Synergies between World Heritage Sites and Key Biodiversity Areas

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Synergies between World Heritage sites and Key Biodiversity Areas

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International organizations that are seriously concerned with the preservation of biodiversity worldwide find themselves confronted with the enormous task of identifying and establishing a hierarchy of sites in need of their attention. In this respect they have become increasingly aware over the years of the work done in the framework of the World Heritage Convention, whose interests are convergent with their own. And while the goals of the Convention are broader than those of the biodiversity conservation community, they, too, explicitly recognize values for ecosystems, and threatened habitats and species.

Mount Kenya National Park/Natural Forest (Kenya).

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[9]Plantlife International
[10]Nature Kenya

The uKhahlamba / Drakensberg Park (South Africa).

A set of common actions would simultaneously meet both World Heritage and biodiversity conservation objectives.

One of the ten World Heritage criteria in the *Operational Guidelines* (criterion x), acknowledges the outstanding universal value of certain sites because they 'contain the most important and significant natural habitats for *in-situ* conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation'. Criterion (ix) further recognizes sites that are 'outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals'.

To date, 124 World Heritage sites have been recognized under criterion (x) of the Convention, of which 82 are also recognized under criterion (ix), so it appears obvious that the identification of areas of significance in terms of high biodiversity and that of sites important to the maintenance of cultural and natural heritage have a number of points in common.

Identifying regions and sites

Biodiversity, and the threats confronting it, vary widely around the world. This being the case, we as a conservation community must be at pains to identify the regions and sites in need of immediate action to reduce the loss of biodiversity.

This is just as true in the case of the World Heritage Convention when it comes to identifying and protecting natural and cultural sites, biodiversity sites included. And so it appears, in principle, that a set of common actions would simultaneously meet both World Heritage and biodiversity conservation objectives.

This potential for collaboration has yet to be fully realized in practice, but we can nonetheless explore it further by taking a closer look at the overlap of World Heritage sites and areas of biodiversity conservation priority, and by considering how the designation of sites that are important for both cultural values and biodiversity can be beneficial to all concerned.

A number of methods based on a variety of factors allow the selection of priority regions for conservation. The biodiversity hotspots approach, introduced by Norman Myers in 1988, is one such method. It uses the criteria of irreplaceability and vulnerability of taxa to determine which biogeographic regions most urgently need the attention of conservationists.

Specifically, according to this method, in order for a region to be recognized as a biodiversity hotspot, it must hold over 1,500 species of endemic plants (this being a measure of irreplaceability) and it must have lost over 70 per cent of its natural habitat as a result of anthropogenic change (this being a measure of vulnerability).

To date, 34 such biodiversity hotspots have been identified. And while their endemic population includes more than 50 per cent of the world's plant species, they cover a mere 16 per cent of the Earth's land surface. We can usefully overlay the biodiversity hotspots with the set of World

