Italy.

The Italian IPA identification process included vascular plants, fungi, bryophytes, lichens and algae. Three-hundred-and-twenty IPAs were identified, eight of which were for freshwater algae alone. The total area of IPAs was 4,476,830ha, corresponding to 15% of the overall area of the country. The mean area of IPAs is 14,348ha but the size varies considerably from 7,887ha to 243,738ha.

For Criterion A threatened species, 320 vascular plants and 72 lichen species were used. For Criterion C threatened habitats, 122 EU Habitats Directive habitats were used. For assessing botanical richness under Criterion B, an assessment was made at the regional level which included a further 1,096 vascular plants, 109 bryophytes, 430 algal species, 42 fungus species and 45 habitats of national interest. There were over 24,000 geo-referenced records for species and habitats.

Italy was divided into a grid of 3,500 10km square cells and the species and habitat maps were overlapped to identify the most important areas for plant diversity and hotspots of richness and diversity – 73% of these cells contained at least one record of an IPA plant or habitat. The next phase was to select the cells with the highest IPA value and to define polygons of actual sites located within these cells. Data for lower plants and fungi was more limited and distributed unevenly across the country and so these data were included in site selection at the second stage of defining polygons (Blasi et al., 2009).

2.9 IPA size and boundaries

Mapping IPAs and agreeing their boundaries is essential for several reasons. Defining a boundary on a map shows the ecological, geographical and political context of the site, including the ownership and the groups who have influence over its protection and management. A map is a first step in sharing data with different audiences to influence the conservation, management and protection. Determining the area of sites and the areas which are protected and threatened is a necessary part of setting priorities for the network. There is a wide range of free software, such as Googlemaps and QGIS, for digital mapping. There is great potential for using these tools to map boundaries and features of IPAs.

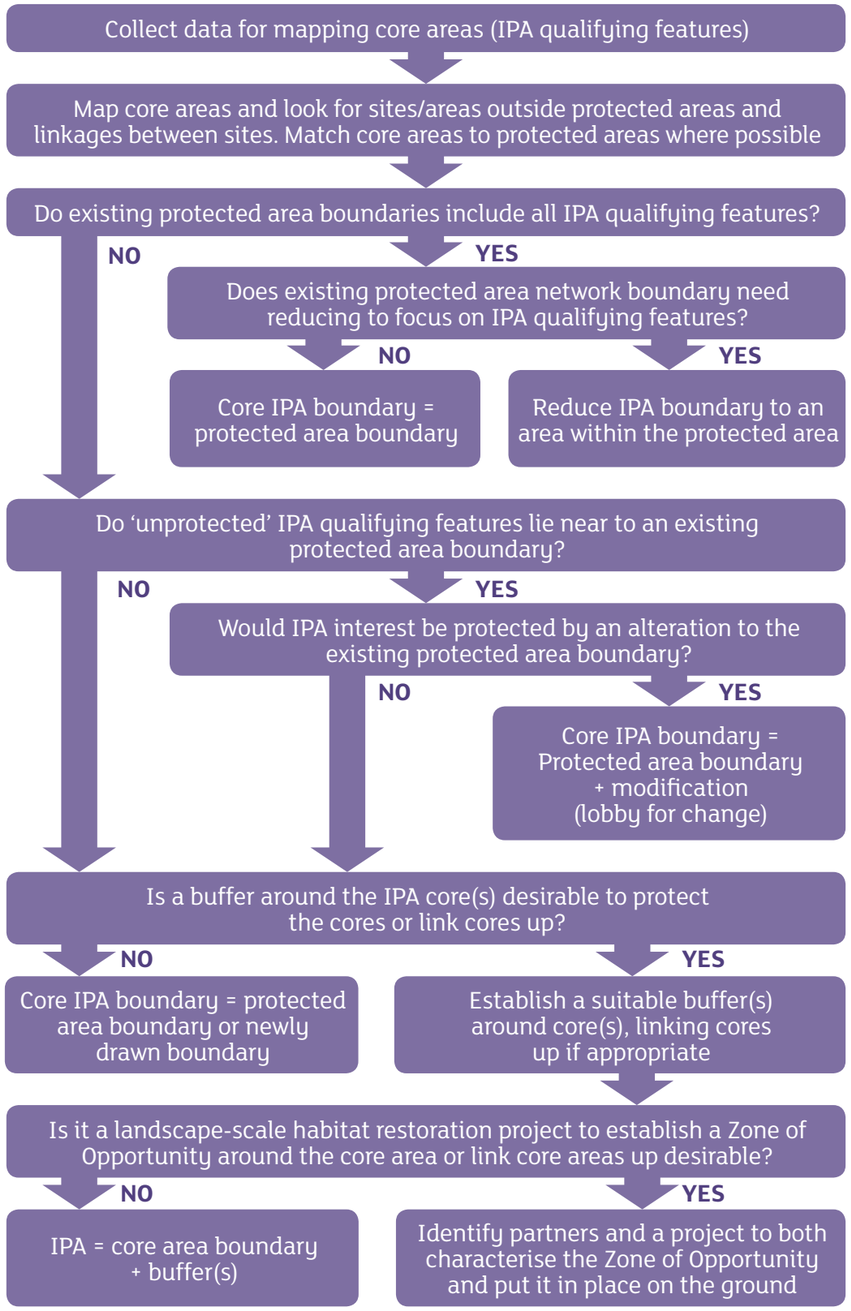
There is no fixed minimum or maximum size for an IPA. Identifying larger sites with multiple IPA-qualifying criteria is one means of conserving diverse ecological areas and focusing conservation priorities, but a small IPA may be appropriate if it contains the only or best population or area for a particular IPA species or habitat. Guiding principles on the size and definition of boundaries are given below but the decision is made by the national IPA team.

