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ENVIRONMENT

Biodiversity in Airport Management

ECO AIRPORT TOOLKIT

2026



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1. INTRODUCTION

This e-publication builds on the chapters on “Biodiversity” from ICAO’s 2022 and 2025 Environmental reports^[1].^[2] It details and further clarifies the potential interactions between biodiversity and airport management, assisting airports in balancing the objectives of preserving biodiversity while maintaining optimal safety levels. It is enriched with numerous real-world case studies from airports around the world, illustrating how biodiversity can be integrated into airport operations through practical, scalable, and innovative solutions. From wildlife risk management to nature-based solutions and stakeholder engagement, it offers a comprehensive and actionable approach for airport operators.

It is well understood that we are in the midst of a nature crisis, in which one million of the world’s estimated eight million species of plants and animals are threatened with extinction^[3]. It is also recognised that businesses are significantly dependent on nature to thrive, with over half of the world’s GDP (approximately \$44 trillion) moderately or highly dependent on nature and its ecosystem services^[4]. This includes airports, which rely on nature to ensure the resilience of their infrastructure. Ecosystems play a vital role in managing rainwater and flooding, keeping runways functional, stabilizing soils beneath heavy structures, and buffering against extreme weather events such as heatwaves and storms. Nature also helps regulate local temperatures, maintain air quality, and support balanced wildlife populations, which can help reduce risks like bird strikes. However, airport development can have significant impacts on biodiversity. In response, many airports are actively working to reduce these pressures and are implementing measures to protect and restore nature for the benefit of future generations.

Airport operators are responsible for maintaining their landscape areas and for managing wildlife on and around their property, with the primary objective of ensuring the safety of operations. Avoiding bird strikes is a critical safety issue. Trimming the height of trees to clear the approach for aircraft is a basic landscape management activity to ensure safety. At the same time, many states have regulations for protecting endangered wildlife and habitat. As a result, many interactions between biodiversity and airport management exist.

Facing the global decline in biodiversity and the vulnerability of infrastructure to climatic hazards, preserving airport ecosystems is a key priority for operators. Importantly, biodiversity conservation and nature-based solutions are areas where airports can act more directly, compared with broader climate change mitigation efforts such as the development and use of sustainable aviation fuels or hydrogen technologies.

[1] ICAO Environmental Report 2022, <https://www.icao.int/icao-environmental-report-2022>

[2] ICAO Environmental Report 2025, <https://www.icao.int/environmental-protection/envrep2025>

[3] <https://www.ipbes.net/news/Media-Release-Global-Assessment>

[4] https://www3.weforum.org/docs/WEF_New_Nature_Economy_Report_2020.pdf

This e-publication will first explore different aspects of biodiversity, its evolution, and the challenges of managing it in an airport environment. It will then discuss:

- Practices that could promote and enhance biodiversity and its conservation while maintaining optimum safety levels; and,
- Ways in which biodiversity and its management are an important part of airport sustainability, including as nature-based solutions, to support both climate change mitigation and adaptation.

To maximize the practicality of this e-publication, a step-by-step approach to support biodiversity in airport management is included below, summarizing the key practices and recommendations that are mentioned and showcased:

Step-by-step approach to support biodiversity in airport management:

1. **Acknowledging the importance of protecting biodiversity** and including this topic in the various airport workstreams.
2. **Taking actions to conserve biodiversity without jeopardizing safety.**
3. **Changing wildlife management practices** from a vision of eliminating danger to one of risk management:
 - a. Undertaking wildlife risk assessments;
 - b. Developing and implementing wildlife management measures and procedures;
 - c. Developing conservation of non-hazardous wildlife.
4. **Developing fauna, flora and habitat inventories**, with rigorous scientific monitoring and through partnerships with various associations and institutes.
 - a. Develop database and partnerships;
 - b. Implement ecosystems conservation initiatives.
5. **Developing a landscape/green space management plan**, which can include:
 - a. The identification and management of differentiated green spaces according to the functional objectives of grassy areas.
 - b. The reduction or phase-out of chemical inputs.
 - c. The recycling of vegetation waste.
6. **Including environmental impact assessments for airport construction projects and considering biodiversity preservation, conservation, restoration or offsetting when developing new constructions**, with the “Avoid”, “Reduce” and “Compensate” approach, and consider nature-based solution measures in the design of buildings.
7. **Considering a differentiated lighting management plan** and exploring noise impacts on biodiversity.
8. **Enhancing waste management to reduce or eliminate plastic pollution**, with clean-up initiatives.
9. **Developing a comprehensive biodiversity strategic plan**, including:
 - a. Inventories, as well as wildlife, landscape/green space, lighting and waste management plans;
 - b. Qualitative and quantitative monitoring;
 - c. Assessment of nature-related impacts and dependencies to identify and prioritise actions to address risks and opportunities;
 - d. Coordination with any agent involved in biodiversity management (wildlife hazard management services, green spaces management services, runway operators services, etc.).
10. **Including transparency and communication with the public and local stakeholders.**
11. **Considering nature-based solutions** according to airports’ local circumstances.

2. Context

2.1 What is biodiversity? Definitions, decline and awareness

Several terms exist to describe ‘biodiversity’, derived from “biological diversity”.

The Convention on Biological Diversity^[5] defines it as “the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems”.

For the World Wide Fund for Nature (WWF), “biodiversity is all the different kinds of life you’ll find in one area - the variety of animals, plants, fungi, and even microorganisms like bacteria that make up our natural world. Each of these species and organisms work together in ecosystems, like an intricate web, to maintain balance and support life. Biodiversity supports everything in nature that we need to survive: food, clean water, medicine, and shelter^[6].”

Biodiversity can be assessed through different dimensions, such as specific diversity (number of species and relative abundance of species in a given environment), genetic diversity (degree of gene variety within a given species) and ecosystem diversity (diversity of biotopes – environments, and biocenoses - all the species in an environment). Biodiversity can also be assessed through the ecosystem services provided by nature, such as environmental regulation, resource supply, and cultural or recreational benefits. The IPBES (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services) report^[7] listed these services in Figure 1.

[5] Article 2, Use of Terms, Convention on Biological Diversity, [Convention Text](#)

[6] <https://www.worldwildlife.org/pages/what-is-biodiversity>

[7] The global assessment report on Biodiversity and ecosystem services, 2019, IPBES



Figure 1 Global trends in the capacity of nature to sustain contributions to good quality of life from 1970 to the present, which show a decline for 14 of the 18 categories of nature's contributions to people analysed (IPBES report)

Biodiversity underpins all natural ecosystems essential for human survival, and is central to the holistic, IPBES “One Health” approach^[8], which recognizes **the interconnected health of ecosystems, animals and humans.**

Yet, as described in the IPBES report, there is growing evidence that biodiversity is declining worldwide. The five direct drivers of this decline, described in the same report, are:

- changes in land and sea use
- direct exploitation of organisms
- pollution (chemical, physical, noise, light, electromagnetic)
- invasive alien species (IAS)^[9]
- climate change

Biodiversity allows us to thrive, and its loss is likely to affect the ecosystem services people rely on. As access to these services declines, people increasingly recognize our collective responsibility to protect and restore biodiversity. Moreover, climate change is a direct driver of biodiversity loss. There is growing awareness of the role biodiversity plays in addressing climate change and supporting recovery from natural disasters. The correlation between climate change and biodiversity decline has led people towards a common approach to curb both, especially when it comes to sustainable development.

In this context, “The Sustainable Development Goals Report”, published in 2023 by the United Nations (UN), listed sustainable development goals directly related to both biodiversity and climate change:

- Goal n°9 encourages States to “build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation”;
- Goal n°13’s target is to “take urgent action to combat climate change and its impacts”;
- Goal n°14’s objective is to “conserve and sustainably use the oceans, seas and marine resources for sustainable development”; and,
- Goal n°15 aims to “protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss”.