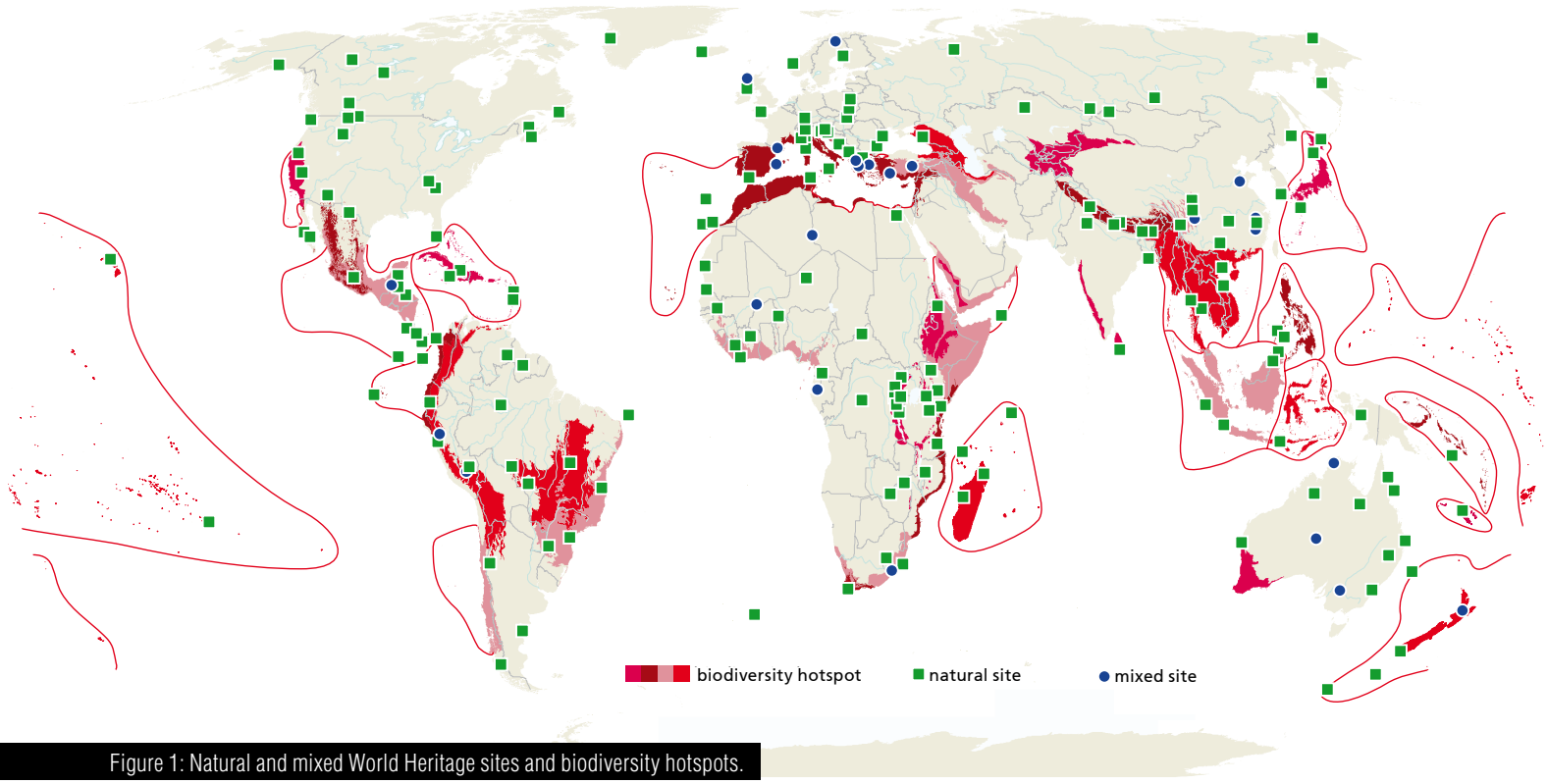


Figure 1: Natural and mixed World Heritage sites and biodiversity hotspots.

Heritage sites (cultural, natural and mixed) to determine whether the identification and listing of these sites has followed similar biogeographic patterns.

If we examine all World Heritage sites taken together, we see that 381 out of 878 (43 per cent) fall within the 34 biodiversity hotspots referred to above, and if we include just those identified for natural criteria the results show that 93 out of 201 natural and mixed sites (46 per cent) fall within the hotspots (Figure 1). These hotspots harbour nearly three times the share of World Heritage sites than might be expected given the slim 16 per cent of terrestrial area that they cover. [NB: The dataset used for these figures is from 2008, when there were 878 sites on the World Heritage List.]

It remains however that a finer scale of data on biodiversity yields an even better parallel to site-level priorities identified through the World Heritage Convention.

Over the past three decades, several approaches for identifying sites of global importance for biodiversity conservation have emerged, the first being the concept of Important Bird Areas (IBAs), developed by BirdLife International. Specialists in other taxonomic groups quickly began to sense that similar criteria could be usefully applied to other taxa. This led to the emergence of Plantlife International's Important Plant Areas (IPAs), IUCN's Important Freshwater Areas, and other such approaches.

In 2004, an umbrella approach – Key Biodiversity Areas (KBAs) – was proposed that would allow the identification of important areas for multiple taxonomic groups even as a partnership of over 60 non-governmental organizations joined forces in the Alliance for Zero Extinction (AZE) and went on to identify the highest priority subset of Key Biodiversity Areas around the world – those which hold the last remaining population of a Critically Endangered (CR) or Endangered (EN) species, classified as such on the IUCN Red List of Threatened Species.

Key Biodiversity Areas thus provided the overarching term for sites of global significance for biodiversity conservation, with Important Bird Areas representing the avian subset, Important Plant Areas the plant subset, and the Alliance for Zero Extinction sites signalling the highest priority Key Biodiversity Areas overall (Figure 2).

World Heritage sites are nominated through national and local efforts, and designated or approved at global level through the intergovernmental World Heritage Committee. Key Biodiversity Areas, in a striking parallel, are identified nationally using locally available data. Such local knowledge serves to identify sites that meet globally standardized criteria, and these are approved at global level to ensure consistent application of the selected criteria.

Key Biodiversity Areas are sites of global significance for biodiversity conservation. IBAs, IPAs and AZE sites each form a subset of KBAs based on more specific criteria.

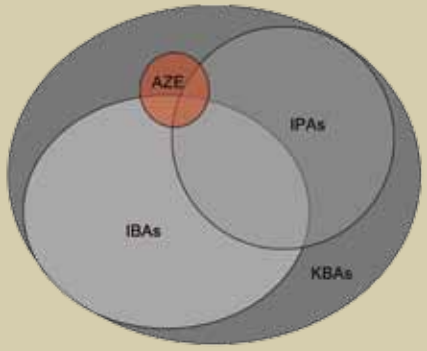


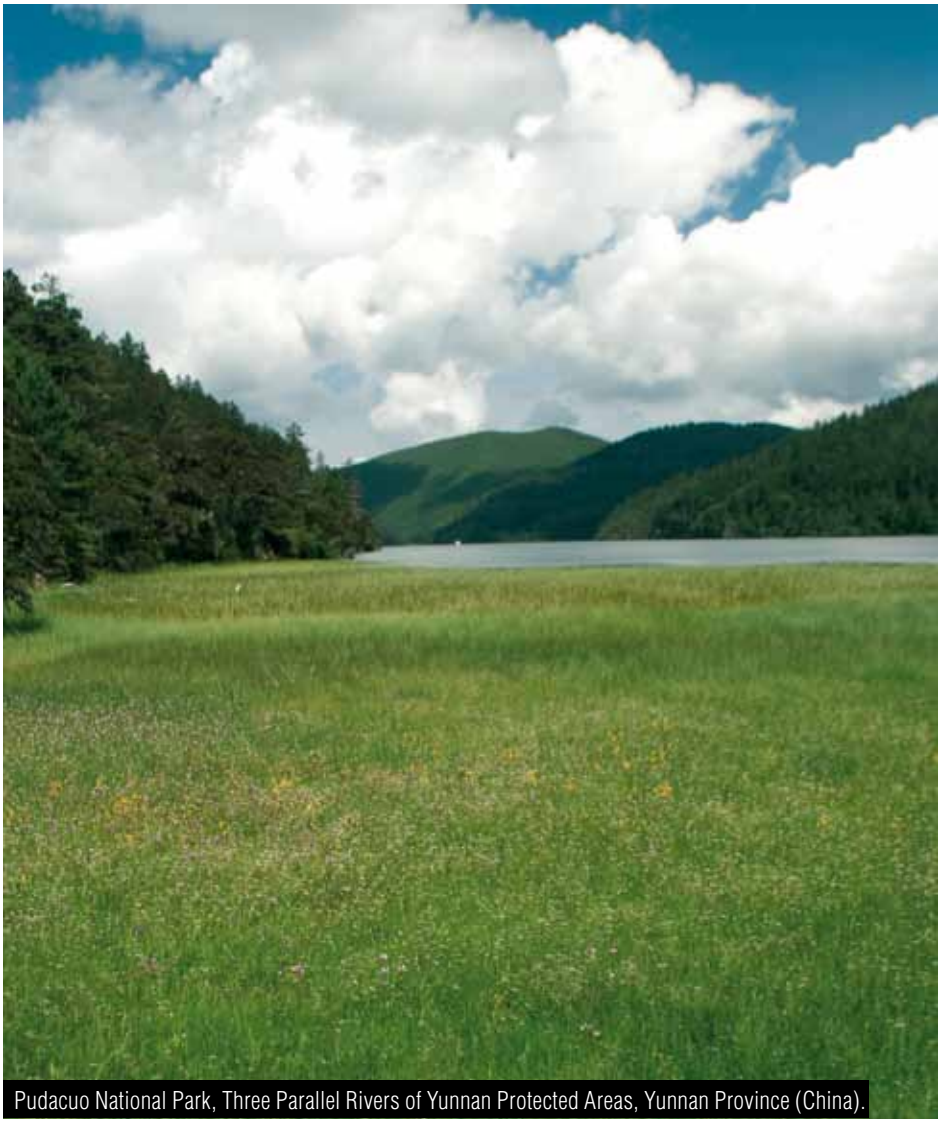
Figure 2.