- The site should have reasonable ecological or geographic integrity.
- An IPA should be able to be managed as a conservation unit or amenable to site management techniques, therefore extremely large areas are not desirable except in exceptional circumstances (e.g. large extents of pristine Criterion C habitats). A guide to the maximum size could be less than 1% of the area of the country or 50,000 km².
- There are no set rules for the treatment of sites that lie close to each other. These could remain as individual IPAs or could be merged to form a single large IPA.
- An IPA should be defined so that as far as possible, it is different in character or habitat or botanical significance from the surrounding area.
- The possibility of linking sites through ecological corridors to prevent isolation of species and to build resilience against the effects of climate change, should be considered.
- Site boundaries can be defined by obvious barriers such as rivers, roads or distinct changes in land use. In larger regions where there are no obvious site boundaries or changes in habitat types, site boundaries can be delimited by geographical features such as ridge-lines or hilltops.
- Where possible and desirable, IPAs should have buffer zones or Zones of Opportunity (areas where habitat restoration can potentially be applied and isolation of species or habitats be prevented) defined around the core IPA areas.
- IPA boundaries can overlap with existing protected area boundaries but they can also extend beyond existing boundaries or in some cases, they can be confined to a smaller area within an existing protected area where it is appropriate to focus conservation action.

The mapping of an IPA should include the boundary of the site and also the core areas where particular qualifying species and/or habitats occur. Where the data are available, the boundaries of any protected areas should also be included. The IUCN World Database of Protected Areas is a source of information on the boundaries of many existing protected areas and there may be access to information on national protected area systems. The mapping process for the large West Coast of Scotland IPA, which includes the definition of core areas, Zones of Opportunity for restoration and the definition of the boundary, is described in Fraser and Winterbottom 2010.

The process of setting IPA boundaries in the UK is summarised in Dines and Hutchinson 2008, and although the specifics of the UK context cannot be assumed for other areas of the world, there are many general principles which can be applied to help define boundaries.

Process for establishing IPA boundaries



Dines, T. and Hutchinson, N., 2008. Developing IPA Boundaries in the UK, Plantlife International

2.10 Publishing the national IPA selection processes

Part of any IPA national programme should be the publishing of the national methodology used to select criteria lists and sites. This could either be an electronic or printed publication and should contain as much information as possible on the sources of data including where expert opinion has been used, and the age and quality of the data.

Any publication should aim to include:

- The participants in the IPA national team, any data providers or supporters of the process.
- The peer review process for criteria lists and sites.
- The list of Criterion A species and their data sources.
- The indicators species list for Criterion B and a description of how they were selected.
- The list of Criterion C habitats, their detailed descriptions, and their data sources.
- A list of the socially, economically or culturally valuable species including any of the Criteria A, B and C lists.
- A description of the selection process used to select IPAs from the potential IPAs.
- A list of sites with their qualifying features, protection status, and known threats.
- Boundary maps of each IPA (e.g. could be one map of the country with outlines of the IPAs or could be individual maps for each IPA).
- Existing or potential overlaps with other networks and designations including protected areas, Important Bird Areas (IBAs), UNESCO Man and Biosphere (MAB) and World Heritage Sites (WHS) sites, Key Biodiversity Areas (KBAs).
- Key recommendations for future research, increased protection, management guidance for sites, species or habitats, conservation opportunities to work with individuals, communities or organisations.
- If available, an assessment of key ecosystem services of the IPA network.
- If available, regional and global level assessments for Criteria A and C species and habitats.

2.11 The IPA review and monitoring process

IPA identification is based on collating the best available data to set conservation priorities. The process should also help to identify data gaps and to prioritise future data gathering.

An IPA can be added to the network at any time if there is sufficient new data to support that identification, and sites can be removed from the network if they no longer support IPA qualifying features and there is no hope for restoration. The network should be subject to periodic reviews to ensure that it still represents the best network to prioritise plant conservation action, to reassess the threats to sites and the network as a whole, and to assess the effectiveness of protection and management measures.

Each country has its own capacity issues but there should be an aim to review the national IPA network at least once every 10 years.

Ongoing monitoring of all sites, qualifying species and habitats should be an aim of the strategy for IPA conservation in order to assess the effectiveness of any management actions, or highlight any increasing threats. However, the lack of botanical capacity is a well-recognised global issue and any monitoring framework should prioritise species, habitats and sites for available monitoring resources. Any national monitoring strategy could also identify key individuals or organisations who might be able to assist with site, species or habitat monitoring. Such monitoring strategies should aim to contribute towards better understanding of progress towards national and international biodiversity targets, including the GSPC.

Protected area or nature reserve managers may not be aware of the plant and fungi interest on their site. It may be possible to include some or all IPA species and habitat monitoring within the activities of protected area or nature reserve management plans.