In addition, in 2022, 196 States adopted the Kunming-Montreal Global Biodiversity Framework (KMGBF) at the COP15 of the Convention on Biological Diversity (CBD). The Framework is aimed at taking urgent action to halt and reverse biodiversity loss by 2030, towards a 2050 vision of biodiversity conservation, through globally coordinated action under the CBD^[10].

[8] Approach developed by the One Health High-Level Expert Panel (IHLEP) supported by the Food and Agriculture Organization of the United Nations (FAO), the World Organisation for Animal Health (OIE), the United Nations Environment Programme (UNEP) and the World Health Organization (WHO); <https://cdn.who.int/media/docs/default-source/one-health/ohhlep/one-health-definition-and-principles-translations.pdf>

[9] Invasive Alien Species : species, subspecies or lower taxon, introduced outside its natural past or present distribution and whose introduction and/or spread threaten biological diversity.

[10] <https://www.cbd.int/gbf>

3.1 Evolution of wildlife hazard management

At first glance, given the obligation to maintain strict safety requirements, the development of airport infrastructure and operations may appear inconsistent with the goals of reducing the environmental impacts of climate change and preserving biodiversity. Traditionally, **biodiversity has been addressed in airport planning primarily for safety reasons**, through wildlife hazard management and habitat control aimed at preventing wildlife strikes, ensuring visibility, obstacle clearance, avoiding fires, and reducing wind-related risks and water erosion. Moreover, aircraft operations can negatively affect biodiversity, both directly through wildlife and landscape management actions, and indirectly through the footprint of infrastructure, pollution, noise, etc.

However, not all species of fauna and flora pose safety hazards – this depends on the airport’s location, local circumstances, and the evolving impacts of climate change. Airports also sometimes manage extensive buffer zones of land, which can be maintained to support biodiversity. In many cases, these areas are large green spaces that act as biodiversity reservoirs, hosting a range of species such as pollinators (e.g., butterflies, bees), beetles that recycle nutrients and support soil health, or frugal plant species such as woodrushes, Rhinanthus, sweet vernal grass, and orchids. In highly anthropized environments, airport **green spaces can even become conserved ecosystems and refuges for species under pressure**.

At some airports, large green spaces are managed as conservation areas, for example meadows (an ecosystem in sharp decline in several countries). However, not all areas of an airport can be preserved in their natural state, and in such cases, engineered landscapes are necessary. Improved knowledge of local species and their management can strengthen biodiversity protections and conservation by airport operators while maintaining optimal safety levels. Additionally, even in engineered landscapes, nature-based solutions^[11] can play a vital role in airport sustainable development. By conserving biodiversity, airports can help to balance their footprint and contribute positively to local and regional environments and communities.

Biodiversity is now seen as an essential part of managing airports sustainably. While aviation can contribute to some of the five direct factors of biodiversity erosion reported by IPBES, **airports still have opportunities to help reduce that loss. By doing so, they can benefit from better coordination between airport management practices, safety requirements, biodiversity protection and enhancement, and overall airport development and sustainability**. Indeed, nature can offer solutions to mitigate and adapt to climate change, as well as provide green spaces for local communities to enjoy.

[11] *Actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits (IUCN)*

3. Biodiversity management at airports

3.1 Evolution of wildlife hazard management

As explained in the previous chapter, airports must manage wildlife and vegetation for safety reasons. Airport land can provide a habitat for wildlife, and this must be factored into decisions that need to reconcile safety requirements and biodiversity conservation, to ensure that no attraction to hazardous birds/wildlife will be created during construction. ICAO Doc 9137 Airport Services Manual provides standard procedures for wildlife hazard management, and states that "an aerodrome operator should develop, implement and demonstrate an effective wildlife hazard management programme" which consists of adopting "reasonable wildlife risk control measures, address features that may attract wildlife, control the presence of wildlife on, and in the vicinity of, the aerodrome"^[12]. The United States’ Federal Aviation Administration (US FAA), the French Civil Aviation Authority (DGAC) and the United Kingdom Civil Aviation Authority (UK CAA) also have guidance documents which describe, among other things, procedures or methodologies for wildlife hazard management by airport operators.

Management practices have evolved over the years, and efforts to protect biodiversity have increased. Indeed, although the safety of operations remains the main goal, biodiversity management at airports aims to reconcile safety with the conservation of species and ecosystems that are not likely to pose safety issues.

There is growing awareness that wildlife management at airports should shift from simply eliminating perceived dangers to actively managing risk. Instead of systematically removing species and their habitats, airports can adopt a structured risk management approach that considers the entire facility as well as the human, material, and technical resources available. This differs from outright removal because it targets specific risks rather than all wildlife. For example, instead of clearing all vegetation, grass height may be managed to deter flocking birds while still maintaining cover.

One such example is the integration of biodiversity into safety practices at Toronto’s Pearson International Airport, Canada.

➤ Safety consideration through the lens of biodiversity at Toronto’s Pearson International Airport, Canada

At Toronto’s Pearson International Airport^[13], Canada, aviation safety is considered through the lens of biodiversity. The airport operators have ensured that one-third of the airport’s property is covered by grass and flood plains, and have maintained Etobicoke Creek as a wildlife corridor. However, the airport has also managed wildlife in coordination with the regulator, Transport Canada, through habitat manipulation, ethical trapping, and falconing (falcons are used to help naturally control birds).

[12] *Airport Services Manual, Part 3, Wildlife Control and Reduction. Fifth Edition – 2020, Doc 9137, AN/898*

[13] *Wildlife Management | Pearson Airport (torontopearson.com)*

Presented below are two examples: the first highlights targeted wildlife risk management at Thessaloniki Airport “Makedonia” (Greece), while the second illustrates the role of partnerships in wildlife hazard management at OR Tambo International Airport (South Africa).

➤ Ringing and relocating Common kestrel at Thessaloniki airport “Makedonia”, Greece^[14]

The Common kestrel (*Falco tinnunculus*) has been identified as one of the species with the highest number of bird strikes during the last years at Thessaloniki airport “Makedonia”. In order to lower their presence airside, and as a result of the number of bird strikes, a specific programme was designed to trap, ring and relocate them, after obtaining permission from the Ministry of Energy and Environment. Trapping is undertaken by the wildlife hazard management team using specially designed traps, and ringing is done by an external expert holding a current permit. They are then relocated to a suitable habitat away from the airport, to minimize return rates to the airport. In addition to the above-mentioned strike prevention method, habitat management with superficial soil tilling makes the airport less attractive to the Common kestrels.

➤ Partnerships for Conservation at OR Tambo International Airport, South Africa

Tambo International Airport has developed a unique partnership with the Endangered Wildlife Trust (EWT). A study showed a total of 324 bird species recorded within the OR Tambo airport study area.^[15] The Airports Company South Africa (ACSA) entered into a strategic partnership with the Endangered Wildlife Trust (EWT) to establish and operate an integrated national bird control program. The aim of the project is to minimise bird strikes and other interactions between wildlife and airport facilities at OR Tambo and other ACSA airports by applying environmentally sensitive management techniques.^[16] This initiative contributed to OR Tambo receiving the ACI Africa Environment and Sustainable Development Award in 2023.

3.2 Biodiversity inventories: learn more before taking action

The first action for biodiversity management at airports is to develop an understanding and raise awareness regarding the species that can be found at their location.

