

# Natural World Heritage Sites in Asia: A Review of IUCN's Outlook Assessment Reports 2014–2020

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## Abstract

The year 2022 marked the fiftieth anniversary of UNESCO's World Heritage (WH) program, with 1,157 cultural and natural sites listed based on 10 criteria. The list has earned global conservation kudos, but unfortunately the WH sites' effectiveness in endorsing heritage has resulted in increased visitor numbers, placing more pressure on already environmentally fragile sites. Enhanced monitoring is fundamental to tackling such threats, so IUCN launched its WH Outlook in 2014, featuring a triennial inventory of all natural WH sites. This paper focuses on the Asia region, unpacking the monitoring indicators used to assess the effectiveness of natural WHS management at those natural WH sites in 2014 and during two subsequent updates in 2017 and 2020. The results add site-specific context by looking at green-flagged examples from Japan, including Shiretoko, Ogasawara and Amami, along with the red-listed Tropical Rainforest Heritage of Sumatra in Indonesia. The results in this paper also suggest that the third monitoring outlook saw improvement in some sites compared to the 2014 and 2017 outlooks, which suggests that the reports could serve as a benchmark for assessing the effectiveness of the management of each respective natural site. There is still room for improving the current IUCN Outlook protocol, such as providing much more comprehensive reports on each site, that could point the way from red-listing to green. The findings of this paper may provide insights for future IUCN Outlooks, specifically towards fulfilling area-based targets in the Global Biodiversity Framework adopted during the fifteenth meeting of the Conference of the Parties of the Convention of Biological Diversity (CBD-COP15) in 2022.

**Key words:** Asia, Global Biodiversity Framework, Invasive Alien Species IUCN, mountainous national park, Natural World Heritage Sites

## 1. Introduction

Many of our planet's most exceptional cultural and natural properties are listed in UNESCO's World Heritage Convention as World Heritage (WH) sites. WH sites, however, face various threats ranging from climate change and Invasive Alien Species (IAS) to "over-tourism," with visitor impacts tied to traffic, trash and the maintenance of toilets and trails. These cumulative impacts result in deterioration of congested tourist honeypot attractions (Yang *et al.*, 2010). In response, various mitigation mechanisms have been established such as an endangered list, and to date three WH sites have been de-listed. Nonetheless, for the list to fulfil its mandate as the most widely-recognized global conservation pact, there is a need to replace the ad hoc

annual State of Conservation (SOC) reports with systematic monitoring and evaluation. The International Union for Conservation of Nature (IUCN), which conducts site inspection of natural WH sites on the tentative list, set up a conservation "outlook" mechanism in 2014 to monitor the threats, value and management condition of natural and mixed WHSs periodically. An extra degree of urgency was recognized at CBD-COP15 in December 2022, when all the parties to the convention agreed to adopt the new Kunming-Montreal Global Biodiversity Framework (GBF), including related targets and milestones. To achieve conservation outcomes, however, this effort must be backed up by effective management of over 270,000 national parks and nature reserves worldwide. Our paper focuses on the Asia region, investigating the monitoring at red- and green-flagged

WH sites in 2014 and during two subsequent updates in 2017 and 2020. The results add site-specific context to complement the international indicators used in assessing the effectiveness of natural WH site management.

## 2. The World Heritage (WH) Program after 50 Years

The year 2022 marked the fiftieth anniversary of the WH program, which was first adopted by the UNESCO General Conference in 1972. One catalyst for the initial establishment of WH sites was the Aswan Dam on the Nile River in Egypt, which triggered a two-decade salvage operation of the Abu Simbel temple complex (Hill, 2021). The convention was duly ratified by 193 state parties, with 1,157 WH sites listed by July 2022. The list is thus one of the most widely-recognized conservation agreements and considered “the most effective international legal instrument for the protection of cultural and natural heritage” (Strasser, 2002).