Botanical teaching institutions may be able to adopt particular IPA sites or species or habitats for ongoing monitoring as part of their student training.

Volunteers are already helping to monitor IPAs and their features. For example, the OBANet programme in Turkey is training local volunteers and school teachers to monitor key species and is raising awareness of local IPAs among the communities who live there. The Natural Networks programme in southeast Europe includes species monitoring as part of its engagement programme for volunteers. The Macedonian Ecological Society is working with the Ljuboten Mountaineering Club to monitor a range of alpine IPA species. A very basic volunteer monitoring framework could be to have a named individual for each IPA who agrees to report any known threats to the IPA national team or appropriate government agencies. Where there is capacity, this individual could also provide a brief annual report of any changes noted to the site, its species or habitats.

Identifying one of two IPAs as key sites or centres of excellence to test implementing management, protection, monitoring and community engagement models could be an effective way to demonstrate good practice and develop guidelines which could be used in other IPAs.

Developing IPA monitoring strategies is beyond the scope of this document. However, monitoring programmes such as the Important Bird and Biodiversity Areas (IBBA) demonstrate the potential for developing systems to allow for the analysis of threats and effectiveness over time. (*http://datazone.birdlife.org/userfiles/file/IBAs/MonitoringPDFs/IBA_Monitoring_Framework.pdf*)

2.12 Alignment with other conservation frameworks

IPA identification can provide data which supports other national and international conservation frameworks and programmes. The aim is not to compete with other frameworks but to focus on collating and prioritising plant and fungi data in a way which is tailored to the specific challenges of botany and mycology, but which can also support the data requirements and aims of other programmes.

IPA data can provide new information on the biodiversity value of existing protected areas and nature reserves.

Data gathered for IPA Criterion A(iii) and A(iv) species is a first step towards formal IUCN Global Red Listing of species.

Data gathering on national threatened and declining habitats is a first step towards greater regional and global knowledge of threatened ecosystems which ultimately could be assessed using IUCN Global Red List of Threatened Ecosystems criteria.

The key differences and similarities between the IPA approach and the KBA approach are discussed in detail in Darbyshire et al,. 2017. The main areas of concern in applying KBA criteria for plants lie in the lack of recognised global level assessments for species and habitats in many parts of the world, and the consequent current reliance on data from better studied groups such as birds in identifying KBAs. However, applying IPA criteria at the national level is an important step in improving knowledge of regional and global threats particularly for threatened habitats and ecosystems. IPA criteria are aligned wholly or partly with some of the KBA criteria and identifying IPAs can also provide key data for identifying KBAs.

This summary table illustrates key methods for potential alignment of IPA and KBA criteria

IPA criteria	Potential alignment to KBA criteria
A(i) Global Threatened Species	A1 Threatened Species
A(ii) Regionally Threatened Species	-
A(iii) Highly Range Restricted Species	B1 Individually Geographically Restricted Species
A(iv) Range Restricted Species	B1 Individually Geographically Restricted Species
B(i) Botanical Richness within defined habitat or vegetation types	[B3 Geographically Restricted Assemblages] *depending on the indicator species used*
B(ii) Botanical Richness of High Conservation Important Species	[B2 Co-occurring Geographically Restricted Species] *depending on the indicator species used*
B(iii) Botanical Richness of Socio-Economic and Culturally Valuable Species	-
C(i) Globally Threatened Habitats	A2 Threatened Ecosystem Types B4 Geographically Restricted Ecosystem Types
C(ii) Regionally Threatened Habitats	-
C(iii) Nationally Threatened or Severely Declining Habitats	-

IPA data can and should be used in applying the mitigation hierarchy, the International Finance Corporation Performance Standard 6 (IFC PS6), and the World Bank Environmental and Social Framework.

The IPA programme is fully aligned with the aims and principles of the CBD, the Global Strategy for Plant Conservation, and the Aichi Biodiversity Targets. These conventions and agreements underpin the UN's Strategic Development Goals (SDGs).

3 IPA data and mapping

3.1 Databases and data flow

One of the key aims of the IPA programme is to bring all the available plant and habitat data together in one place to make a selection of key sites, assess their threats and protection levels, and then to disseminate these data in accessible and consistent formats to a range of audiences who have an influence on the protection and conservation of the IPAs. Making key information on IPAs available online allows conservationists, scientists, policy makers and planners at the national or international level to include plant data in their assessments and provides transparent supporting evidence in cases where the site is threatened by development or poor management.

The IPA online database (*http://www.plantlifeipa.org/home*) was originally developed in 2002 to collate and disseminate information on the IPAs in the European programme. In 2017, it underwent an upgrade to accommodate the revision of the global criteria, new mapping and GIS facilities, and more user-friendly search options for public viewers.

Data for each site is entered online by national co-ordinators with secure logins. National co-ordinators can view but not edit the data from all the other countries in the database. Site factsheets based on the information entered are available via the public-access website. The database has provision for confidential treatment of particularly sensitive species.

All national IPA teams using the database develop a data-sharing agreement with Plantlife which sets out the details of how the data should be used, any data ownership issues and citations. The general format of these data sharing agreements is based on the model developed by Birdlife International in the Important Bird Area Programme. National teams can download their own dataset from the online database whenever it is needed.

