Mitigating biodiversity impacts of new sports venues

INTERNATIONAL UNION FOR CONSERVATION OF NATURE

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Mitigating biodiversity impacts of new sports venues

This publication has been made possible in part by funding from the International Olympic Committee.

Published by: IUCN, Gland, Switzerland

Citation: Brownlie, Susie (2019). *Mitigating biodiversity impacts of new sports venues*. Gland, Switzerland: IUCN. xii+80pp.

ISBN: 978-2-8317-1954-2

DOI: https://doi.org/10.2305/IUCN.CH.2019.02.en

Cover photo: © iStock / miroslav_1

Layout by: Imre Sebestyén jr / Unit Graphics

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Table of Contents

Boxes

Figures

Tables

Executive summary

Sport is often closely associated with the great outdoors. In its very earliest incarnations, the natural landscape was the field of play, while today the success of some outdoor sports relies on natural landscapes. Recognition of these dependencies, as well as a drive to make sport more biodiversity-friendly, has led to an increased interest in sustainable sports development and conservation among sport federations, governments, the private sector and the conservation community.

The conservation of biodiversity is a cornerstone of sustainable development, and involves ensuring the persistence of the diversity of species and ecosystems, sustainably managing living natural resources, and maintaining healthy functioning ecosystems. Conservation also recognises that biodiversity can provide important social and cultural benefits to people, who are an integral part of these ecosystems. However, despite the fact that the ecosystem services underpinned by biodiversity form the basis for our shared health, wealth, and well-being, recent analyses suggest that the rate of biodiversity loss has crossed the 'safe boundaries' for humanity.[1] Climate change is predicted to aggravate rates of biodiversity loss in ecosystems and weaken their ability to deliver life-support systems and other benefits to people.

Wherever a new sports venue is built, or the refurbishment of an existing venue is undertaken, it is likely that biodiversity will be affected by that development, although the significance of impacts on biodiversity – both negative and positive – will vary enormously from sport to sport and location to location.

In particular, poorly planned sports venues can have a wide range of negative impacts on biodiversity, including habitat loss, pollution, and the disturbance of wildlife through noise, lighting, trampling and the introduction of invasive alien species.

On the positive side, these venues can help to raise awareness of conservation issues and human dependence on nature. They can also contribute materially by protecting areas known to be important for biodiversity, increasing natural habitats for plants and animals, helping to restore degraded areas, supporting local efforts to conserve biodiversity and encouraging the involvement of local communities in conservation activities. Where sports venues are carefully designed, impacts on biodiversity can be avoided and an overall gain of biodiversity can be achieved.

1 Rockström et al., 2009.

Sports organisations, public authorities and financial institutions as well as those involved in the actual construction and decommissioning of venues all have a role to play in managing the range of impacts that sport venues may have on biodiversity. This includes implementing different measures that can be taken to mitigate any negative impacts and adopting approaches that contribute to biodiversity conservation. Moreover, with careful planning and design, new sports venues and the expansion of existing sites or temporary facilities can, in some cases, even contribute to an overall gain of biodiversity.

Biodiversity impacts can be successfully managed by implementing the mitigation hierarchy steps, from avoidance to minimisation, restoration and biodiversity offset. Specific measures to mitigate biodiversity impacts associated to new sport venues, extensions and temporary facilities include the avoidance of impacts in World Heritage sites and protected areas, the restoration of degraded sites as part of the siting of new venues and the use of green design elements. In addition, through auditing and reporting, project developers can demonstrate to their stakeholders that mitigation measures are being implemented and biodiversity outcomes achieved.

The most cost effective approach is to consider biodiversity early on and continuously throughout the development process. Such an approach can also help developers minimise risks and prevent unforeseen delays and costs, and avoid having to repair or compensate for environmental damage afterwards. Another key factor of success is to use biodiversity information and the right expertise as early as possible in the development and design phases.

The IUCN report, *Mitigating biodiversity impacts of new sports venues*, is the second in a series of reports published under a collaborative partnership with the International Olympic Committee. It offers in-depth guidance on how to integrate biodiversity considerations in the development of a new venue or a temporary facility, including five checklists covering all aspects from the early planning stage and site selection to the decommissioning.