To be inscribed, WHSs must be deemed to satisfy one or more of 10 criteria, of which six denote cultural heritage, such as unique civilization or architecture, and four refer to natural categories such as biodiversity and geological heritage. In keeping with its historical roots, the list still contains many more cultural sites ( $n=832$ ) than natural sites ( $n=206$ ) (Buckley, 2018). For the former categories, the preliminary site inspection and recommendation is conferred by the International Council on Monuments and Sites (ICOMOS), whereas natural WHSs are under the jurisdiction of the IUCN. In 1993, Tongariro, New Zealand was inscribed as the first mixed WHS, with categories vi, vii, viii recognized in both dimensions. The number of mixed WHSs subsequently increased to 39 by 2021.

**Table 1** Selection criteria for inscription as natural world heritage (WHC, 2021a).

Cat.	Description of criteria
vii.	<i>“to contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance”</i>
viii.	<i>“to be outstanding examples representing major stages of earth’s history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features”</i>
ix.	<i>“to be 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”</i>
x.	<i>“to 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”</i>

However, the effectiveness of WHSs in endorsing heritage attractions has inadvertently raised expectations for increased visitor numbers and revenue (Buckley, 2004; Shackley, 2006). The de facto image of WH listing has evolved into a “top brand” that confers a competitive advantage over rival destinations (Buckley, 2004). Sustainability has thus taken a back seat to tourism as inscription is perceived as a “magnet for visitors” and a means to inflate tourism (Fyall and Rakic, 2006). This underlying assumption of a positive correlation between inscription and visitation is fundamental to the WH list’s success, but the influx of visitors and the presence of tourist-oriented activities impacts residents’ everyday lives through externalities, echoing the “over-tourism” debate.

Various control mechanisms have been set up to mitigate such threats and encourage effective management of WH sites (Venkatachalam *et al.*, 2022). Foremost among these is the “in danger” list which, as of 2019, included 53 WH sites. Threats are classified into those with general potential for negative impacts, or more “specific and proven imminent threats” that can be ascertained (UNESCO/WHC, 2022). This “red list” is a wake-up call for urgent and major conservation action, as occurred at Yellowstone after the national park was placed on the WH endangered list from 1995 to 2003 due to issues of over-tourism, wildlife management and invasive species. Although Yellowstone’s status was subsequently restored, two other sites that had been on the Endangered List went on to be “de-listed” (Dresden Elbe Valley revoked in 2009 and Liverpool Maritime Mercantile City in 2021). A third site (Arabian Oryx Sanctuary) was directly removed from the WH list in 2007 due to the rapid decline in the oryx population, followed by the species’ extinction after an initially promising reintroduction campaign.

Notwithstanding the removal of these three sites, other WHSs remain on the list despite facing serious threats, a laissez-faire approach described by Strasser (2002) as “once inscribed, forever inscribed.” There is thus an urgent need to enhance systematic monitoring, and in 2014, the IUCN established a “conservation outlook” to be used the monitoring of natural and mixed WHSs every three years. After that, the adoption of GBF, whose Target 3 is “at least 30 per cent globally of land areas and of sea areas protected areas and other effective area-based conservation measures places,” heightened pressure on PAs such as WH sites to achieve conservation via more effective management. Our paper reviews IUCN data to examine WH site trends across the Asia region in 2014 and during two subsequent updates in 2017 and 2020 in the context of additional site-specific threats.

### 3. IUCN's Outlook Assessment of Natural WH Sites in Asia (2014–2020)

In 2020, the Asia region comprised 51 natural and six mixed WH sites spread across 19 sovereign states spanning over 1.1 million square kilometres. This total, however, includes the listing of the Great Barrier Reef (Australia) inscribed in 1981 (approx. 348,700 sq. km) and the Phoenix Island Protected Areas (Kiribati) in 2010 (approx. 408,000 sq. km). These two vast territories alone comprise more than two-thirds of Asia's entire WH territory and Fig. 1 shows a significant uptick in aggregate area in the two respective years of 1981 and 2010.