The Royal Botanic Gardens, Kew are also collating IPA data with their national partners in the tropical IPA programme. Plantlife and Kew are working closely together to ensure consistent data collection methods for IPAs and also to ensure that relevant, available data on sites is compatible with the IUCN Key Biodiversity Areas (KBA) Standard, wherever possible and practical.

Accommodating different languages and Alphabets

The key data are collated and displayed in English to allow for international dissemination but there is also capacity to include text descriptions and site names in different languages and alphabet systems. The IPA database supports data entry in the Roman, Cyrillic and Arabic alphabets. Text can be entered in national languages as well as English in order to maximise accessibility by national and international audiences.

3.2 Example information for IPA site questionnaires

The IPA site questionnaire is a list of the key information which is collected to publicise the site to key audiences and to target future protection and management. The differing qualities and accuracies of plant and habitat data around the world are well recognised and throughout the data collation process, national teams are asked for their opinion of their data quality (*good, medium, poor or unknown*). This in itself helps to understand where the major knowledge gaps are for future work and funding.

Data lists for certain fields are pre-entered into the database for each country to make the data entry process quicker and to prevent data being corrupted and unusable through mis-keying or mis-spelling. The pre-entered lists appear as a drop-down menu for particular fields including Criterion A species, Criterion C habitats, Ownership Types, National Protected Area Designations, Threats, Ownership Types, and Biogeographic Regions.

Key data fields for IPAs

Data field	Example data	What will it be used for?
Country	Romania	To associate each IPA with its own country for assessment and dissemination.
Biogeographic region	Continental	To assess all IPAs associated with a particular biogeographic region as well as with an individual country.
General site information for each IPA		
Site name	National name: Cheile Întregalde International name: Intregalde Gorges	The national site can be in the national language (with available alphabets). The international site name should be in English.
Site code	Country ISO Code and site number RO023	Used as an easy site identifier and short-hand in reports.
Site central co-ordinates	46° 12´ N / 23° 25´ E	Allows for a centre of the site to be displayed on a map.
Site area (ha)	355 (ha)	Allows for a calculation of total IPA areas, % of protected or threatened IPAs, IPAs as a % of total country area.
Site elevation in metres above sea level (min & max)	500 to 1,000	Allows for an assessment of IPAs at a range of altitudes, e.g., an assessment of which IPAs could be affected by water management, coastal problems, or climate change.
Management plan	Yes	Tickbox – add a simple tick if the site has a valid management plan. More information can be included in the Text Summary screen including any guidance on particular species or habitats.
Agreed boundary	Yes	Tickbox – add a simple tick if the site has an agreed boundary.
Digitised boundary	Yes	Tickbox – add a simple tick if the site has a digitised boundary.
Show species to public	Yes	Tickbox – tick if you agree that species data (name and trend, not the exact location) can be shown to the public.
General habitats at the IPA (i.e. all habitats found on the IPA, not IPA Criterion C Threatened Habitats)		
Habitat Level 1 (Based on Level 1 of the International Vegetation Classification IVC system)	Shrub and herb vegetation (10%) Forest and woodland (80%)	Choose all relevant Level 1 habitats from the drop down list. Use % cover if you have this information, otherwise major or minor. % cover must add up to 100. % cover statistics with site area data allows for assessment of areas for particular habitats.

Habitat Level 2 (Based on Level 2 of the International Vegetation Classification IVC system)	Temperate and boreal forest and woodland (major) Temperate and boreal grassland and shrubland (minor)	Choose all relevant Level 2 habitats from the drop-down list. Use % cover if you have this information, otherwise major or minor. % cover must add up to 100. % cover statistics with site area data allows for assessment of areas for particular habitats.
Habitat national/regional Level 1		
Ownership	State Conservation organisation Religious group	Select all types of ownership from the drop-down list. Drop-down lists are agreed before data entry begins
Land use	Agriculture (animals) major Extraction (minerals) minor Tourism/recreation (80%) Research (100%)	Choose one or more land uses from a drop-down list and % cover or major, minor, unknown Land uses can add up to more than 100% since land uses can overlap. The list of land use in the drop-down list is agreed before data entry begins. An assessment of land uses helps to target audiences or strategies for conservation.
Site account compiler(s)	V. Cristea	To acknowledge the people who compile site accounts.
Site data providers	V. Cristea	To acknowledge the people who provide data on the site.
Site protection and threats		
Threats (to site, species or habitat) Type and level of threat	Level 1 agriculture and aquaculture Level 2: 2.3 Livestock farming and ranching (major)	The list of threats in the drop-down list is based on the IUCN threat system. The level of threat (to the site) can be assessed using the method described below. Please be specific in the comments box if the threat is to the site as a whole or a particular species or habitat.
Existing protected areas associated with IPA	Name and designation of protected area Cheile Intregalde Natural Monument	Existing protected areas can be entered before data entry begins or they can be added during the process of data entry.
Area of overlap with IPA	Enter the area of the IPA which is protected 25ha	This statistic allows for national and international assessments of the protection status of IPAs.
Relationship to IPA	Protected area contained by IPA	There are four choices for the relationship: IPA contained within protected area, protected area contained with IPA, IPA overlaps with protected area, IPA adjacent to protected area.