Before implementing a biodiversity management programme, fauna, flora, and habitat inventories should be conducted to evaluate the situation. These complementary inventories enhance but do not replace the daily reporting of wildlife observations completed during wildlife risk management operations and of wildlife strike occurrences. They should be seen as a way to improve data collection to enhance knowledge of:

- wildlife behaviour as part of wildlife risk management;
- habitats or species (fauna and flora) that may be protected or, on the contrary, may need to be addressed (for example: invasive alien species (IAS)); and,
- the general biodiversity status for the scientific community.

[14] Annual Wildlife Hazard Management Review 2021 https://www.fraportgreece.com/uploads/flipbooks/Annual_Wildlife_Hazard_%CE%9Canagerment_Review_2021.pdf

[15] <https://www.frontiersin.org/journals/ecology-and-evolution/articles/10.3389/fevo.2021.715771/full>

[16] https://www.worldbirdstrike.com/images/Resources/IBSC_Documents_Presentations/Amsterdam/IBSC25_WPSA5.pdf

As local ecosystems evolve, these inventories should be carried out and updated at a regular frequency, to monitor biodiversity performance and understand risks and opportunities over time. This is why some dedicated scientific protocols could be used to make these inventories. These scientific protocols can cover a class, a group of species or, depending on requirements, even specific species, such as migratory birds, nesting birds, butterflies, pollinators, and orchids. They can target species and habitat types as well as their abundance. As part of this rigorous monitoring, it is important to use terminology that is consistent with that employed by scientific organizations and NGOs maintaining regional biodiversity datasets. To carry out the necessary inventories, airports may rely on specialized associations, research institutes, or engineering firms, with which agreements, partnerships, or contracts can be established. At the same time, a number of citizen science protocols, designed for non-experts, can be implemented directly by airport personnel.^[17] Examples of successful biodiversity inventory implementation at Bahia Airport in Brazil and of large-scale biodiversity inventory efforts at airports across France are presented below.

➤ Inventories of birds at Bahia Airport, Brazil

Bahia Airport in Salvador Bahia, Brazil, catalogued over 200 bird species. Mapping these species at Salvador Bahia Airport has reduced collisions causing damage to aircraft by 80%^[18]. Furthermore, through a fauna management license, the airport captures, treats and releases animals to nature in licensed places, preserving local biodiversity. The reiteration of these inventories is important for monitoring over time.

➤ Biodiversity inventories at airports in France

The DGAC France launched a survey in 2023 to evaluate how French airport operators take biodiversity into account^[19]. Out of 430 airports, 223 responded. The survey revealed, among other things, that on average over 60% of the airports’ surface area is grassland, that 43% of the airports that responded had already carried out biodiversity inventories, that 46% had already implemented conservation measures, and that 35% had a partnership with an association. The inventories are mostly conducted with a methodological choice based on participatory science and in particular, on the Vigie-Nature programme run by the MNHN (French Museum of Natural History). On the one hand, participatory science enables airports to gain a better understanding of the biodiversity of their airfields through simple, rigorous protocols that are accessible to everybody, not only specialists. On the other hand, it helps the scientific communities to take ownership of this knowledge: all the data collected can feed into national databases used by researchers, helping to improve the global knowledge of biodiversity.

Monitoring not only fauna, but also flora and habitat, enables airport operators to better understand the interactions between species and ecosystems, thereby strengthening wildlife hazard management. From a biodiversity protection and sustainable development perspective, monitoring also helps airports identify habitat types, species present, and their ecological roles, such as carbon sequestration, contributions to soil quality, or benefits to local communities. It can reveal the presence of invasive species, highlight areas of high biodiversity value, and potential measures to further protect and enhance

[17] <https://www.mnhn.fr/en/participate-in-science>

[18] <https://en.newsroom.vinci-concessions.com/news/salvador-airport-named-brazils-most-sustainable-airport-bb22-55ff8.htm>

[19] <https://www.stac.aviation-civile.gouv.fr/fr/publications/prise-en-compte-biodiversite-par-exploitants-daerodromes>

these areas. Monitoring also allows for identifying and managing habitat health and species abundance over time.

Mapping the different species and ecosystems is crucial to adapting green space maintenance practices at the airport, and to identifying potential habitats (e.g., nesting, burrowing, feeding, and growing), as well as the paths and flight trajectories of wildlife. For these purposes, placing the mapping within a wider geographical context than just the airport footprint is essential to better understand ecological dynamics. Migratory patterns and routes of birds, along with the characteristics of forests, wetlands, and rivers, are tied to the ecology of the broader surrounding areas. Mapping highlights how the airport connects to nearby ecological corridors, which helps explain changes in on-site biodiversity, as well as the airport's potential effects on surrounding environments.

In conclusion, the first step to improving biodiversity management at airports is to develop knowledge and awareness through inventory creation. Once the species and ecosystems on and around the airport have been clearly identified, action can be defined, planned and implemented.

A unique example of species-specific protection efforts is found at Ajaccio Airport in France.

➤ Protection of the Corsican snail *Helix ceratina* at Ajaccio Airport, France

Considered extinct until 1990 (rediscovered by Ripken 1995, Bouchet 1997), the Corsican *Helix ceratina* is an endemic snail of Corsica, restricted to less than two hectares of the fluviomarine terrace of the Gravona and Prunelli delta, in the city of Ajaccio. It is critically endangered, with a poor outlook and declining numbers. (Hélix 2023 green fund project). Ajaccio airport, and more specifically the threshold of runway 02, is located on the seafront dune, the natural habitat of the Corsican *Helix*.



In order to collect scientific data to better understand and protect the species, the airport's environmental department and the permanent center for environmental initiatives (CPIE) of Ajaccio (which is the coordinator of the national plan of actions for *Helix ceratina*) carried out research and counted individuals in the airside zone at night, which is the snail's period of activity. This action confirmed the snail's presence at the airport, although only small numbers were observed. This data has enabled the airport to initiate measures such as campaigns to eradicate the Invasive Alien Species (IAS) witch's claw, which degrades the snail's habitat and hinders its movements, or to adapt the routing of vehicles using the area in order to preserve the snail's micro-habitat. Future research campaigns at airport facilities will provide answers as to the effectiveness of the measures taken. Science and knowledge about this species progress slowly... at the snail's pace!

An additional case of comprehensive biodiversity mapping and monitoring is illustrated by Sydney Kingsford Smith Airport, Australia.

➤ Biodiversity surveys at Sydney Kingsford Smith Airport, Australia

Located on Sydney's Botany Bay, Sydney Kingsford Smith Airport (SYD) controls lands encompassing a number of environments, including wetlands and marine habitats. Aside from the natural features present on airport property, the airport's grassed verges and seawall surrounding the runways provide habitats for wildlife. As a result, the airport is home to many threatened and migratory species. To better understand the biodiversity at the airport, several surveys have been conducted at airport throughout the 2000s and 2010s. These surveys determined that airports can house over 90 native flora species, at least 100 bird, reptile, amphibian and mammal species and a range of fish species. Through these surveys airport management is able to develop wildlife management plans to minimize hazards to aircraft operations, without additional adverse impacts to habitats. Beyond surveys of flora and fauna on airport property, SYD implemented an updated Wetlands Management Plan in 2017 to manage the 4 kilometers of wetlands on airport property. According to the airport's 2019-2024 Environment Strategy, "the plan provides the framework for management of the wetlands such that a range of often competing interests and functions are met, including biodiversity conservation, minimizing risk to aircraft from bird strike, heritage values, visual amenity, education and research." Through this active management of natural habitats, the airport is able to ensure safety while conserving biodiversity.

3.3 Landscape and green space management

The methods and principles airports can use for vegetation and soil maintenance are directly linked to biodiversity enhancement and the safety of operations. They should be customized and adapted to each airport surface, facility, design, species, climate, etc. No universal plan can be provided. Nevertheless, general goals can be established through:

- Differentiated management of green spaces;
- The cessation or reduction of chemical inputs;
- The recycling of vegetation waste;
- The development of a green space management plan.