Comparing criteria

Under the World Heritage Convention, countries may propose areas for inscription on the World Heritage List by referring to either cultural or natural criteria – or both. While the coincidence between cultural World Heritage sites and Key Biodiversity Areas is of interest given the manifold benefits that such sites provide, the more obvious comparison involves the 201 natural World Heritage sites currently (March 2010) listed under the World Heritage Convention.

The criteria for identifying Key Biodiversity Areas are based on the concepts of vulnerability and irreplaceability mentioned earlier, and specifically, these areas must contain 'significant populations of globally threatened, restricted range, congregatory or bioregionally restricted species'.

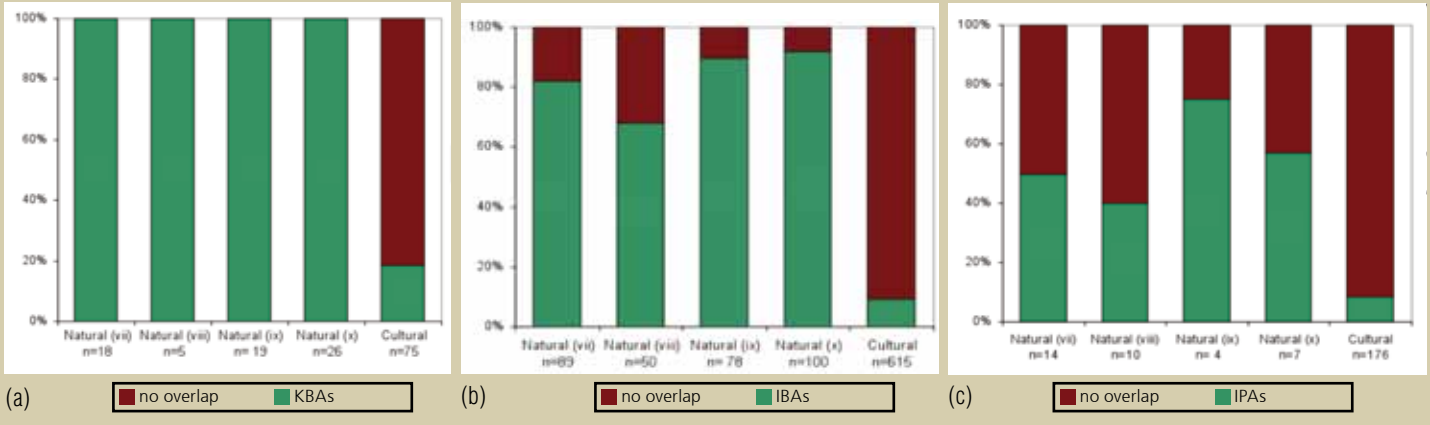
These Key Biodiversity Area criteria are most closely related to World Heritage site criteria (ix) and (x) already cited. Sites that qualify as Key Biodiversity Areas under the bioregionally restricted criterion must hold significant components of the species that are representative of particular bioregions or vegetation types and are therefore outstanding examples of ecosystems and communities of plants and animals (criterion ix). The other criteria for which Key Biodiversity Areas may be identified (globally threatened, restricted range, or congregatory species) link with criterion (x) as such areas are all important habitats for the *in-situ*



Pudacuo National Park, Three Parallel Rivers of Yunnan Protected Areas, Yunnan Province (China).

Figure 3.

Proportion of World Heritage sites identified as (a) Key Biodiversity Areas, (b) Important Bird Areas and (c) Important Plant Areas. Natural site criteria: (vii) natural phenomena / beauty/ aesthetic importance (viii) geological record / processes, (ix) ecological and biological processes / ecosystems and communities of plants and animals, (x) priority natural habitats for biological diversity / threatened species. Note that World Heritage site criteria are not mutually exclusive as sites may qualify under one or more criteria, including both natural and cultural.