The report by Osipova *et al.* (2020) coordinated the condition of all 57 WHs according to reports submitted by site managers. Over half of Asia's WH sites were assessed as effectively protected and managed. In 43% of sites, however, "protection and management are of some concern and in 4% of serious concern." Only one site was flagged red, symbolizing "in danger." This was the Tropical Rainforest Heritage of Sumatra, a serial listing that comprises three mountainous national parks in Indonesia: Gunung Leuser National Park, Kerinci Seblat National Park and Bukit Barisan Selatan National Park. This composite site of three parks covering almost 26,000 square kilometres promises to protect Sumatra's biodiversity, but all three parks, running down the Bukit Barisan mountain range, have been on the WH endangered list since 2011 and remain in "critical" condition due to threats from road construction, agricultural encroachment, illegal logging, poaching and governance break-downs (Pamungkas and Jones, 2021). The fragmented pockets of archetypal rainforest offer a habitat for many endangered and endemic species such as the iconic Sumatran orangutan and rhino, and thus have potential for nature-based tourism (NBT). However, as in other emerging Southeast Asian economies, the growth in population and increasing disposable income has been a driver of unplanned development, and better management is needed to mitigate rampant development and deforestation (Bui and Dolezal, 2020).

Although the Sumatran site was the only one in Asia on the WH "in danger" list, there have been calls for others such as the Great Barrier Reef in Australia to be red-flagged due to frequent coral bleaching and poor water quality. It is one of only nine marine and coastal sites, and the maritime threats facing this site differ from those faced by mountainous WH sites, so further thematic analysis is required by biome. Based on the frequency of self-reported threats, the most prevalent pressure across Asia's WH sites is derived from hunting, followed by tourist visitation and climate change (Osipova *et al.*, 2020). The 2020 results also showed some improvement compared to 2017, both in terms of the increasing percentage of sites assessed to have effective management, and a decrease in the number of sites where protection and management were assessed as of serious concern. IUCN's Outlook Assessment also identified three new WH sites listed, including two in China (Fanjingshan (2018) and Migratory Bird Sanctuaries along the Coast of the Yellow Sea-Bohai Gulf of China (Phase I; 2019)) and one in Iran, Hyrcanian Forests (2019). The triennial report also acknowledged certain data deficiencies. For example, the database did not include the area of the Three Parallel Rivers of Yunnan site in China, which UNESCO's website displayed as 1.7 million hectares (WHC, 2023).

### 4. Reading the Outlook Report at Site Level: Case Studies from Japan

The aforementioned threats faced by Sumatra's tropical rainforest exemplify a WHS deemed to be in "critical" condition due to cumulative impacts from road construction, farming, forestry and poaching. This red flag also reflects the fragmented geographies and governance of the three separate mountainous national parks that comprise the conservation zone of this Indonesian WHS. Conversely, the Shiretoko Peninsula protects a contiguous area in Japan's north-eastern corner whose remote location has restricted anthropogenic impacts. The northern tip of this peninsula in Hokkaido has no paved roads and can only be accessed by boat or