3.3.1 Differentiated management of green spaces

The height at which vegetation is cut in green spaces — along with the timing, frequency of mowing, and the tools used — has a direct impact on both biodiversity conservation and safety. For example:

- Shredding or mowing tools are more destructive for biodiversity than cutting tools. When cut at a single point, the stalk falls to the ground, and fauna can escape from the fallen clippings before it is collected.
- High and dense meadows are less attractive for raptors than short lawns because the visibility of prey is harder in such habitats.
- Less frequent grass maintenance lets flora complete its entire life cycle, which in turn has a positive effect on wildlife life cycles, particularly pollinators.
- Wildlife is attracted by freshly cut grass. For safety reasons, it is therefore best to carry out grass management before the period of lowest traffic on the airfield, or at night.
- Adapted and more regular management is required to deal with IAS, whose fast reproduction and expansion can cause visibility problems for pilots and airport agents (e.g., firefighters, wildlife hazard management staff) on fences, runway edges, markings (e.g., lights, signs), or overgrowth of water retention basins or damage to fences.

Not all grassy areas of an airport have the same functional objectives, depending on their location, their role towards airport operations, or the species they contain. As such, they do not have all the same management constraints. For example:

- The runway strip has the specific objective of being a surface graded and prepared to accommodate the accidental rolling of an aircraft, and ICAO Technical Specifications Doc 9137 recommends that grass be maintained at a height of 10 cm.
- Around lighting and signage elements and radio navigation instruments, it is necessary to maintain good visibility and to prevent interferences, and thus, to cut frequently.
- A land parcel containing invasive alien species (IAS) has to be managed with specific and dedicated tools and methods to control the propagation of these species.
- A land parcel containing patrimonial species has to be carefully managed to preserve these species, particularly their life cycle.

As the primary mission of airport operators is to ensure safe operations, safety will always be the first factor to be considered when managing the area. However, without compromising safety, biodiversity objectives can be set for certain areas where safety constraints do not impose overly strict maintenance procedures.

As a result, depending on the functional objectives of each grassy area, airport operators can carry out the right maintenance, at the right height, timing and frequency, and with the right tools. The airport can be divided into different parcels with specific objectives and criteria for grass management. This is the concept of differentiated green spaces management.

3.3.2 Reducing or eliminating chemical inputs

Some airports use chemical inputs for weed control. Indeed, for safety and security reasons, airports have to prevent weeds around fence lines and airport beacons (the lighted markers used to indicate the airfield and runway boundaries). As fence lines can be very large and airport beacons can be numerous, some airports use chemical inputs that they consider cost-effective and efficient. However, chemical pollution is one of the factors contributing to biodiversity erosion, and it is an issue that can be addressed for biodiversity protection at airports. Some States regulate the use or type of chemical inputs. Nevertheless, **reducing or stopping the use of chemical inputs can be part of a landscape management plan for airports supporting biodiversity enhancement.**

As part of a global adaptation of green spaces management, weed control in various zones can be analysed and goals redefined, differentiating aesthetic goals from safety and security goals. In zones where weed control is still needed, alternatives to chemical inputs can be used, such as thermal weeding with flame or hot water, weeding with a mechanical brush, or with a hoe or hand weeding. Alternative techniques may require more time and/or frequency of intervention than one or two annual chemical sprays for the areas concerned, but at the facility level, the adaptive management plan can allow reallocating resources to those tasks.

3.3.3 Recycling vegetation waste

At the end of a grass management operation, disposing of bio-waste is a key step, as it may have an impact on flight safety and biodiversity. Leaving grass clippings on the ground can have several effects:

- **Risk of grass clippings being blown into the manoeuvring area by the engines or propellers.** The risk is the ingestion of these cuttings by the aircraft engines or their projection towards another safety-critical element.

- **Wildlife risk.** The decomposition of plants attracts many insects that serve as food, especially for birds. The presence of this "compost" becomes an attractive factor for fauna.
- **Fire hazard.** Grass clippings, especially if they are dense, can reach high temperatures during the fermentation process. There is a risk of self-ignition in the case of dry grass, but also in the case of a runway excursion and subsequent kerosene loss.
- **Risk of creating voids.** If the grass clippings are compacted and left on the ground of the meadow for a long period of time, they can cause cavities by smothering the vegetation.
- **Enriching the soil with organic matter and nitrogen.** The risk is that once a certain level of soil enrichment has been reached, fast-growing nitrophilous plants that are more difficult to control will become established. The less nutrient-rich (or "leaner") the soil is, the greater the diversity of the flora tends to be. However, it is also important to consider whether introducing certain types of vegetation could attract unwanted wildlife.

Depending on the plant species, their nutrient quality, and their height, **grass clippings can be exported as fodder, litter, mulch or used for composting or methanization.** The objective of vegetation waste recycling directly influences the choice of appropriate tools for cutting and grinding grassland.

3.3.4 Developing a green space management plan

All the methods and principles airports use for vegetation and soil maintenance can be described in a single document. Since grass management can affect both safety and biodiversity, this document should be shared with everyone whose work is connected to biodiversity enhancement or operational safety. This shared document can also provide a basis for monitoring indicators and for enabling all relevant actors to decide on appropriate actions.

3.4 Integrating biodiversity conservation in airport construction projects

The conservation of biodiversity is under threat during construction work, but airports can incorporate preservation, conservation, or offsetting measures when planning new infrastructure projects.

Indeed, construction projects may result, among other things, in scars on the land, the temporary or permanent destruction of habitats, and the displacement of animals. Therefore, safety impacts from any construction project should be reviewed, including through an **environmental assessment**. This is relevant for all types of construction projects, including greenfield airports. In doing so, the airport can identify endangered or protected species, as well as unique habitats, to assess how the new construction may affect biodiversity.

For the environmental impact analysis, **the sequence "avoid", "reduce" or "minimise" and "compensate" may be applied:** avoid adverse impacts to preserve biodiversity, then minimise/reduce impacts that cannot be avoided, and lastly, offset or compensate for remaining impacts.

- For example, in the context of a photovoltaic power plant installation on the airport meadows, the first step, "avoid", could recommend installing the panels on artificial surfaces such as roofs or car parks.
- In the context of a terminal expansion, the step "reduce" could recommend adjusting the terminal design to avoid the most sensitive habitats or to include wildlife corridors.

- In addition to reducing, the same terminal expansion project could also include compensation measures, by creating new habitat or investing in habitat restoration.

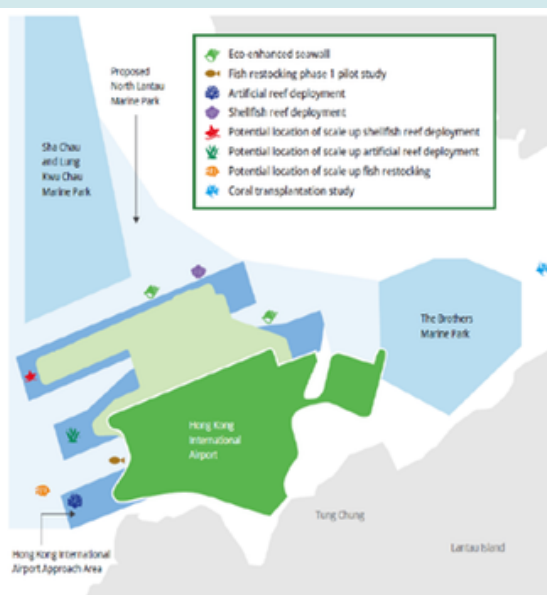
State requirements for monitoring and reporting may impact how wildlife and other biodiversity are managed. Many States have requirements for conducting an environmental impact assessment when making modifications to an airport. Additionally, if endangered species are present at the airport, there may be other requirements for reporting, as well as restrictions on the actions that airport staff can or cannot take. A good management plan for biodiversity at the airport will make it easier to fulfil any regulatory requirements when the time comes. By integrating biodiversity conservation at an early stage in airport development, land-use planning and environmental management systems, environmental impacts are considered both during the construction of the airport and throughout its operation.