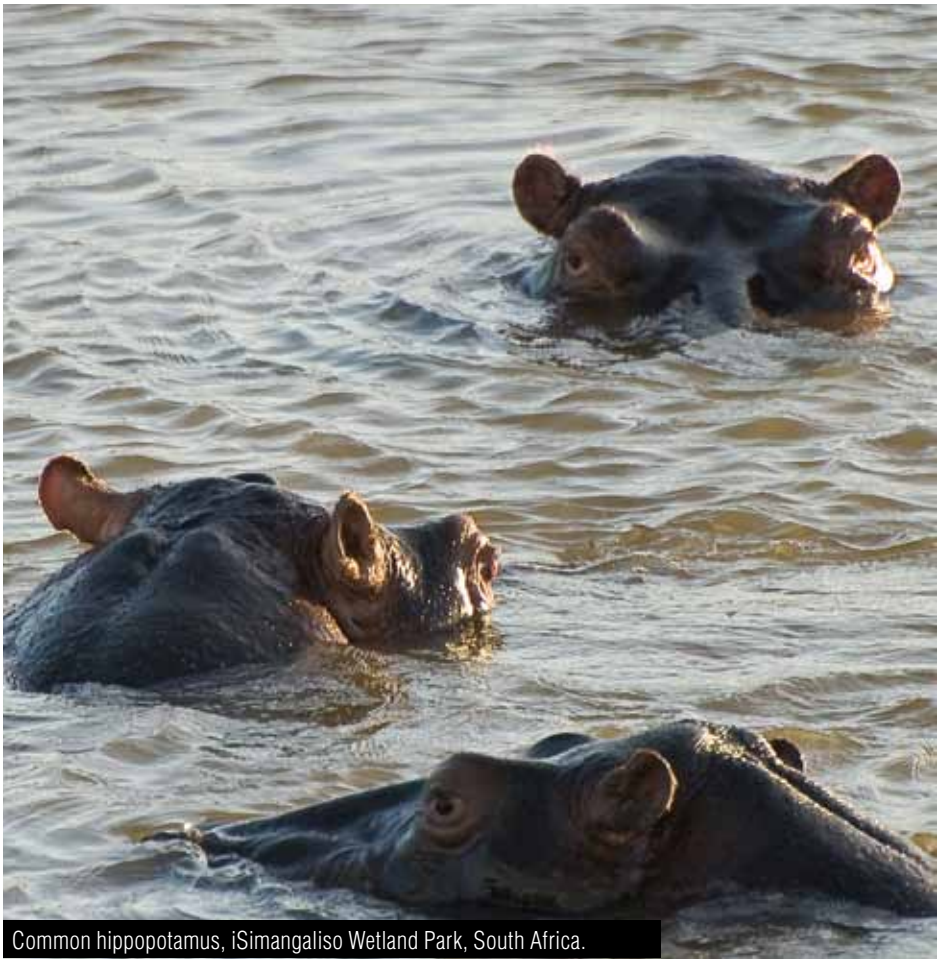
conservation of biodiversity and explicitly harbour threatened species.

While natural World Heritage site criteria are broader, there is a large degree of concordance between natural World Heritage sites and Key Biodiversity Areas as far as the identification of sites is concerned. What is more, natural sites must meet criteria of integrity, protection and management, in addition to the biological criteria. This being the case, it appears likely that there are opportunities for data sharing and further coordination between the World Heritage Committee and those organizations dedicated to the maintenance of global Key Biodiversity Area datasets, particularly in natural World Heritage site selection and approval under criteria (ix) and (x).

Overlap

As we have already pointed out, there are several subsets of Key Biodiversity Areas either based on single taxonomic groups (of birds or plants) or looking at the most urgent subset of multiple taxonomic groups. While there is global coverage for Alliance for Zero Extinction and near global coverage for Important Bird Areas, there is still much work to be done to reach comprehensive global coverage of Key Biodiversity Areas identified for multiple taxonomic groups. In the 2008 World Heritage site dataset there is a total of 878 sites (679 cultural, 174 natural, and 25 mixed). To get a sense of how the World Heritage sites compare with Key Biodiversity Areas around the world, and to draw conclusions with respect to their overlap, the analysis is divided into four sections to cover the different Key Biodiversity Area datasets (KBAs for multiple taxonomic groups, birds, plants and AZE sites).

We summarize these analyses in Figure 1, which lists all World Heritage sites also identified as Key Biodiversity Areas. The results presented here are conservative, since they include only central coordinates for the World Heritage sites (these were the only spatial information that existed across all sites). We did manually cross-check the results for natural World Heritage sites against the Key Biodiversity Area datasets. Nevertheless, the lack of World Heritage site boundaries presumably results in an underestimate of the overlap between Key Biodiversity Areas and World Heritage sites.



Common hippopotamus, iSimangaliso Wetland Park, South Africa.

While natural World Heritage site criteria are broader, there is a large degree of concordance between natural World Heritage sites and Key Biodiversity Areas.

Key Biodiversity Areas for multiple taxonomic groups

Key Biodiversity Areas have been identified for multiple taxonomic groups in 68 countries and parts of eight others. All of these Key Biodiversity Area identification efforts included information on mammals, birds and amphibians, while several also included reptiles, plants as well as freshwater and marine species. While not a complete global dataset, the Key Biodiversity Areas in these countries give a good idea of the overlap between sites of global importance for biodiversity as a whole with World Heritage sites.

To date, 105 World Heritage sites have been identified in these countries, 32 of which are based on natural criteria (two are identified on both natural and cultural criteria). All of these 32 natural World Heritage sites have also been identified independently as Key Biodiversity Areas (Figure 3). It is particularly interesting to note that the six sites identified under geological and aesthetic criteria also qualify as Key Biodiversity Areas, highlighting that World Heritage criteria (ix) and/or (x) are also appropriate for these sites. Even more striking is the fact that at least an additional 12 *cultural* World Heritage sites have also been identified as Key Biodiversity Areas, suggesting that there may be room for additional natural criteria to be proposed for these sites. The cultural values provided by many of these Key Biodiversity Areas are of particular interest in the context

of developing approaches for the more effective conservation of these sites. The case study of Mount Emei Scenic Area (China) explores this idea further.