Text summaries		
Site description	There is the option to include a text summary in a national language as well as English	This is a short summary of the main features of the site, geology and geography, general importance, brief, details of its protection, ownership conservation status.
Botanical significance	There is the option to include a text summary in a national language as well as English	This is a short summary of the botanical significance of the site, e.g. the number of species and habitats (e.g. 780 species, 36 endemic species, 20% of the flora of the country) it contains, species or habitats of conservation importance (three globally threatened species, six Aiii and Aiv species, the only or best example of a particular habitat) any culturally important species.
Management or conservation issues or guidance	There is the option to include a text summary in a national language as well as English	This is a brief summary of the main conservation issues at the site including its protection status, its management status, any known or potential threats and any key points of guidance to improve its management.
Qualifying criteria		
Criterion A (threatened species) – the following data are collected for each Criterion A species at a particular IPA		
Species name and criteria	*Sorbus dacica* Borbas A(iii)	The name of the species and its IPA criteria are selected from a drop-down list which is agreed before data entry begins.
Abundance at site and data quality	Rare (good data quality)	These data show the baseline for the abundance of a particular IPA species at a particular IPA. This can be used as the basis for developing a monitoring strategy for the site or the network
Trend at site and data quality	Declining (medium data quality)	These data show the available data on population trends and can be used to develop a monitoring strategy for the site or the network.
% of national pop and data quality	50% of national population (good data quality)	These data demonstrate the national importance of a particular population at a particular IPA
% of global population and data quality	50% of global population (good data quality)	These data demonstrate the global value of the site and also help to align the IPA data with the KBA standard
Age of data	2010	These data demonstrate where assessments are being based on old data and help to prioritise future data gathering and monitoring.
Data on a species which are not qualifying features	Enter data on IPA species even if they are not a qualifying species for a site	Some IPA species have a relatively wide distribution. These species may be present at more than 10 sites. Data can still be recorded for them even if they are not qualifying features.

Criterion B – Exceptional botanical richness (the following data are collected for each richness assessment at a particular IPA		
B(i) Habitat and number of species	Coastal dunes (32 indicator species)	These data allow an assessment of the habitats which have been selected for their richness at the national and international level Further information can be included in the text box
B(ii) Number or % of indicator species of conservation importance	47 species (8% of indicator species)	More information on the habitats or species can be included in the text box. The list of indicator species would be published as part of the IPA national methodology
B(iii) Number of % of indicator species of socio-economic or cultural value	23 species (10% of indicator species)	More information on the habitats or species can be included in the text box. The list of indicator species would be published as part of the IPA national methodology
Criterion C – Threatened habitats (the following data are collected for each Criterion C habitat at a particular IPA)		
Habitat name and IPA criteria	6,520 mountain hay meadows C(ii)	The name of the habitat and its IPA criteria are selected from a drop-down list which is agreed before data entry begins.
Area of habitat and data quality	50ha (data quality good)	These data show the baseline for the area of a particular IPA habitat at a particular IPA. This can be used as the basis for developing a monitoring strategy for the site or the network.
Trend	Stable	These data show the available data on the area trends and can be used to develop a monitoring strategy for the site or the network.
% of national area of habitat and data quality	5% (medium data quality)	These data demonstrate the national importance of a particular habitat at a particular IPA
% of global area of habitat	Unknown	These data demonstrate the global value of the site and also help to align the IPA data with the KBA standard.
Age of data	2002	These data demonstrate where assessments are being based on old data and help to prioritise future data gathering and monitoring.
References and data sources		
Citation	A Vascular Plant Red List for England, Stroh, P A et al. 2014, BSBI	You can record available information on published or unpublished sources used to identify or describe the IPA

3.2.1 Assessing threats to sites, species or habitats

To assess the degree of threat to the site or the IPA qualifying species or habitat as high, medium or low, the following scale can be used. The score for each of the three sections (I, II, or III) is added. A total score of 3, 4, or 5 is a low degree of threat; a total of 6 or 7 is a medium degree of threat; a total score of 8 or 9 is a high degree of threat.

I - Effect of threat on site, IPA species or habitat	Score	II – Spatial scale of threat	Score	III – Realisation of threat	Score	Total score
Destruction/ extinction	3	Affects the site/IPA species population/IPA habitat as whole	3	Threat already exists	3	
Rapid deterioration	2	Affects a large part of the site/IPA species population/IPA habitat but not all parts of the site, species population or habitat	2	Threat is planned with realisation expected in the short term	2	
Slow deterioration	1	Affects a relatively small part of the site/IPA species population/IPA habitats, but is not critical for the survival of the site, species or habitats	1	Threat is planned with realisation expected in the long term	1	
Total score	Figure from this column		Figure from this column		Figure from this column	Total score (add figures from the columns)

3.3 Mapping and GIS

Mapping IPAs is essential to define their boundaries and area, to determine ownership, protection levels and to plan for their management. Mapping of the IPA should include the boundary and the locations or core area of qualifying IPA species and habitats, any buffer zones and where appropriate any Zones of Opportunity for restoring or linking habitats or species populations.

Information on basic GIS techniques and detailed instructions on digital mapping of habitats is provided in a report by the Centre for Middle Eastern Plants (Royal Botanic Gardens, Edinburgh) available to download via the IPAMed website (*http://www.medplantsnetwork.net/wp-content/uploads/2017/03/IUCN_Habitat_Mapping_HANDBOOK_EN.pdf*).