In addition, the invasion of airport meadows by invasive alien plants is often linked to disturbances such as construction work on the property. Leaving land bare and turning over land can facilitate the establishment of IAS. It is therefore essential to pay particular attention to the identification and control of these species during this period. Projects can apply soil from outside the airport, in which case special attention should be paid to the quality of the soil and whether it contains any IAS. Moreover, if seeds have to be sown on plots during work, a preference to local seeds should be given.

This approach is well illustrated by the mitigation and enhancement measures undertaken during the expansion of Hong Kong International Airport.

➤ **Mitigation and enhancement measures implemented to help reduce the environmental impacts from the Expansion of Hong Kong International Airport into a Three-Runway System**

Hong Kong International Airport (HKIA) has long recognised a duty of care to avoid and minimise adverse impacts on biodiversity assets from airport development and operations. Prior to getting the go-ahead for the Expansion of HKIA into a Three Runway System (3RS), a thorough environmental impact assessment was completed to demonstrate that identified environmental impacts could be mitigated and managed to an acceptable level.



Many mitigation measures were stipulated to protect the airport’s adjacent marine environment and the area’s fisheries resources. For example, the largest marine park in Hong Kong namely the North Lantau Marine Park was designated adjacent to HKIA to compensate for marine habitat lost associated with the 3RS reclamation. Furthermore, the Airport Authority Hong Kong (AAHK) developed a Marine Ecology and Fisheries Enhancement Strategy comprising voluntary enhancement initiatives that may add ecological / biodiversity value to nearby waters. Enhancement initiatives implemented include installation of hundreds of eco-enhanced seawall blocks along the airport’s new seawall, deployment of Artificial Reefs and Shellfish Reefs in waters near the airport, and the release of over 75,000 fish fingerlings in phases to enhance fisheries resources near HKIA.

In 2016, AAHK also established a Marine Ecology Enhancement Fund and a Fisheries Enhancement Fund, for the purpose of enhancing the marine environment for the benefit of marine ecology (including Chinese White Dolphins) and fisheries resources in Hong Kong’s western waters and further afield into the Pearl River Estuary and to support fishers and encourage more sustainable fishing operations. As of July 2025, the funds have granted over HK\$112M to support 82 projects.

A further illustration of biodiversity integration in airport development is provided by the seaweed restoration initiative at Kansai International Airport (Japan).

➤ **Creation of a new ecosystem surrounding a seaweed colony at Kansai International Airport, Japan**



Seaweed transplantation at KIX airport island

The Kansai International Airport^[20] (KIX), Japan, was built on the sea to create an environmentally friendly airport free of noise pollution. Although there were concerns about the impact of the KIX airport's construction on the marine environment, the airport has created a new ecosystem around a seaweed colony where it was previously sand and silt seabed by actively working to create seaweed beds since the construction of the airport island. The airport transplanted 35,000 large seaweeds over a four-year period (2019–2022) to areas where seaweed was scarce, and continues to maintain the extensive seaweed beds surrounding the airport island. This project has achieved credit certification for 103.2 tons of carbon sequestration, gained recognition as a site contributing to the Kunming-Montreal Global Biodiversity Framework target "30 by 30," and provided seaweed to the local communities.

The integration of biodiversity into airport infrastructure is also reflected in the development of İzmir Adnan Menderes International Airport in Türkiye.

➤ **Türkiye- İzmir Adnan Menderes International Airport**



Izmir Adnan Menderes Airport, operated by TAV Airports, holds a LEED Silver Certification for its Domestic Terminal. Sustainability measures were integrated into the terminal’s design and construction, including landscaping adapted to the Aegean region’s climate.

Native and drought-resistant species such as olive, lavender, rosemary, broom, palm, and pine trees were selected for their resilience to hot, dry summers and minimal irrigation needs. A comprehensive biodiversity baseline assessment was conducted for the airport and surrounding areas. The study identified 246 plant species and 215 vertebrate species, most classified as “Least Concern,” but also highlighted conservation priorities such as the Common Pochard, European Turtle Dove, and Tortoise. Local habitats—agricultural fields, woodlands, and modified landscapes—provide vital ecosystem services and support both resident and migratory species.

[20] ACI APAC & MID – Green Airports Recognition 2024 – Platinum – Kansai Airport. [aci-asiapac.aero/f/library/7073/Green Airports Recognition Programme 2024 - Publication.pdf](https://aci-asiapac.aero/f/library/7073/Green%20Airports%20Recognition%20Programme%202024%20-%20Publication.pdf)



The airport is situated along secondary bird migration routes, with low potential for significant interaction between operations and migrating bird populations. Nearby ecologically rich areas, such as the Gediz Delta and Tahtalı Dam, offer more suitable feeding, breeding, and resting habitats, serving as natural corridors that help minimize bird-airport conflicts. Indoor landscaping at the International Terminal arrival level features three landscaped areas with low-water plants and palm trees, maintaining the sustainability focus within the terminal environment while enhancing passenger experience.

3.5 Additional initiatives to protect and enhance biodiversity

3.5.1 Light and noise management

Flora and fauna can be very sensitive to light pollution, an issue that could be better addressed for biodiversity protection at airports. Indeed, artificial light at night has physiological, metabolic and behavioural effects on fauna, leading to the loss of natural habitats, increased habitat fragmentation and direct mortality for nocturnal species^[21]. While the use of artificial light mainly impacts animals, plants' seasonal patterns can also be disturbed. For example, their flowers are visited by fewer nocturnal pollinators than those in an unlit meadow. Similar to the concept of differentiated green spaces management, a **differentiated lighting management plan** can be implemented at airports. This means that as all areas do not have the same lighting requirements, an airport can identify and map the needs and adapt lighting accordingly. For example, differential lighting management can be addressed through a temporal dimension (e.g., turning unnecessary lights off when the airport is closed), or through luminaire specifications and spatial organisation (e.g., height, angle of orientation, luminaire spaces, light emitted) for lights that are not covered by regulatory specifications.

According to a study from the UK Civil Aviation Authority on The Effects of Aircraft Noise on Biodiversity^[22], aircraft noise also has measurable impacts on biodiversity, particularly on birds, where it disrupts communication, alters song behaviour, and can reduce reproductive success. Evidence also shows stress-related physiological effects in mammals and broader ecosystem consequences such as changes in species richness and pollination. While impacts exist, research remains uneven, and more robust, long-term studies are needed to inform airport planning and biodiversity protection.

This approach to managing light pollution is well illustrated by the initiative led by La Réunion Roland-Garros Airport in France.

[21] *Dark Infrastructure: an ecological network for night-time wildlife*. Romain Sordello, Fabien Paquier and Aurélien Daloz – September 2021

[22] <https://www.caa.co.uk/publication/download/20406>

➤ Dark night contribution by La Réunion Roland-Garros Airport, Reunion Island, France

La Réunion Roland-Garros Airport, France, has taken part, for more than 10 years, in the “day of night” initiative organised by the National Park of Reunion Island and the Society for ornithological studies on Réunion Island (SEOR)^[23]. This initiative takes place on an annual basis to protect young Barau's petrel, a bird endemic to Reunion Island.