There are obviously many other Key Biodiversity Areas in these countries (in total, they hold over 2,300 such areas), and although not all of these would correspond to natural World Heritage sites, they may prove to be a useful dataset for States Parties to use when selecting additional areas to include in their inventory or Tentative List, as well as for the World Heritage Committee when reviewing proposed natural World Heritage sites.

Important Bird Areas – the global subset of KBAs for birds

As the avian subset of Key Biodiversity Areas, Important Bird Areas make use of KBA criteria to identify globally important sites for the conservation of bird species. Such Bird Areas have been identified in nearly all countries around the world. While focused on a single taxonomic group, recent case studies have shown that Important Bird Areas are quite effective at picking up the important sites for other taxa as well.

In total, 746 World Heritage sites have been identified in the countries where Important Bird Areas have also been identified, and 154 of these are based on natural criteria. Of the 78 natural sites selected on criterion (ix), 70 (90 per cent) have also been identified as Important Bird Areas; while 92 of the 100 criterion (x) natural sites (92 per cent) are also Important Bird Areas (Figure 3). Again, this extreme degree of overlap suggests that both the Important Bird Areas and the natural World Heritage site approach (under criteria ix and x) are seeking to conserve similar outstanding natural features.

Important Plant Areas – the subset of KBAs for plants

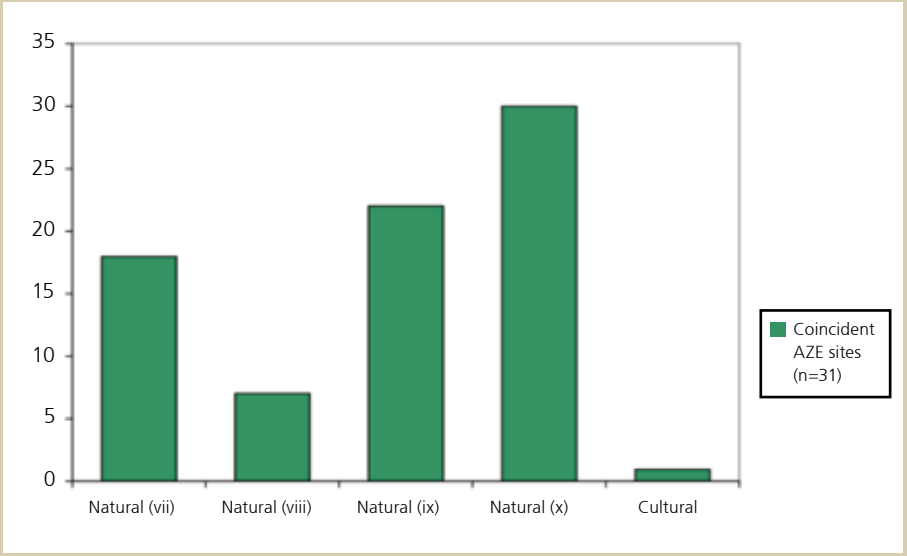
Important Plant Areas are internationally significant sites for wild plants and their habitats, identified as such in view of the presence of threatened species, threatened habitats and/or exceptional species richness. Thus, they are part of the Key Biodiversity Area family of globally significant sites for biodiversity conservation. To date, 66 countries around the world have begun Important Plant Area programmes.

African fish-eagle, iSimangaliso Wetland Park (South Africa).

In total, 746 World Heritage sites have been identified in the countries where Important Bird Areas have also been identified, and 154 of these are based on natural criteria.

Figure 4.

Breakdown of natural criteria for the 31 (total = 563) Alliance for Zero Extinction sites covered by World Heritage sites.



The Iberian lynx, an endangered species endemic to the Iberian Peninsula.

Greater flamingo, Floreana Island, Galápagos Islands (Ecuador).

Alliance for Zero Extinction sites each hold the only known population of one or more highly threatened species.

Like multi-taxa Key Biodiversity Areas and Important Bird Areas, Important Plant Areas also exhibit a high degree of overlap with natural World Heritage sites, especially for those sites qualifying under criteria (ix) and/or (x). In Europe, North Africa and the Middle East, 70 per cent of natural sites identified for biological values also qualify as Important Plant Areas. Again, it is interesting to note that even though the cultural sites were not proposed under any natural criterion, 13 (8 per cent) of these sites have been identified as Important Plant Areas under strict biological criteria.

Sites requiring urgent conservation to avoid species extinction

Often referred to as the 'tip of the iceberg' subset of Key Biodiversity Areas, Alliance for Zero Extinction sites each hold the only known population of one or more highly threatened species and are therefore perfectly obvious and extremely urgent priorities for conservation on the ground. We compared the 563 AZE sites for which spatial data are available with the full set of World Heritage sites and found that 31 of these sites (6 per cent) are covered by natural World Heritage sites of criteria (ix) and (x) (Figure 4). As States Parties consider nomination of additional sites for World Heritage recognition under criteria (ix) and (x), the remaining 532 AZE sites might sensibly be given particularly urgent attention.

Viewed from the ground

To put some of the previous analysis in context, the following case studies provide useful insight into how conservation is implemented on the ground at sites that have been identified both as natural or mixed World Heritage sites and also as Key Biodiversity Areas.

Pudacuo National Park, Three Parallel Rivers of Yunnan Protected Areas, Yunnan Province (China).

Emei Shan (China).

Mount Emei Scenic Area, including Leshan Giant Buddha Scenic Area mixed World Heritage site

Emei Shan (Mount Emei), is located in the Sichuan Province of China and was designated a mixed natural and cultural World Heritage site in 1996 (in combination with the Leshan Giant Buddha, located about 40 km east). Both its cultural value and biological diversity are remarkable. Emei Shan is the highest of the Four Sacred Mountains of Buddhism in China, and is the place from which Buddhism spread to the rest of China. The bodhisattva Puxian is said to have visited the mountain astride a six-tusked elephant, and is considered the mountain's patron deity. The area has been inhabited for about 10,000 years, and a medicinal plant farmer is said to have built the first temple in the 1st century AD. Since the 9th century, a large number of Buddhist monasteries have been built on the mountain, leading to increasing importance as a pilgrimage site.