The new IPA database has been designed to accommodate spatial files and represent them visually on a global Google map. The map can be viewed with simple map features (road systems etc.) or satellite views. An IPA country co-ordinator can upload a KML file showing the mapped boundary of the IPA at the same time as adding a new IPA site account to the database. Alternatively,a full set of country IPA boundaries can be submitted to the database administrator which can then be loaded and cross-referenced with site account information. Where boundaries have not been mapped, the longitude and latitude values entered when adding a site to the database will be shown and is representative of the central point of the IPA. A new GIS data request function has been set up so that all parties wishing to access IPA information (both data and GIS files) can request information direct from the administrator, who will respond within a given timeframe.

4 A checklist for ongoing protection, management and conservation of IPAs

The survival and flourishing of IPAs and their species and habitats is the ultimate aim of the IPA programme. There are different challenges and opportunities for conservation in different countries and not all of the suggestions below will be applicable in each country. The checklist below provides a potential framework for beginning to develop an IPA conservation strategy after identification.

There are well-recognised capacity issues in the identification of key plants sites and this is also valid for their ongoing protection and conservation. There is a need to set priorities for the protection, conservation and management within the identified IPA network of sites, species and habitats. These priorities can be set on the basis of threat, irreplaceability, high numbers of qualifying species or habitats, the potential for successful management, or the potential for effective partnerships with individuals, communities or organisations within a particular IPA or IPAs. The setting of priorities for ongoing conservation is a national decision for the IPA National Co-ordinating Group with advice from the IPA Technical Advisory Group and the Wider Stakeholder Consultative Group.

Conserving IPAs needs a wide supporter base, and engaging a wide range of potential supporters from the beginning of the process has been effective in other countries. Sharing information about IPAs in easily accessible formats with specialist and general audiences at the national and international level is essential to ensure that the sites are widely recognised, valued and not lost through ignorance of their existence. Digital mapping, digital files and online databases make the process of sharing appropriate levels of information very cost effective and achievable for a range of organisations in different countries.

There are conservation activities which can be implemented across the whole IPA network with relatively low-capacity demands, such as sharing data and raising awareness, and some activities requiring more capacity which could be piloted in a small number of sites. One or more pilot IPAs could be prioritised to implement a range of protection, management, community engagement and public awareness measures. These pilot IPAs could have the potential to become Centres of Excellence for IPA conservation to raise the profile of the whole network and to develop models which can be implemented in other IPAs.

IPA data can be shared at different levels for different audiences. The most basic information that could be shared widely is:

- the boundary map.
- the number and type of qualifying features (e.g. three globally threatened species, six nationally threatened or severely declining habitats, a site of exceptional richness for socio-economic and culturally important plants).
- the protection status and known threats .

The IPA online database allows a summary factsheet to be shared online with key data, which can include the names (but not locations) of individual species (see section 3). Other audiences, such as managers of protected areas which are also IPAs, would usually require a higher level of information such as the locations of individual IPA species and habitats within the site boundary. The decision on how to share data with different audiences is taken by the national IPA team.

Activity	Aim(s)	Potential Audience(s)
Publishing and sharing IPA methods and data	To share information on key plant and fungi sites, their features, their locations and threats, so that they are not lost through ignorance of their value.	All types: Scientists Political decision makers Landowners and managers Funders General public
Publishing the IPA methodology	To demonstrate clearly the data and methods used to identify sites. To highlight data gaps and focus future data-gathering efforts.	National and international scientists and conservation specialists Politicians and government agencies Conservation funders
Digital mapping of sites and boundaries	To have accessible data on sites, boundaries and features. To identify key landowners and managers. To allow a range of audiences to become involved in IPA conservation.	National and international scientists and conservation specialists Landowners and managers National and international developers and financiers Politicians and government agencies General public
Publishing site accounts (through publications, databases*, websites) * See section 3	To disseminate the key information on individual IPAs, including their botanical and mycological value, protection status, management guidance to a range of audiences.	National and international scientists and conservation specialists Landowners and managers National and international developers and financiers General public
Sharing IPA data with protected area and nature reserve managers	To ensure that the managers of existing protected areas and nature reserves are aware that their site is also an IPA along with available management guidance. To request that IPA species and habitats are recognised in management plans and activities.	Protected area and nature reserve managers Individuals, communities or organisations who live or work on existing protected areas or nature reserves
Sharing IPA data with other types of landowners and managers	To ensure that the owners of IPA land and those who live or work on IPAs are aware of the botanical and mycological importance of the site and have access to any management guidance.	Individuals, communities or organisations who own, manage, live or work on IPAs including private owners or government land
Sharing IPA data at the international level, such as with the WCPA database or UNESCO MAB or WHS databases	To ensure that information about the botanical and mycological value of existing or potential protected areas is widely recognised through inclusion in the site factsheets of international databases.	National and international scientists and conservation specialists Politicians and government agencies General public
Aligning and sharing IPA data with other conservation frameworks including KBAs, IUCN Red Listing of species and ecosystems, RAMSAR sites.	To ensure that IPAs or IPA qualifying species and habitats are recognised within other conservation frameworks as appropriate.	National and international scientists and conservation specialists politicians and government agencies