Barau's petrel, the location of its colonies and its flight corridors on the island

Indeed, when they leave their nests for their first flight to the ocean between March and April, these birds are severely affected by light pollution. As a result, the airport dims the lights in the public car parks and at the passenger and freight terminal entrances, from sunset until the departure of the last aircraft corresponding to the end of operations. The airport also switches off the lights in the aircraft car parks when they are unoccupied, as well as the illuminated sign on the front of the passenger terminal building, for the number of nights required by the operation.

3.5.2 Clean-up initiatives

The collection of refuse has always been an issue at airports, especially airside. Foreign object debris (FOD) found in inappropriate locations is a serious safety issue that can damage equipment or injure personnel. In a broader context of physical pollution, the collection of refuse is also essential for ecosystems preservation. Plastic pollution in particular has been identified as an issue for marine ecosystems: IPBES reported that worldwide, marine pollution by plastics has increased tenfold since 1980, affecting at least 267 species, including 86% of marine turtles, 44% of seabirds and 43% of marine mammals. Plastic pollutants are particularly dangerous because of their ability to bind contaminants of concern, such as heavy metals, persistent organic pollutants and certain pathogens.

With high levels of passenger consumption at airports, **collecting and sorting waste is an important part of a sustainable development approach for airports.**

This commitment to ecosystem preservation through waste management is reflected in the coastal clean-up efforts led by Mactan-Cebu International Airport in the Philippines.

➤ Coastal clean-up initiative by Mactan-Cebu International Airport, Philippines

Mactan-Cebu International Airport (MCIA)^[24] launched a marine preservation commitment by implementing the "Coastal Clean-Up" project to support environmental sustainability. Various consecutive clean-up events took place from April to May 2023, resulting in collecting more than 18 tons of solid waste.

[23] https://www.seor.fr/media/media_426.pdf; <https://la1ere.francetvinfo.fr/reunion/nuits-sans-lumieres-2024-halte-a-la-pollution-lumineuse-pour-la-sauvegarde-des-petrels-1477670.html>

[24] ACI APAC & MID - Green Airport Recognition 2024 – Platinum - Mactan-Cebu International Airport. [aci-asiapac.aero/f/library/7073/Green Airports Recognition Programme 2024 - Publication.pdf](https://aci-asiapac.aero/f/library/7073/Green%20Airports%20Recognition%20Programme%202024%20-%20Publication.pdf)



Tidal flats where the MCIA approach lights is located and Olango Bird sanctuary are also used as foraging areas of the migratory birds.

This helped in the restoration of the mangrove areas, served as feeding grounds for migratory birds, reduced plastic pollution in the sanctuary's ecosystem, and also helped educate and raise awareness in the community on the importance of protecting the environment. It also facilitates regulatory authorities' enforcement against wildlife-trafficking.

3.5.1 Beehives and insect hotels

With the dual aim of educating and creating favorable habitats for insects, airports can take initiatives to install insect hotels or beehives. While they are a good way of communicating with and educating communities, certain precautions should be taken to ensure that they do not harm biodiversity. Indeed, large insect hotels bring together species that are normally solitary, and the concentration of these individuals in the same place is likely to provoke the emergence and spread of diseases and parasites or to attract and facilitate the work of predators. **Recreating natural micro-habitats through more flexible management of certain areas** (e.g., leaving low walls, standing or fallen trunks, large branches, or soil heaps) can be a viable solution. If an insect hotel is included for educational purposes, preference should be given to smaller structures with small holes.

Similarly, increasing the number of hives in airport meadows can put pressure on the floral resources available to wild pollinators. When these food resources are limited, indirect competition may arise between honeybees and wild pollinators. Honeybee colonies can also carry viruses or parasites that affect wild populations. In addition, because honeybees are generalists that visit a wide variety of plant species, they are less effective in facilitating sexual reproduction of plants than wild pollinators, which are more specialized and restricted to fewer plant species. Finally, competition can also arise between the hives themselves, each of which can contain tens of thousands of individuals who have to share floral resources. The following precautions can be taken if an aerodrome wants to implement this initiative: plan for a low density of hives in a square kilometre and respect a sufficient distance between beehives, adapt the platform management by giving priority to refuge strips and areas rich in melliferous plants (local and wild flowers) and contact specialist associations.

Beehives can also be used as a biomonitoring tool in a program of reducing/stopping pesticides at aerodromes, as has been done at Aeropuertos Dominicanos Siglo XXI^[25].

[25] ICAO Environmental Report 2022, <https://www.icao.int/environmental-protection/Documents/EnvironmentalReports/2022/ICAO%20ENV%20Report%202022%20F4.pdf>.

3.5.4 Biodiversity and sense of place

For travellers arriving at a new or unfamiliar place, it is the airport that starts to form the first impressions. For this reason, many airports are designed in iconic styles and often decorated to showcase a country's most important heritage and assets. The biodiversity of the airport can also contribute to this.

This conceptualization of biodiversity as integral to cultural identity and public space is exemplified by the wildlife promotion initiative implemented at Nigerian airports.

➤ Nigerian airports: Initiative to Promote Wildlife at Airports

Many travellers to Africa are attracted to the destination because of their interest in its rich wildlife. This was recognized by the government of Nigeria, which inaugurated a committee to promote wildlife in major airports across Nigeria.^[26] The effort was part of a broader initiative to preserve and showcase the country's rich natural heritage, and integrate Nigeria's iconic landscapes into major public spaces. The vision was for airports to be similar to National Parks, raise awareness about biodiversity conservation, enhance ecotourism, and facilitate wildlife research. The Nigeria example shows how biodiversity management at the airport can serve several roles, promoting ecotourism and benefiting other sectors of the economy.

3.5.5 Developing a biodiversity strategic plan

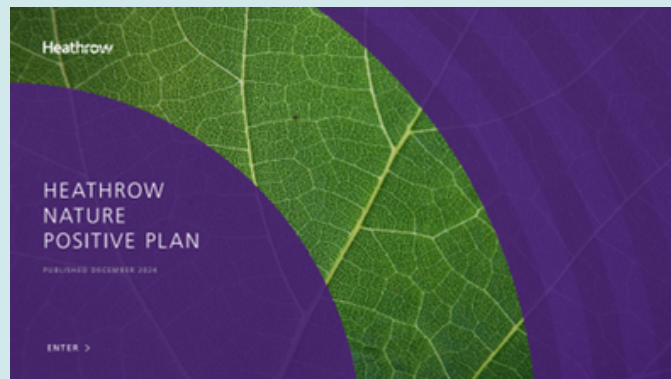
Building on the green space management plan described in 3.3.4, which provides an overview of green space management and associated species, an **airport can go further by consolidating all aspects into a comprehensive biodiversity management strategy**. This can include all initiatives related to biodiversity management and be shared with staff involved in any aspect of biodiversity, as well as with stakeholders whose activities are linked to it (e.g., wildlife hazard management services, green space management services, runway operations, etc.). Key Performance Indicators (KPIs) can be integrated into this strategic plan to enable both qualitative and quantitative monitoring. They can also improve transparency by providing indicators that are easily communicated and understood by a wide range of audiences.

This approach is exemplified by several leading initiatives: Heathrow Airport's Nature Positive Plan, which embeds biodiversity into all aspects of operations and long-term planning; Groupe ADP's strategy, which allocates up to 30% of airport space to biodiversity and applies ecological practices across its sites; and Fraport Greece's Biodiversity Conservation Programme, which promotes habitat preservation and species monitoring across 14 regional airports.

➤ Heathrow Airport Nature Positive Plan

In December 2024 Heathrow Airport launched its Nature Positive Plan to better understand and reduce its impacts on nature. The plan is holistic and addresses issues concerning airport operations, airport maintenance and development activities, as well as broader value chain dependencies and impacts.