Emei Shan (Mount Emei), is located in the Sichuan Province of China and was designated a mixed natural and cultural World Heritage site in 1996.

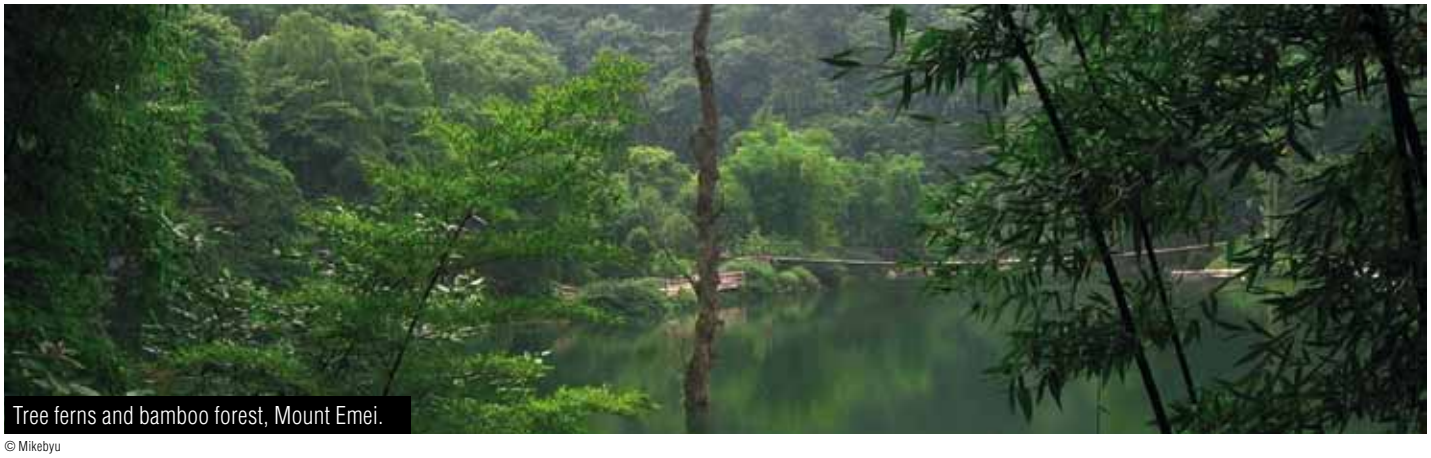
The natural World Heritage site designation is based on the mountain's plant diversity, which ranges from subtropical to subalpine pine forests, and includes orchids, primulas, rhododendrons, camellias, ginkgos, cycads and tree ferns. Many plant species are endemic to the mountain. The site is also globally important for a number of other taxonomic groups. It is an Alliance for Zero Extinction site based on the presence of two amphibian species that are found nowhere else: the chevron-spotted brown frog (*Rana chevronta*, Critically Endangered) and Longdong stream salamander (*Batrachuperus londongensis*, Endangered). It has also been identified as an Important Bird Area based on the presence of three restricted-range, vulnerable bird species endemic to China: the Emei Shan liocichla (*Liocichla omeiensis*), gold-fronted fulvetta (*Alcippe*

The sacred mountain Emei Shan has kilometers of stone carved stairs winding up to temples and shrines.

A large number of Buddhist monasteries have been built on the mountain, leading to its increasing importance as a pilgrimage site.

variegaticeps), and grey-hooded parrotbill (*Paradoxornis zappeyi*). Given its location in a highly developed and densely populated region, Emei Shan is one of the only areas where these birds occur in relatively large numbers. Most recently, the mountain was identified as a Key Biodiversity Area by Conservation International, Peking University and partners based on the species mentioned above, and delineated using the boundaries of the Emei Shan Natural and Historical Heritage Site.

Mount Emei's sacred status has resulted in very limited habitat clearance over time, allowing it to retain its remarkable plant and animal diversity. For this reason, the mountain has some trees that are over 1,000 years old. Nevertheless, threats to its species remain. Emei Shan is formally protected by the Chinese Government, but despite the presence of a number of small reserves for endemic species conservation, the area is managed mainly for its cultural value rather than explicitly for biodiversity conservation. For example, removal of stones for construction projects has in the past posed a threat to the Longdong stream salamander (which is also threatened by over-harvesting for traditional medicine). Small-scale agriculture and stream acidification due to air pollution are additional threats to many species. The site's fame generates several hundred thousand visits a year. The designation of Emei Shan as a national Nature Reserve, increased monitoring, and further efforts to reduce tourist impacts would support the continued persistence of the site's unique and threatened biodiversity.



Tree ferns and bamboo forest, Mount Emei.

Mount Kenya National Park/Natural Forest (Kenya).