Checklist for developing an IPA conservation strategy or framework	Aims	Individuals and organisations involved
Identify landowners/ managers of IPAs to determine the potential for future conservation, and to target appropriate management advice and guidance.	To identify the groups and individuals who own or manage IPAs and how best to engage with them for the long-term conservation of the sites and their species and habitats.	IPA National Co-ordinating Group with support from Technical Advisory Group and Wider Stakeholder Consultative Group (as appropriate) Relevant national authorities Landowners Community groups
Prioritising sites (ranking IPAs on their need for protection, management or potential for success).	To ensure that IPAs most in need of protection or conservation management, or those with the most potential for successful management are targeted.	IPA National Co-ordinating Group with support from Technical Advisory Group and Wider Stakeholder Consultative Group (as appropriate)
Prioritising species and habitats (ranking species and habitats on their need for protection, active management or potential for successful management).	To ensure that the species and habitats under the highest threat or greatest potential for successful management are targeted for conservation action and monitoring	IPA National Co-ordinating Group with support from Technical Advisory Group and Wider Stakeholder Consultative Group (as appropriate)
Identifying key legal and political opportunities for protecting or conserving IPAs.	To ensure that the possible routes to protect or conserve IPAs are widely recognised by the IPA national team and relevant decision makers.	IPA National Co-ordinating Group with support from Technical Advisory Group and Wider Stakeholder Consultative Group (as appropriate) Relevant government agencies Legal advisers Other conservation NGOs
Identifying individuals and organisations as potential IPA supporters and contacting them with relevant requests for assistance.	To promote the value of IPA to a wide range of people who could have influence over their conservation.	IPA National Co-ordinating Group with support from Technical Advisory Group and Wider Stakeholder Consultative Group (as appropriate)
Identifying a named person as a contact for each IPA, and sharing that information with relevant local and national audiences.	Where possible, having a named individual as the contact for each IPA makes it easier to share information or to highlight threats.	IPA National Co-ordinating Group with support from Technical Advisory Group and Wider Stakeholder Consultative Group (as appropriate) IPA contact/guardian
Protection, management, monitoring		
Where appropriate, proposals for increased protection on existing or new protected areas are developed and presented.	To ensure that any IPA which requires further protection is recognised by the appropriate national or international authorities.	IPA national team National protected area network managers Politicians and relevant government agencies
Record any available management guidance for species or habitats and share with appropriate audiences.	To collate and share available management guidance. To highlight the major gaps in management knowledge.	IPA national team Conservation specialists Other conservation NGOs Socio-economic or cultural plant experts
Develop management plans for sites, species and habitats based on the national priority lists above.	To improve the management and ongoing conservation of priority species and habitats.	IPA National Co-ordinating Group with support from Technical Advisory Group and Wider Stakeholder Consultative Group (as appropriate) Protected area or reserve managers Community groups or private landowners
Identify species, habitat and site monitoring priorities, and develop a monitoring strategy.	To assess the effectiveness of the IPA network in conserving sites, species and habitats. To identify declining trends and to change management where possible and appropriate.	IPA National Co-ordinating Group with support from Technical Advisory Group and Wider Stakeholder Consultative Group (as appropriate) Protected areas or reserve managers Landowners Botany students Volunteers
Community management and community benefit		
Consult with local communities and local plant experts on their concerns and suggestions about IPA management. This could be at all IPAs or focused on those sites identified under Criterion B(iii).	To identify local concerns, priorities and suggestions on IPA management and conservation.	IPA National Co-ordinating Group with support from Technical Advisory Group and Wider Stakeholder Consultative Group (as appropriate) Local plant experts, traders or healers External specialists (if appropriate)
Work with one or more communities who live or work within an IPA to develop a community focused management plan, which in the future can be replicated at other sites.	To investigate the potential for using community engagement and community benefit as a central element of IPA management planning. To learn the best ways to engage with communities who live or work in IPAs for mutual benefit to plants and people.	IPA National Co-ordinating Group with support from Technical Advisory Group and Wider Stakeholder Consultative Group (as appropriate) Community groups Landowners and managers External specialists (if appropriate)
Work with traditional medicine experts, traders and consumers to develop a model of sustainable medicinal plant management within IPAs.	To develop workable models for community management and benefit from medicinal plants which also conserve the plants and their habitats.	IPA National Co-ordinating Group with support from Technical Advisory Group and Wider Stakeholder Consultative Group (as appropriate) Traditional medicine experts Medicinal plants traders and consumers. Community groups Landowners and managers