Overall, the report highlights sport stakeholders have an opportunity to make a real contribution in reversing the current negative trends in biodiversity conservation. When well-designed and executed, new sport venues and temporary facilities can actually achieve conservation and restoration of biodiversity, and therefore become positive agents of change, strengthening the environmental legacy for the hosting community and the broader sporting industry.

Acknowledgements

Many thanks to Michelle Lemaitre, Julie Duffus (International Olympic Committee) and David Stubbs (Sustainability Experts Ltd.) for their guidance and continuous support; Marc Stalmans, Tim Gayda (TWG Consulting, Canada), Xavier Becker and Sam Thomas (GEO Foundation) for their feedback on the various drafts; Stephen Woodley (WCPA) and Alma Roberts (WWF-UK) for their commitment as peer reviewers; and Giulia Carbone (IUCN) for her coordination and oversight role.

This publication has been made possible thanks to funding from the International Olympic Committee.

Glossary of terms, abbreviations, acronyms

Additional Conservation Actions	A broad range of activities that are intended to benefit biodiversity, where the effects or outcomes can be difficult to quantify (Biodiversity A to Z).
Area of influence	The area likely to be affected by the project, impacts from unplanned but predictable developments caused by the project that may occur later or at a different location, indirect project impacts on biodiversity or on ecosystem services upon which affected communities' livelihoods are dependent, impacts of associated facilities, and cumulative impacts (adapted from IFC, 2012, Performance Standard 1).
Associated facilities	Facilities that are not funded as part of the project, that would not have been constructed or expanded if the project did not exist, and without which the project would not be viable (IFC, 2012, Performance Standard 1).
BAP	Biodiversity Action Plan. A BAP is compiled where additional information on ecosystems and biodiversity has to be obtained or additional engagement with stakeholders is needed to firm up impact assessment and mitigation and management actions (adapted from IFC, 2012, Performance Standard 6, Guidance Notes, Annex A).
BBOP	Business and Biodiversity Offsets Programme
Biodiversity	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 (Convention on Biological Diversity, 1992).
Biodiversity offsets	Biodiversity offsets are measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development after appropriate mitigation measures have been taken. The goal of biodiversity offsets is to achieve no net loss and preferably a net gain of biodiversity on the ground, with respect to species composition, habitat structure, and ecosystem function, and people's use and cultural values associated with biodiversity (BBOP, 2012, Glossary).
BMP	Biodiversity Management Plan. A BMP is used where there is a high level of confidence in the planning of proposed mitigation and management measures (adapted from IFC, 2012, Performance Standard 6 Guidance Notes, Annex A).
BOMP	Biodiversity Offset Management Plan. A BOMP incorporates the mitigation measures relevant to the biodiversity offset as set out in the EIA, and develops them to ensure their implementation (BBOP, 2012, Glossary).
Brownfield	An area of land that was previously used for industry or other type of developments.
CBD	Convention on Biological Diversity
Compensation	Measures to recompense, make good, or pay damages for loss of biodiversity caused by a project. In some languages, 'compensation' is synonymous with 'offset', but in this paper, compensation is a more general term, of which biodiversity offsets are just one subset. Compensation may achieve No Net Loss/Net Gain (in which case it is an offset), but in other cases, compensation can involve reparation that falls short of achieving no net loss (and is therefore not an offset). This can be for a variety of reasons, including that the conservation actions were not planned to achieve no net loss; that the residual losses of biodiversity caused by the project and gains achievable by compensation are not quantified; that no mechanism for long-term implementation has been established; that it is impossible to offset the impacts (for instance, because they are too severe or pre-impact data are lacking, so it is impossible to know what was lost as a result of the project); or that the compensation is through payment for training, capacity building, research, or other outcomes that will not result in measurable conservation outcomes on the ground (BBOP, 2012, Standard).