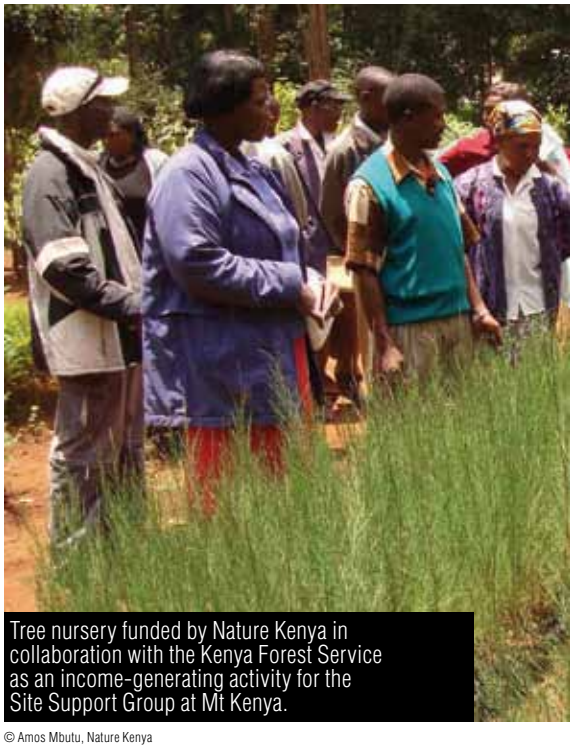
Mount Kenya National Park/Natural Forest World Heritage site

Mount Kenya is an imposing extinct volcano that dominates the landscape of the Kenyan highlands east of the Rift Valley, some 140 km north-east of Nairobi, with its northern flanks astride the Equator. It was inscribed on the World Heritage List in 1997 under natural criteria (vii) and (ix). The mountain's sprawling slopes are cloaked in forest, bamboo, scrub and moorland, giving way on the high central peaks to rock, ice and snow. Its forests are part of the largest continuous block of indigenous closed canopy forest in the country. Apart from its importance for biodiversity, Mount Kenya also has enormous traditional religious significance for the Kikuyu, Embu and Meru peoples who live around it. Numerous important traditional uses are therefore made of the forest. The mountain is a vital water catchment for the Tana and Ewaso Ngiro rivers, while the moorland (with its extraordinary Afro-alpine vegetation) and peaks attract a steady stream of tourists.

Mount Kenya was identified as an Important Bird Area encompassing a somewhat larger area than the World Heritage site on the basis of several criteria. It holds resident populations of Sharpe's longclaw *Macronyx sharpei* (Endangered) and Abbott's starling *Cinnyricinclus femoralis* (Vulnerable) while the migrant lesser kestrel *Falco naumanni* (Vulnerable) is a regular visitor. In addition, six of the eight restricted-range species whose distributions define the Kenya Mountains Endemic Bird Area occur here, as do 54 of the 70 species of the Afro-tropical Highland biome that occur in Kenya. Mount Kenya is also an Alliance for Zero Extinction site for the giant thicket rat *Grammomys gigas* (Endangered), which is entirely confined to the mountain. The Afro-alpine flora is known to include some endemics, so the site seems certain to qualify as an Important Plant Area.

Mount Kenya is an imposing extinct volcano that dominates the landscape of the Kenyan highlands east of the Rift Valley.

Parts of Mount Kenya, in particular the forest reserve, are subject to a number of



Tree nursery funded by Nature Kenya in collaboration with the Kenya Forest Service as an income-generating activity for the Site Support Group at Mt Kenya.

threats, of which the most serious is illegal logging, as demand for indigenous timber continues to be extremely high despite a ban on extraction decreed in 1999. This is coupled with encroachment and the presence of squatters in parts of the forest. Human population densities around the mountain are high, especially in the south-east, and encroachment has fragmented and destroyed areas of the lower-altitude forest. The farming undertaken by squatters includes the cultivation of illegal but lucrative gardens of cannabis *Cannabis sativa*, which are widespread in forest clearings on the lower slopes. In recent years however, the bans on logging and illegal cultivation have been more vigorously enforced by the Kenya Wildlife Service which, combined with the eviction of many of the squatters, reportedly resulted in a drastically reduced rate of exploitation of Mount Kenya's forests. Information on these increases in conservation responses are being fed through to systematic monitoring of the Important Bird Area network in Kenya, organized by Nature Kenya, BirdLife International's national partner organization, working in close and effective collaboration with the Kenya Wildlife Service, the Kenya Forest Service, the National Museums of Kenya, the National Environment Management Authority of Kenya and the local community. Communities are involved through Site Support Groups, which are groups of volunteers who, in partnership with relevant stakeholders, help to promote conservation and sustainable development at Important Bird Areas, and indeed other Key Biodiversity Areas. In this instance, Nature Kenya has established and nurtured the capacity of the Mt Kenya Biodiversity Conservation Group which, in partnership with lead government agencies, is executing a conservation programme for the more effective protection of Mount Kenya. Activities include environmental education at the Mt Kenya Resource Centre, income-generating activities, forest and biodiversity monitoring, and habitat restoration.

Mount Kenya was identified as an Important Bird Area encompassing a somewhat larger area than the World Heritage site on the basis of several criteria.

The migrant lesser kestrel *Falco naumanni*.

World Heritage sites and Important Plant Areas in Montenegro

Twenty-seven Important Plant Areas have been identified in Montenegro to date, two of which are also World Heritage sites: the Natural and Culturo-Historical Region of Kotor (including Risanski Bay) and Durmitor National Park (including the Tara River canyon). These are the only two World Heritage sites listed for Montenegro and were designated in 1979 and 1980 respectively.

Kotor-Risanski Bay is the inner part of the Boka Kotorska Bay on the Adriatic Coast. It has been used as a natural harbour since the Middle Ages, and became an important artistic and commercial centre with famous schools of masonry and iconography. The town of Kotor contains four Romanesque churches and impressive town walls which climb steeply up the cliffs above the town. Although designated a World Heritage site because of its cultural importance within a stunning landscape, the bay contains marine habitats of conservation importance that justify its selection as an Important Plant Area. Subterranean calcareous springs emerge at or under the waterline, allowing the creation of rare littoral communities: seagrass, spike rush, soft and hard seabeds and kelp forests.

The main threats to the Kotor-Risanski Bay site as a whole are tourism development and urbanization, water pollution (aquaculture, fisheries, sewage, salt-water intrusion through over-extraction of freshwater sources), dredging and invasive species. Efforts have been made to address these through integrated environmental management planning, with construction of a waste-water treatment plant and improved sewerage in the Old Town. However, more work is needed to improve the water quality across the bay, as uncontrolled development continues in order to satisfy the burgeoning tourist industry – a pattern repeated along the Adriatic coast.