Develop a pilot eco-tourism project based at an IPA.	To investigate the potential and challenges of using eco-tourism to promote and conserve IPAs while providing community benefit.	IPA National Co-ordinating Group with support from Technical Advisory Group and Wider Stakeholder Consultative group (as appropriate) Landowners and managers Local community groups Eco-tourism providers and charities (e.g. the Travel Foundation) External specialists (if appropriate)
Public awareness		**Potential audience(s)**
Launch IPAs through TV, radio, print media and digital media.	To raise the profile of IPAs nationally and internationally. To identify potential IPA supporters.	All types: General public (national and international) Regional and national audiences
Develop a poster map of IPAs and key/iconic species, & distribute widely.	To promote simply and clearly the network of IPAs and what it aims to conserve at the local and national level.	Schools and colleges Government agencies Media outlets Community halls
Engage with schools and colleges (to learn about IPAs, or visit them, or use them as part of science or botany education).	Share the importance of IPAs with the next generation. Promote IPAs as places where learning and training can take place.	IPA National Co-ordinating Group with support from Technical Advisory Group and Wider Stakeholder Consultative Group (as appropriate) Schools and colleges Landowners and managers
Art and culture at IPAs – pilot a local or national art competition/exhibition or writing competition, or a cultural performance based around IPAs and their plants.	Promote the artistic and cultural potential of IPAs for inspiration and places of great cultural value. Inspire artists, writers and performers to engage with IPAs.	IPA National Co-ordinating Group with support from Technical Advisory Group and Wider Stakeholder Consultative Group (as appropriate) Local and national artists/writers/performers Local and national media
What to do if sites are in danger of destruction or major development		
Identify a named person for each IPA to identify threats or be contacted about threats.	To ensure that there is at least one person who is responsible for watching over the site to identify threats or whom others can contact about threats.	IPA contact/guardian
Include IPA data in the application of Environmental Impact Assessments, the Mitigation Hierarchy, IFC PS6, and World Bank Environmental and Social Framework.	Ensure that those involved in potential destruction/major development are aware of the site's IPA status, and that the botanical value of the site is being included in environmental assessments.	IPA contact/guardian IPA National Co-ordinating Group with support from Technical Advisory Group and Wider Stakeholder Consultative Group (as appropriate) Landowners and managers Relevant government departments and politicians Developers/project managers/financiers
Identify any legal processes for protecting the site if appropriate.	Ensure any legal options for protection are identified and, where possible, implemented.	IPA contact/guardian IPA National Co-ordinating Group with support from Technical Advisory Group and Wider Stakeholder Consultative Group (as appropriate) Relevant government agencies Legal professionals
Notify national and international-level audiences about the threat or potential threat.	Ensure that relevant government agencies, national and international conservation specialists and the media are aware of the situation.	IPA contact/guardian IPA National Co-ordinating Group with support from Technical Advisory Group and Wider Stakeholder Consultative Group (as appropriate) Relevant government agencies Local, national and international Conservation groups and specialists Local, national and international media

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5 Supporting information

5.1 Frequently Asked Questions (FAQs)

Why are IPAs defined at the national level?

IPAs are defined at the national level for two main reasons. Many plant, fungi and habitat data are held at the national level and most legislative and conservation frameworks are implemented at the national or sub-national level. The IPA model is a globally consistent framework, which uses the same three criteria all over the world, but which recognises the value of national decision making for the long-term conservation of sites. IPA programmes can and do use global or regional-level data, and in turn can contribute national-level data to global initiatives.

Why is IPA not a legal site designation?

The IPA framework provides a thorough, scientific assessment of priority plant sites irrespective of their current or future legal protection status. Many IPAs will already be included (all or in part) within existing protected areas. Identifying a site as an IPA in some cases may lead to new or increased protection status. However, not all IPAs will necessarily become protected areas and may be managed through other conservation or community frameworks.

Do all sites that contain an IPA-qualifying feature automatically become IPAs?

No. IPA identification is a two-stage process. The first stage is to identify all the sites that contain IPA species, habitats or richness assessments. The second stage is to select a national network of IPAs that represents a complementary set of sites which will conserve the full range of IPA species and habitats, the best sites for wild plants, fungi and habitats, and will help to prioritise conservation action.

How are the size and boundaries of IPAs defined?

There is no minimum or maximum size for an IPA. Identifying larger sites with multiple IPA-qualifying criteria is one means of conserving diverse ecological areas and focusing conservation priorities. However, a small IPA may be appropriate if it contains the only or best population, or area, for a particular IPA species or habitat.

How do IPAs relate to other conservation frameworks?

The IPA framework is intended to support and underpin other conservation frameworks rather than to compete with them. IPA criteria provide a transparent but pragmatic method of identifying priority plant and fungi sites and the data created by IPA programmes can be used to support Red Listing of species or habitats and contribute to the identification of Key Biodiversity Areas (KBAs).

5.2 List of acronyms

CBD – Convention on Biological Diversity
CITES – Convention on International Trade in Endangered Species
CR – Critically Endangered (IUCN Red List Category)
CWR – Crop Wild Relatives
EN – Endangered (IUCN Red List Category)
EPCS – European Plant Conservation Strategy
EU – European Union
GSPC – global Strategy for Plant Conservation
HRE – Highly Restricted Endemic
IBA and IBBA – Important Bird Area and Important Bird and Biodiversity Area
ICCA – Indigenous and Conserved Community Areas
IFC – International Finance Corporation
IPA – Important Plant Area
IUCN – The World Conservation Union
KBA – Key Biodiversity Area
NCG – National Co-ordination Group (of an IPA national team)
RRE – Range Restricted Endemic
TAG – Technical Advisory Group (of an IPA national team)
TIPA Tropical Important Plant Area
UNESCO – United National Educational, Scientific and Cultural Organisation
VU – Vulnerable (IUCN Red List Category)
WCSG – Wider Consultative Stakeholder Group (of an IPA national team)

5.3 Definitions

The definitions for 'population', 'range', 'region' and 'restricted habitat' are described in detail in Darbyshire et al. 2017

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