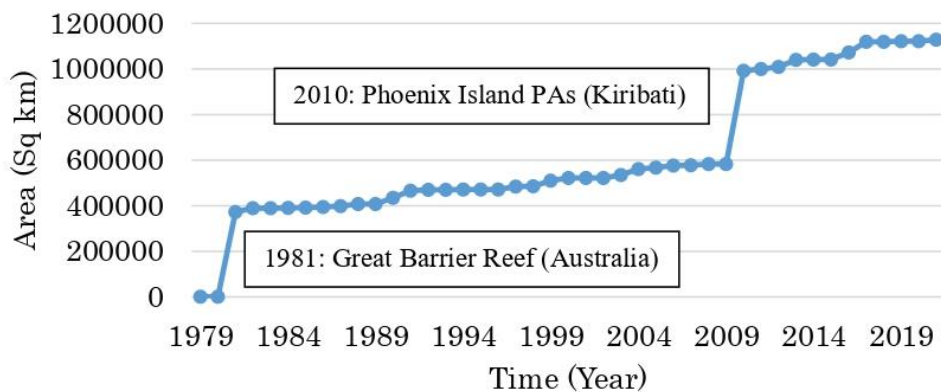
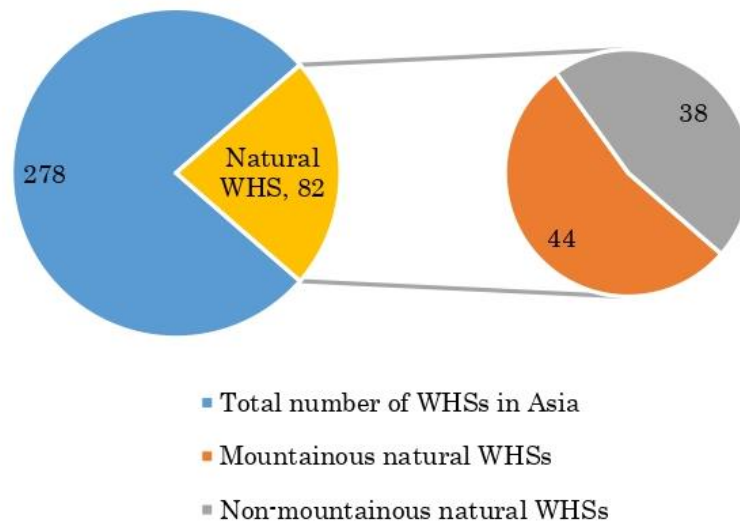


Fig. 1 Aggregate area of UNESCO Natural World Heritage Sites in Asia.



**Fig. 2** Number of mountainous natural World Heritage Sites in Asia.

multi-day hike. It is this same combination of marine and mountainous ecosystems that underpins a holistic “sea-to-summit” conservation model which has enabled a green flag from the IUCN monitoring teams who have consistently evaluated Shiretoko’s condition as “good with some concerns.” However, issues raised include a need for heightened consideration of riverbed monitoring, fish passage and dam removal, and annual culls of Stellar sea lions (Rand, 2020). Unlike the population pressure in the Sumatran case, Shiretoko’s watershed was threatened by “extensive anthropogenic engineering of their watercourses through damming, check weirs, and artificial embankments” that undermine the natural drainage systems’ capacity for “landscape diversity through active erosion, material transport, and habitat provision” (Chakraborty and Takenaka, 2019). Wildlife countermeasures have also targeted the Yezo sika, an endemic subspecies of deer whose population overabundance has impacted local ecosystems, with severe effects on forest vegetation (Uno *et al.*, 2022).

A total of 278 WH sites were listed in Asia in 2020, with 82 designated as natural WHSs (Fig. 2). This represents a similar proportion of natural WHSs (23%) compared to the global 20% ratio recognized by Buckley (2018). However, our analysis indicated that over half of Asia’s natural WHS were categorized as mountainous natural areas. This lists also includes Shiretoko, along with Shirakami and Yakushima that together comprise the first three natural WHSs to be listed in Japan. All strive for a version of the “sea-to-summit” conservation model that aims to incorporate elements of both marine and mountainous ecosystems holistically (Shirane *et al.*, 2021). The IUCN outlook reports re-emphasize the challenges faced by these mountainous WHSs that face climate change and IAS issues. The latter is especially true of island groups, such as the Ogasawaras or Bonin islands, listed as a natural WH site in 2011 under Criterion (ix). This chain of over 30 volcanic islands located 1,000

kilometers south of Tokyo had been seriously affected by negative impacts from IAS even before its WHS nomination, and the listing dossier delineated specific countermeasures (Hashimoto, 2010). Thanks to these efforts, black rats (*Rattus rattus*) were subsequently eradicated on Higashijima, and a nesting site for Bryan’s shearwater (*Puffinus bryani*) was discovered on the same island in 2015, the species’ only confirmed nesting site on the planet. Also, eradication of feral goats from all of the Ogasawara islands except Chichijima has encouraged renewed vegetation growth (Kawakami, 2019). In addition, progress against feral cats has led to an increase in the population of red-headed wood pigeons (*Columba jenthina nitens*) (Horikoshi *et al.*, 2020). Yet the spread of IAS such as the green anole (*Anolis carolinensis*) continues to cause problems for Ogasawara’s fragile ecosystem (Karibe, 2019).