Conservation status	Category of threat to, and likelihood of, the continued existence of a species or ecosystem.
Critical habitats	Areas with high biodiversity value, including (i) habitat of significant importance to Critically Endangered and/or Endangered species, (ii) habitat of significant importance to endemic and/or restricted-range species, (iii) habitat supporting globally significant concentrations of migratory species and/or congregatory species, (iv) highly threatened and/or unique ecosystems, and/or (v) areas associated with key evolutionary processes (IFC, 2012, Performance Standard 6).
Cumulative impact	Impacts that result from the incremental impact, on areas or resources used or directly impacted by the project, from other existing, planned, or reasonably defined developments at the time the risks and impacts identification process is conducted (IFC, 2012, Performance Standard 1).
Direct impact	An outcome directly attributable to a defined action or project activity; often also called a primary impact (BBOP, 2012, Glossary).
Ecosystem	A dynamic complex of plant, animal, and micro-organism communities and their non-living environment interacting as a functional unit (Convention on Biological Diversity, 1992).
Ecosystem services	The benefits people obtain from ecosystems. These include provisioning services such as food, water, timber, and fibre; regulating services that affect climate, floods, disease, wastes, and water quality; cultural services that provide recreational, aesthetic, and spiritual benefits; and supporting services such as soil formation, photosynthesis, and nutrient cycling (BBOP, 2012, Glossary).
Enhancement	Going beyond mitigation of negative impacts in order to make a net positive contribution to the environment (modified from Rajvanshi et al*.,* 2011).
EIA	Environmental Impact Assessment (EIA). The process of identifying, predicting, evaluating, and mitigating the biophysical, social, and other relevant effects of development proposals prior to major decisions being taken and commitments made. Simply defined, EIA is the process of identifying the future consequences of a current or proposed action. The 'impact' is the difference between what would happen with the action and what would happen without it (IAIA). In some countries, EIA incorporates consideration of social and biophysical impacts. In others, an EIA covers only biophysical impacts and, where social impacts are included, the term ESIA is used to indicate the broader scope.
ESIA	Environmental and Social Impact Assessment
ESS6	World Bank Environmental and Social Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources
Fragmentation of habitat	The disruption and spatial and functional break-up of extensive habitats into isolated and small patches, interspersed with other habitats. Small fragments of habitats can only support small populations of fauna, and these are more vulnerable to extinction. The patches may not even be habitable by species occupying the original undivided habitat. The fragmentation also frequently obstructs species from migrating between populations. Fragmentation of habitats is therefore expected to lead to losses of species diversity in the longer term (CBD Biodiversity Glossary).
Free, Prior and Informed Consent	This principle recognises that indigenous communities have a right to self-determination, and must give their free and informed consent prior to any development or use of resources on ancestral land.
Green venue	A venue that is designed, built, and operated in an ecologically and resource-efficient manner to reduce environmental impacts and strive for sustainability.
Habitat	The place or type of site where an organism or population of a species naturally occurs (Convention on Biological Diversity, 1992).

Habitat degradation	The diminishment of habitat quality, which results in a reduced ability to support flora and fauna species. Human activities leading to habitat degradation include polluting activities and the introduction of invasive species. Adverse effects can become immediately noticeable, but can also have a cumulative nature. Biodiversity will eventually be lost if habitats become degraded to an extent that species can no longer survive (CBD 2008: Biodiversity Glossary).
HAP	A Habitat Action Plan (HAP) describes management actions targeting a particular habitat.
IAIA	International Association for Impact Assessment
ICCA	Indigenous and Community Conserved Area
IFC	International Finance Corporation
IFC PS6	International Finance Corporation Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources
Indirect impact	Impact triggered in response to the presence of the project, rather than being directly caused by the project's own operations; sometimes called secondary or induced impacts (BBOP, 2012, Glossary).
Invasive alien species	*A* species that is established outside of its natural past or present distribution, whose introduction and/or spread threaten biological diversity (Convention on Biological Diversity, 1992).
IOC	International Olympic Committee
IUCN	International Union for Conservation of Nature
KBA	Key Biodiversity Area (KBA) sites contributing significantly to the global persistence of biodiversity (IUCN, 2016, A global standard for the identification of Key Biodiversity Areas, version 1.0).
Mitigation hierarchy	A tool that aims to help manage biodiversity risk and is commonly applied in EIAs and ESIAs. Includes a hierarchy of steps: avoidance, minimisation, restoration, and offset (adapted from BBOP and UNEP Finance Initiative, 2010).
Modified habitats	Areas that may contain a large proportion of plant and/or animal species of non-native origin, and/or where human activity has substantially modified an area's primary ecological functions and species composition (IFC, 2012, Performance Standard 6).
Natural capital	The stock of renewable and non-renewable natural resources (e.g. plants, animals, air, water, soils, minerals) that combine to yield a flow of benefits to people (Natural Capital Coalition).
Natural habitats	Areas composed of viable assemblages of plant and/or animal species of largely native origin, and/or where human activity has not essentially modified an area's primary ecological functions and species composition (IFC, 2012, Performance Standard 6).
NBSAP	National Biodiversity Strategy and Action Plan (required of contracting parties to the CBD).
Net gain of biodiversity, or net positive impact for biodiversity	A target for a development project in which the impacts on biodiversity caused by the project are balanced or outweighed by measures taken to avoid and minimise the project's impacts, to undertake on-site restoration, and finally to offset the residual impacts, so that no loss remains. Where the gain exceeds the loss, the terms 'net gain' or 'net positive impact' may be used instead of 'no net loss' (BBOP, 2012, Glossary.
NGO	Non Governmental Organisation
No net loss of biodiversity	The point at which the project-related impacts on biodiversity are balanced by measures taken to avoid and minimise the project's impacts, to undertake on-site restoration, and finally to offset significant residual impacts, if any, on an appropriate geographic scale (BBOP, 2012, Glossary).