[26] <https://leadership.ng/federal-govt-launches-initiative-to-promote-wildlife-at-airports/>



Commitments include expanding the amount of land the airport manages for conservation purposes, growing its network of local biodiversity sites, continuing to invest in UK forests and peatland, and disclosing nature-related impacts and dependencies in line with the Taskforce on Nature-related Financial Disclosures recommendations. This effort builds on Heathrow's strong track record on biodiversity management, such as 170ha of land

managed for biodiversity with 10 sites upholding the coveted Biodiversity Benchmark Award for the last 17 years.

➤ **Groupe ADP, a concrete commitment to biodiversity through a global environmental transition strategy.**^[27]

Among other commitments (expressed and published within the act4nature international initiative), the company devotes at least 25% and up to 30% of its airport space to biodiversity, thereby affirming its commitment to preserving ecosystems. To structure this approach, a roadmap is being implemented across all its entities to ensure the best operational roll-out and monitoring of its biodiversity commitments. In 2008, airports in the Paris region launched a policy of drastic reduction of chemical use in their green spaces. Thus, the Paris-Orly airport has been the first one to achieve 'zero phyto' on its total green area surfaces in 2015, followed successively by Paris-Le Bourget and Paris-CDG. This approach is accompanied by practices such as late mowing and other differentiated grass management practices, which help to preserve natural habitats and promote the development of local flora and fauna. At the same time, the group is collaborating with various associations and public institutions to enhance the precision of its observations and improve its understanding of animal behaviour in the specific settings of its sites. Participatory renaturation projects are also being carried out in collaboration with the employees or with local authorities to promote the voluntary restoration of natural environments and respect for ecological corridors. This approach is part of a comprehensive environmental transition framework that also tackles critical issues such as waste reduction and recovery and limiting the spread of artificial surfaces.

➤ **The Fraport Greece “Biodiversity Conservation Programme” in annual Wildlife Hazard Management Review 2021**^[28]

The Fraport Greece “Biodiversity Conservation Programme” provides a framework within which Fraport Greece opts to manage biodiversity at the airport areas as part of its Environmental & Social (E&S) Management System (ESMS).



Hypericum perforatum and *Anacamptis pyramidalis* at Thessaloniki Airport “Makedonia”, Greece.

The Biodiversity Conservation Action Plan 2021-2025 covers a habitat area of around 17km² in total (covered with vegetation at the airside) for the 14 regional airports. A comprehensive database will be created for a period of 5 years, for a variety of wildlife species and their populations. Various measures are planned to support locally the protection of flora and fauna species that are not hazardous to aircraft flights. The variety of the Biodiversity Conservation Programme objectives include grassland preservation, water surface monitoring, conservation of non-hazardous wildlife (insects, amphibians, reptiles) as well as marine conservation initiatives.

[27] <https://essentiel.groupe-adp.com/fr/la-biodiversite-dans-nos-aeroports>

[28] Fraport Greece, Annual Wildlife Hazard Management Review 2021 https://www.fraport-greece.com/uploads/flipbooks/Annual_Wildlife_Hazard_%CE%9Canagement_Review_2021.pdf

4. Nature-based solutions for airports

4.1 Biodiversity: a natural ally to climate change mitigation and adaptation

As introduced in Chapter 1, biodiversity and climate change are deeply interconnected. Climate change is one of the five factors contributing to biodiversity loss, and biodiversity loss, through the decrease of ecosystem services that regulate the environmental processes (see Figures 1 and 2), exacerbates the impacts of climate change and increases climate risks.

While efforts by airports to mitigate climate change are essential, and measures such as biodiversity conservation can contribute to carbon sequestration and other benefits, airports should also anticipate the impacts of climate change on their infrastructure and operations. In this context, biodiversity can serve as a valuable ally in strengthening climate adaptation and resilience. Building on this, airports can go further by advancing biodiversity protection and developing “**nature-based solutions**” that support long-term sustainability and help initiate adaptation to climate change.

Nature-based solutions are potential answers to both climate change mitigation and adaptation, and are defined by the International Union for Conservation of Nature (IUCN) as: "actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits".

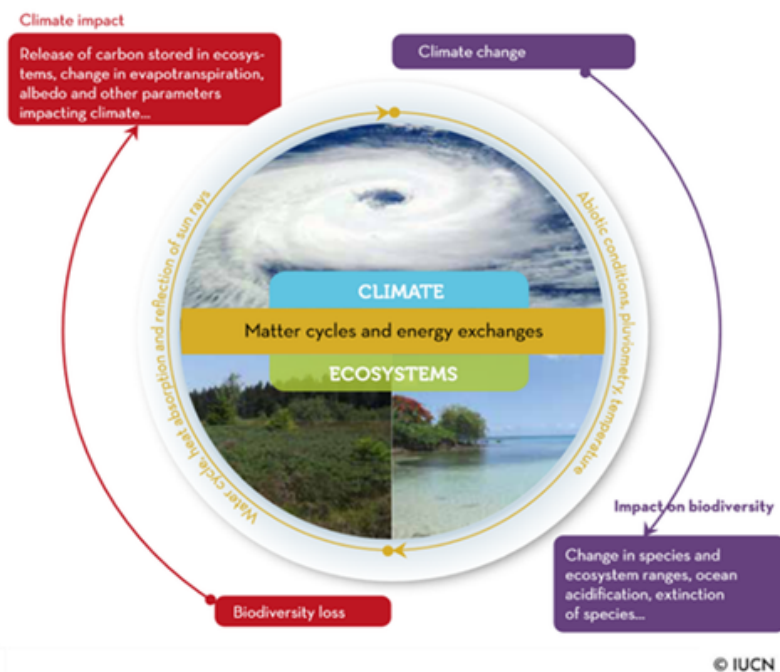


Figure 2 The interconnexion between climate change, ecosystems and biodiversity (IUCN)



Figure 3 The IUCN concept of Nature-based Solutions and their contribution to addressing societal challenges.

Nature-based solutions consist of three types of actions:

- Preservation of functional ecosystems in good ecological condition;
- Improving ecosystem management for sustainable use by human activities;
- Restoring degraded ecosystems or creating new ones.

Examples of nature-based solutions and their benefits to mitigate and adapt to climate change:

- **Native forests and other vegetation** help stabilize slopes and therefore reduce the risk of landslides;
- **Wetlands** can help regulate floods; de-waterproofing (e.g., greening, permeable pavements) can encourage infiltration of rainwater;
- **Coastal vegetation and natural features such as sand dunes and mangroves** can protect from storm surges, strong winds and cyclones;
- **Healthy coral reefs, oyster reefs, mangroves, or seagrass beds** can reduce wave energy and coastal erosion during coastal storms;
- **Vegetated bioswale**, in other words, a channel for stormwater runoff that is planted with grasses and plants. The plantings slow the water flow, which therefore slows soil erosion, and also cleans the water by allowing it to filtrate through soils;
- **Greening roofs** and other surfaces can reduce the “heat island” effects.

For airports, the choice of one or another nature-based solution will depend on the airport location, the degree of exposure to climate change effects, the adaptation needs and existing adaptive capacity, the level of commitment to mitigate climate change, the facilities and general design of the airport and, above all, the direct and indirect impact on flight safety. Then, not all the above solutions are always applicable for airports. **Any nature-based solution implementation project at an airport has to be carefully analysed from a safety and local perspective**, especially considering the potential impact on wildlife strike risk. Some solutions are more viable than others, or at least are likely to generate fewer constraints than others. For example, converting impervious paved surfaces into vegetation in front of passenger terminals landside, is a less risky nature-based solution to implement than creating a wetland on the airside. Indeed, the last one could attract birds and increase wildlife risk, and should be carefully analysed.

This approach is also recognized at ICAO level: the 2022 document “Climate change: climate risk assessment, adaptation and resilience. Menu of adaptation options”^[29] highlights nature-based solutions alongside technical and building measures, underlining their relevance as credible options for airports.