Japan’s IAS Act was enacted in 2004. The law distinguishes between IAS of domestic origin, such as rats, goats, cats and Java cedar, introduced to Ogasawara from elsewhere in the Japanese archipelago. Despite their significant impacts, these translocated species cannot be designated as “Specified Alien Species.” Once designated as Specified Alien Species, various types of handling related to the breeding, cultivation, storage, transportation and introduction are legally prohibited, while eradication is encouraged. However, culling domestic feral animals such as cats could prove unpopular amongst local residents and polarize opinions on other conservation projects, so Ogasawara opted instead to pioneer a non-lethal management scheme to capture and rehouse feral cats (Mameno and Kubo, 2021). Together with the collaboration of various stakeholders, such as the Tokyo Veterinary Medical Association, feral cat countermeasures including a local bylaw requiring residents to register their cats was later extended to include other pets. In 2018, Ogasawara’s WHS Management Plan was also revised to reinforce IAS countermeasures as part of its

comprehensive ecosystem management from the perspectives of species interactions, ecosystem functions and widespread migratory species. IUCN's outlook evaluated Ogasawara's condition to be "good with some concerns," but more flexible adaptive management is required. Hence greater cooperation among the relevant ministries and agencies from the central and local governments along with conservation experts and local residents is crucial.

Amami is another group of sub-tropical Pacific islands that was listed as part of Japan's fifth natural WHS in 2021 together with Tokunoshima and Iriomote islands and Yanbaru National Park on the northern part of Okinawa's main island (MOE, 2022). The archipelago forms a biodiversity hotspot, home to many endemic organisms, including rare birds such as the Amami jay (*Garrulus lidthi*) and woodpecker (*Dendrocopos owstoni*) and other vertebrates such as the Amami rabbit (*Pentalagus furnessi*) (Ishida *et al.*, 2015). The impact of introduced predators such as mongooses (*Herpestes javanicus*) on islands such as Amami and Okinawa has severely threatened native populations or even driven them to extinction, exacerbated by the historical absence of mammalian carnivores (Yagihashi *et al.*, 2021). In particular, "five mammal species, three bird species, and three amphibian species in the property have been identified globally as Evolutionarily Distinct and Globally Endangered species" (WHC, 2022). The Japanese Ministry of the Environment started a mongoose eradication program in 2000 before the IAS Act was enacted. The Ministry designated the species as a "Specified Alien Species" as soon as the Act came into force in 2005 and scaled-up a comprehensive "capture-and-kill" program aiming to remove all mongooses from Amami. In the initial phase, the Ministry offered incentives to hunters based on the number of animals captured. After the population density decreased, the Ministry gradually shifted from this bounty system to traps set by "mongoose busters" together with specially trained sniffer dogs (Komine *et al.*, 2016). In total 21,009 mongooses were captured from 2000 to 2019, but there have been no subsequent captures, so the species is believed to have been removed from Amami. If proven successful, the eradication of the mongoose on such a large island would be unprecedented in the context of an IAS introduced across at least 64 islands and four continents, mainly in the tropics (Barun *et al.*, 2011). The Amami example suggests that a comprehensive strategy can succeed in eradicating such notorious IAS as the mongoose even from larger island groups. However, the project's cost-effectiveness was questioned in 2012 by a review panel of external experts (lacking any natural science experts) in a verdict that was strongly criticized by the Japanese Society of Mammalogists (Yamada *et al.*, 2012). The program was ultimately continued but this incident may indicate insufficient public awareness of the

importance and difficulties of combating IAS. Notwithstanding the mongoose's likely eradication on Amami, other IAS problems – such as feral cats – still persist (Mameno *et al.*, 2017).