OECM	Other Effective area-based Conservation Measures (OECM) a geographically-defined space, not recognised as a protected area, which is governed and managed over the long term in ways that deliver the effective in-situ conservation of biodiversity, with associated ecosystem services and cultural and spiritual values.
Precautionary principle	Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation (Rio Declaration, 1992, Principle 15).
Protected areas	A clearly defined geographical space, recognised, dedicated, and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values (IUCN definition, 2008).
Residual impact	The remaining adverse impact on biodiversity after appropriate avoidance, minimisation, and rehabilitation measures have been taken according to the mitigation hierarchy (BBOP, 2012, Glossary).
Resilience	The capacity of a natural system to recover from disturbance (OECD, 2007).
Restoration	The return of an ecosystem or habitat to its original community structure, natural complement of species, and natural functions (CBD, 2008, Biodiversity Glossary).
Rights-based approach	An approach to conservation that respects, and seeks to protect and promote, recognised human rights standards (IUCN).
SAP	A Species Action Plan (SAP) describes management of a particular species of concern.
Significant impact	An impact that is outside the limit of acceptance or may result in non-compliance with accepted environmental quality standards, thresholds, or targets.
Sports venue	The place, building, or structure in which a sporting competition is held. In this guideline, the term is used broadly to include buildings, equipment, built infrastructure (e.g. powerlines), and services needed to enable sporting activities.
Threatened species	Species categorised as Critically Endangered, Endangered, or Vulnerable by The IUCN Red List of Threatened Species™. The Red List is widely recognised as the most comprehensive, objective global approach for evaluating the conservation status of plant and animal species (IUCN Red List of Threatened Species™).
UNEP-WCMC	United Nations Environment – World Conservation Monitoring Centre
UNESCO	United Nations Educational, Scientific and Cultural Organisation
WCC	World Conservation Congress
WCPA	World Commission on Protected Areas
WHS	World Heritage Site
Wildlife	Living, non-domesticated animals and plants
WWF	World Wide Fund for Nature

1

1. Introduction

1.1 Purpose of the guidelines

These guidelines are intended to clarify the possible range of impacts that the development of new sports venues (permanent or temporary) may have on biodiversity, in order to help plan measures to mitigate any negative impacts and exploit opportunities to benefit conservation. The focus is on early and ongoing consideration of biodiversity throughout each phase of the development of new sports venues, with an emphasis on avoiding negative impacts and risks, rather than relying on repairing or compensating for damage.

These guidelines are intended for use by all parties involved in the planning and development of large and small sports venues, including new permanent venues, temporary structures and extensions, or refurbishment of existing facilities. These parties may include:

a) those responsible for planning a venue, e.g. landowners, private developers, sports organisations (international, regional, national, and local sporting federations and clubs; event organisers and local organising committees), public authorities (city councils, sports departments), architects, managers, and other industry professionals;

b) those responsible for constructing, operating, and decommissioning or dismantling a venue;