The other Montenegrin World Heritage site – Durmitor National Park – was designated as a result of its natural value. The site is dominated by the huge limestone massif of Durmitor with over twenty peaks rising above 2,000 m. The vegetation zones range from the valley forest (beech, oak and hornbeam) through to Mediterranean

The Tara gorge within the Durmitor National Park (Montenegro).

© Mark Wheaver

Crno Jezero is one of the glacial lakes of the Durmitor National Park.

© Peter.g.ashby

The site is famous for the unique hydrology of Crno Jezero lake and the Tara River canyon (one of the deepest gorges in Europe at 1,300 m).

conifer forest (including the very rare *Pinus nigra illyrica*), sub-alpine forests and peat bogs, alpine meadows, and extensive high alpine rock and scree (piles of rock fragments that accumulate at the base of cliffs). These habitats support over 700 plant taxa, and the rich karstic and calcareous grassland flora includes endemic species such as *Daphne malyana*, *Campanula hercegovina*, *Protoedraianthus tarae*, *Saxifraga prenja* and *Oxytropis dinarica*. Durmitor is also home to significant populations of European threatened species such as *Adenophora liliifolia* and *Cypripedium calceolus*.

Additionally, the site is famous for the unique hydrology of Crno Jezero (one of 18 glacial lakes), the Tara River canyon (one of the deepest gorges in Europe at 1,300 m), and over 300 animal (including invertebrate) taxa including flagship species such as the brown bear *Ursus arctos*, grey wolf *Canis lupus*, and wildcat *Felis silvestris*. The site has also been identified as an Important Bird Area based on the presence of several bird species of European conservation concern.

Durmitor National Park is managed by the National Parks Authority under the Ministry for Spatial Planning and Environment, and has been the subject of many management plans and initiatives. Urban and tourist development remains a concern, especially since the town of Žabljak has been excluded from the national park. The development of skiing infrastructure poses a particular threat. Plans to dam the Drina River in Bosnia for hydroelectric power were halted in 2004, but these plans could be revisited, and there is also concern about illegal logging within the park itself.

The current management plan runs until 2020 and addresses these and many other issues. It defines the zoning system, provides specific management goals for biodiversity conservation and contains guidelines on forestry and planning regulations, visitor infrastructure, education, etc. Logging and hunting activities are completely forbidden in the core zones of the national park, apart from 'sanitary cuts' and fuel wood logging by the local population. However, the National Parks Authority is limited in its ability to prevent illegal construction activities in the national park and its transition zone, and resources to support staff and their activities are scarce. Additional income is currently derived from logging and tourism taxes, which often conflict with the aims of the park itself.

Bay of Kotor (Montenegro).

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Where do we go from here?

The criteria for identifying Key Biodiversity Areas (including bird and plant areas, and Alliance for Zero Extinction sites) match the natural World Heritage site criteria (ix) and (x). As such, Key Biodiversity Areas could be used to inform proposals and decisions for new World Heritage sites under these two criteria. Given the very high level of global overlap of World Heritage sites with the types of area mentioned above, there may be significant opportunity to coordinate efforts for site conservation between the World Heritage Convention and Committee and the Key Biodiversity Area partners through advocating for a common agenda.

IUCN, working with such partners as the World Conservation Monitoring Centre of the United Nations Environment Programme (UNEP-WCMC) has developed gap analyses and theme studies in the past to advise States Parties on possible World Heritage priorities. These should be updated to consider the latest information in relation to Key Biodiversity Areas.

The process of informing governments on potential candidates for World Heritage status, or indeed any form of formal protection, will increasingly be facilitated by emerging decision-support and planning tools, and there is a need to put more dynamic information into the hands of States Parties, the World Heritage Committee, and its Advisory Bodies, to assist them in site selection and comparative analysis in the process of World Heritage nominations.

One such initiative is the Integrated Biodiversity Assessment Tool (IBAT; see www.ibatforbusiness.org). This web-based initiative to facilitate access to and interpretation of critical conservation data, including both Key Biodiversity Area and protected area data, is a joint output of a partnership between BirdLife International, Conservation International, IUCN and UNEP-WCMC.

Many leading businesses and developers have acknowledged the inherent sensitivity of World Heritage sites and seek to minimize their impacts in such areas, thus strengthening this synergy between Key Biodiversity Areas and the World Heritage Convention, a process facilitated by IBAT, which further supports efforts by leading businesses and developers who have acknowledged the inherent sensitivity of World Heritage sites to the reduction of their impacts in such areas.

The loss of even a single Alliance for Zero Extinction site would probably result in the extinction of one or more species, and thereby represents a loss of heritage. The many Alliance for Zero Extinction sites that are not yet designated as World Heritage sites therefore represent urgent priorities for the World Heritage Convention. By paying particular attention to these sites, and perhaps by calling attention to these sites among States Parties, countries could be exhorted to propose sites that meet Alliance for Zero Extinction criteria, under World Heritage site criterion (x).

While cultural World Heritage sites are, by definition, not selected with reference to biological criteria, they may nonetheless provide a useful additional means for conserving biodiversity, as evidenced by the 64 Key Biodiversity Areas that are also cultural World Heritage sites. These sites provide a unique means of demonstrating how the conservation of cultural resources can often benefit biodiversity and vice versa.

Finally, as this analysis has brought into focus, consistent spatial data do not yet exist for the full set of World Heritage sites. This leads to a considerable degree of potential error in the results. Standardizing and harmonizing these datasets would greatly facilitate communication and collaboration. UNEP-WCMC are working to consolidate spatial data for natural World Heritage sites as part of their work in managing the World Database of Protected Areas, and similar work should be considered for cultural World Heritage sites.

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Daphne malyana.

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