## 5. Conservation Outlook for Natural WHSs: from Red to Green?

The designation criteria of WHSs continue to echo those of national parks, nature reserves and other protected area conventions in assuming static distribution of biodiversity. Yet climate change and the proliferation of IAS-related issues are increasingly forcing a re-think in prioritization of adaptive management policies. According to the Protected Planet Report 2020, current data deficiencies include flagship PAs and even some WH sites, so IUCN launched its outlook report in 2014 with an inventory of all natural WHSs on a triennial basis, most recently conducted in 2020 (Osipova *et al.*, 2020). The aim was to actively utilize the existing State of Conservation (SOC) reports as the basis for a systematic assessment of the heritage conservation status and outlook for natural WH properties. These contain summaries of all natural and mixed properties based on a property-specific data compilation and assessment.

Three cycles of IUCN's Outlook assessments have been conducted since 2014. The desk-based system enables periodic but comprehensive evaluations of threats, conservation and management across natural and mixed WH sites, while reflecting on the sites' underlying value. Cross-section results for 2020 combined with longitudinal trends from three consecutive data sets can facilitate trouble-shooting and aid knowledge transfer among site managers. For example, Osipova *et al.* (2020) noted that climate change now represents the most frequent danger to all natural WH sites worldwide, threatening 33% of sites. IASs were reported to be the second most common threat and IAS countermeasures such as the mongoose eradication programme on Amami could provide pointers for site managers. The third-ranked threat noted by Osipova *et al.* (2020) was impacts linked to human activities such as "tourism visitation, hunting, fishing, fires and livestock grazing," where the red-listed Sumatran site can offer insights into pertinent issues that are connected to such concerns as "limited manpower, anthropogenic disturbance and public engagement opportunities" (Nath *et al.*, 2022). Beyond raising awareness of such threats, the new outlook system also provides a platform for positive feedback. The Green list of Protected Areas showcases best-practice management via site-level improvements such as at Wadi Al-Hitan, Egypt in 2018. The conservation narrative focuses on the cetacean transition from terrestrial to marine life, and the site is said to be "managed 'with love' by the staff members, who are qualified, committed and excelling in their work" (IUCN, 2023). Overall, the capacity to

conserve natural WH sites forms a litmus test for the broader success of global conservation. Securing a positive outlook for these sites is a priority, sending a message to park managers facing familiar trade-offs between conservation and development. More regular monitoring and routine reporting by the IUCN could also encourage red-flagged sites to mitigate management issues as in the 1995–2003 Yellowstone “sin bin” period.

## 6. Conclusion and Future Research

Fifty years have passed since the initial establishment of the WH program, aimed at creating a framework for the global protection of both cultural and natural heritage sites. The twin tracks, however, have diverged with considerable discrepancies, and since 2014 the IUCN has published a monitoring outlook list to provide more in-depth monitoring of natural WH sites on a triennial basis. The findings are especially pertinent considering the relevant targets consisting of GBF. Also, the GBF monitoring framework with its groups of indicators could offer an extra impetus to the IUCN Outlook in guiding future indicators and encourage more sustainable management of natural WH sites and other types of protected areas.

The results from the latest monitoring outlook report released in 2020 show an increased number of effectively managed sites and fewer sites of concern compared to the equivalent reports in 2017 and 2014. Albeit it is too soon to say if this could be taken as vindication of the new outlook system, it is hoped that these findings can serve as a “benchmark” for assessing the effectiveness of natural WH site management. There are still some limitations, however, as the current outlook report by Osipova *et al.* (2020) only provides a broadbrush review of natural WHS threats that must be complemented by site-specific monitoring. Although the findings from the outlook system are broadly transferable, they are still unable to provide many in-depth insights for park managers in terms of specific threats such as IAS. As such, there is still potential for utilizing the outlook results for tasks aside from monitoring such as providing feedback and suggesting holistic approaches for park managers at the site level, encouraging red-listed sites to learn from the practices of those on the green list. Furthermore, site managers and researchers could conduct thematic analyses to review the current and forecast the future outlook assessment, providing a tool to help reassess the positioning and current condition of their respective natural WH sites.

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