This type of solution is illustrated by Queenstown Airport’s wetland restoration project, which reduces flooding, prevents erosion, and enhances biodiversity through native plant reintroduction. A commitment to nature-based solutions is also visible at Katowice International Airport, with rain gardens and green infrastructure, and at La Réunion Roland-Garros Airport, where bioclimatic design integrates biodiversity and climate resilience into terminal architecture.

➤ Restoration to reduce and mitigate flooding and prevent wetland erosion at Questown airport, New Zealand

Queenstown Airport in Otago, New Zealand^[30], with less than 8 million passengers per annum, is deeply conscious of the need to protect its biodiversity. More than 20 species of native plants have been recorded. Queenstown Airport has a target to completely restore the wetland within ten years. Proving its engagement to conserve biodiversity by replanting native species around “Shotover Wetland restoration”. Over 3000 native plants form a buffer that filters pollutants, reduces and mitigate flooding, prevents wetland erosion, and provides shelters for birds and fish.



➤ Implementation of NBS at Katowice International Airport, Poland



In Poland at Katowice International Airport Wojciech Korfanty^[31], a project of designers is to implemented rain gardens to intercept part of the rainwater flowing from the parking lot before it goes to the rainwater sewage system. They are in areas where there are no existing underground sewage networks and near rainwater drainage inlets. These changes are made to

existing infrastructure, without impacting the number of parking spaces. Additionally, flower meadows are designed in places where it is technically impossible to implement rain gardens and where artificial surfaces can be dispensed with. Finally, the implementation of a green wall and pergolas maintain biodiversity while providing nature-based solutions to temperature control and shading.

[29] ICAO Report *Climate Change: Climate Risk Assessment, Adaptation and Resilience*, 2022; <https://www.icao.int/environmental-protection/Pages/Climate-Change-Climate-Risk-Assessment,-Adaptation-and-Resilience.aspx>

[30] ACI APAC & MID – *Green Airports Recognition 2024 – Platinum - Queenstown Airport, New Zealand*. URL: aci-asiapac.aero/f/library/7073/Green-Airports-Recognition-Programme-2024-Publication.pdf

[31] *Katowice International Airport Wojciech Korfanty - ArchiClima*, <https://archiclina.pl/en/wdrozenia/katowice-international-airport-wojciech-korfanty/>

➤ New bioclimatic arrivals terminal at La Réunion Roland-Garros Airport, Reunion Island, France

As a result of a growth in traffic and new security standards, Reunion’s Roland Garros Airport, France, launched the New West Terminal project^[32]. The design strategy was an integral part of the sustainable development approach and clearly reflected the environmental goal of decarbonising the airport activities, based on the following concepts:

- Making the most of the wind available on site to avoid the need for air conditioning, thanks to the layout, architecture and the building’s openings (tested in a wind tunnel);
- Reducing solar heat gain while encouraging natural lighting;
- Controlling climate management and user comfort;
- Creating cooler areas thanks to nearby green spaces, thus lowering the temperature of the surrounding environment;
- Optimising storm-water management while developing biodiversity endemic to Reunion Island.



The presence of endemic vegetation ensures islands of coolness inside. Plants are present in the baggage reclaim area, in the form of hanging baskets. Vegetation around the building creates a green setting as the shrubs and trees grow. The vegetation absorbs some of the heat at the foot of the terminal, reducing the air entering the building by around 2°C.

[32] <https://www.reunion.aeroport.fr/en/grands-travaux/nouvelle-aerogare-arrivee>

5. Wildlife Trafficking

The issue of wildlife trafficking, while not the primary focus of this document, warrants attention due to its significant impact on biodiversity conservation. Taking wildlife from their natural habitats poses a serious threat to biodiversity, which has considerable potential to undermine the role that natural ecosystems play in climate stability and the mitigation of climate change impacts. Airports play a critical role in the fight against wildlife trafficking, which is among the world's largest illegal trades and often exploits the air transport system. Through initiatives such as the ROUTES Partnership^[33] and the United for Wildlife Transport Taskforce, that brings together stakeholders from across the transport industry to jointly examine the industry's role in the illegal wildlife trade, and organizations such as Airports Council International (ACI), airports have access to practical tools, including staff training, reporting mechanisms, and risk assessment frameworks that help detect and deter the illegal transport of wildlife. The International Air Transport Association (IATA) works with airlines and with industry stakeholders to identify and create awareness around good practices and share technological advancements across sectors. Wildlife trafficking, like most challenges in aviation, is a systemic issue that can only be addressed through multistakeholder coordination and collaboration. ICAO has also adopted recommended practices requiring States to ensure airports and airlines have clear reporting procedures, embedding this issue into global aviation standards. Protecting biodiversity in this way not only safeguards ecosystems but also reduces the risk of zoonotic disease emergence^[34].

6. Conclusion

At a time when biodiversity is in serious decline and climate change is eroding the resilience of critical infrastructure, preserving ecosystems is no longer optional for airport operators; it is a strategic necessity. This publication has shown the wide range of interactions between biodiversity and airport management, and the many opportunities to turn those interactions into benefits for safety, sustainability and community value.

Airports can lead by example by embedding biodiversity into their sustainability strategies, aligning with global frameworks, and shifting from species elimination to a risk management approach that safeguards both operations and nature. Regular inventories and mapping of fauna, flora, and habitats, using scientific and participatory methods, allow data-driven decisions. Differentiated green space management, reduced chemical inputs, and sustainable recycling of vegetation waste protect and enhance ecosystems without compromising safety.

Every development project should follow the “Avoid-Reduce-Compensate” principle, prevent the spread of invasive alien species, and integrate biodiversity-friendly designs. Airports should also consider broader environmental impacts, including the effects of noise and light pollution on species. Adaptive lighting strategies can already be applied, but when it comes to aircraft noise, although evidence shows impacts on communication, reproduction, and stress responses in wildlife, further long-term and robust research is still needed. Similarly, waste reduction, clean-up campaigns, and carefully managed pollinator habitats help protect ecosystems while building trust with local communities.

Airports, together with airlines and other stakeholders, are also on the frontline in the fight against wildlife trafficking, one of the largest threats to global biodiversity. Staff training, reporting mechanisms, and international cooperation strengthen aviation's role in disrupting illegal trade while safeguarding ecosystems and reducing risks such as zoonotic disease emergence.

Beyond conservation, biodiversity can enhance the sense of place at airports, reinforcing cultural identity, supporting ecotourism, and creating a unique gateway experience for passengers. Strategic biodiversity planning that incorporates such initiatives, supported by clear Key Performance Indicators (KPIs), ensures transparency, accountability, and long-term alignment with global frameworks such as the Kunming–Montreal Global Biodiversity Framework.

Above all, airports can use biodiversity itself as a nature-based ally, restoring wetlands, greening roofs, and creating vegetated buffers, to adapt to climate change, manage stormwater, reduce heat islands, and strengthen resilience. With safety as a guiding principle, these measures demonstrate that airports can be both engines of connectivity and guardians of the natural systems that make that connectivity possible. Acting now, systematically and collaboratively, can ensure aviation's future is not only safe and efficient, but also nature-positive.

[33] The ROUTES Partnership was a USAID-led initiative from 2015 to 2020 that brought together transport and logistics companies, government agencies, development groups, law enforcement, conservation organizations, academia, and donors to disrupt wildlife trafficking activities.

[34] https://aci.aero/wp-content/uploads/2022/08/wp_144_en.pdf

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*If some recommendations can apply to any airport, these publications have been written for French airports and is adapted to their climate, their species, and their management resources and could therefore not totally be compatible with airports located elsewhere in the world.

— END —



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