c) financiers; and

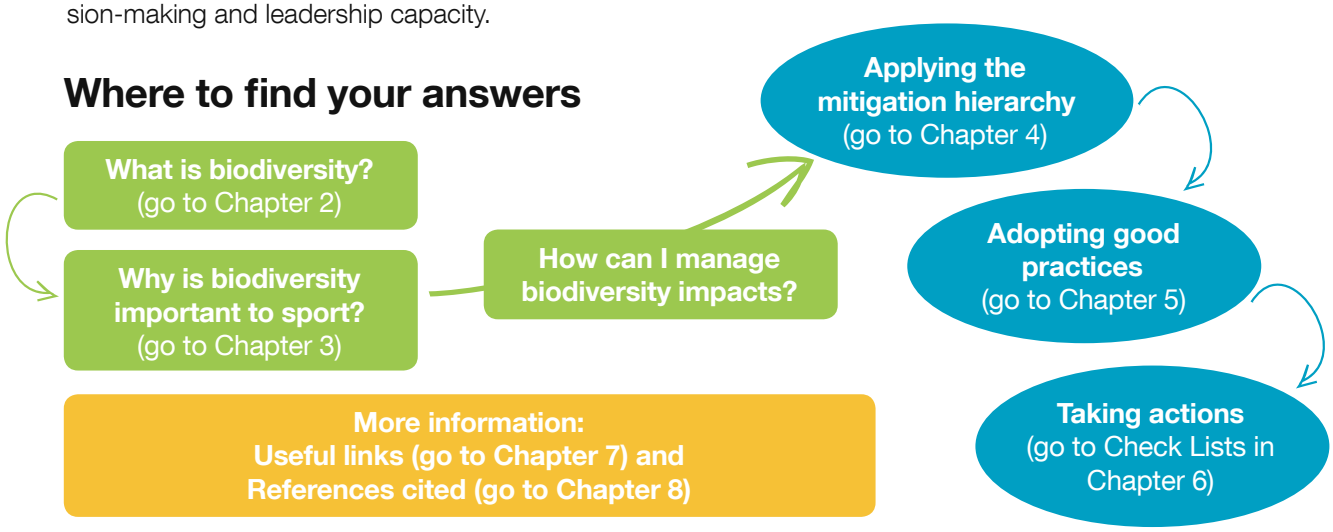
d) relevant authorities who must give permission for a venue to be developed and check compliance with any conditions (e.g. statutory environmental or conservation authorities, planning authorities, other public agencies, and sporting bodies).

1.2 Structure of the guidelines

The first four chapters of this document provide an overview of the importance of biodiversity and its relation to sport, and the key approaches needed to ensure that biodiversity issues are addressed throughout the design and development processes. These chapters will be useful to all parties, including those involved in a non-technical, but decision-making and leadership capacity.

The remaining chapters and appendices provide more detailed technical content and reference material for people working on the practical aspects of planning, siting, design, construction, and management of sports venues.

Where to find your answers



2

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2. Biodiversity conservation

This chapter provides you with definitions and explanations of key concepts related to biodiversity which will help you navigate the rest of the Guidelines. The chapter defines what is "biodiversity" and explains what are the biodiversity conservation approaches relevant to sport (conserving species; conserving ecosystems; conserving ecological processes; maintaining priority ecosystem services; and protecting areas of high importance for biodiversity).

2.1 What is biodiversity?

Biological diversity, or biodiversity, means the total variety of all living things. The Convention on Biological Diversity[2] (CBD) defines biodiversity 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.*

The biodiversity of a particular area is best described in terms of the species and communities found in its different ecosystems, their structure, and the way they function.

Biodiversity is often referred to as 'nature' or 'the natural environment', and also as 'wildlife'. While not exactly the same thing, these terms have similar meanings.

The conservation of biodiversity is a cornerstone of sustainable development, and involves ensuring the persistence of the diversity of species and ecosystems, sustainably managing living natural resources, and maintaining healthy functioning ecosystems. Conservation also recognises that biodiversity can provide important social and cultural benefits to people, who are an integral part of these ecosystems. For example, 11 million people depend on natural World Heritage sites and could be affected negatively by the impacts of harmful industrial activities.[3] Wise and integrated management can ensure sustainable use of biodiversity, with sustained benefits to society.[4]

Biodiversity includes all ecosystems, from urban and intensively managed environments to largely natural areas and remote wilderness areas. However, despite the fact that the services provided by the ecosystem services underpinned by biodiversity form the basis for our shared health, wealth, and well-being, recent analyses suggest that the rate of biodiversity loss has crossed the 'safe boundaries' for humanity.[5] Climate change is predicted to aggravate rates of biodiversity loss in ecosystems and weaken their ability to deliver life-support systems and other benefits to people.

At the international level, parties to the CBD adopted the Strategic Plan of Biodiversity (2011-2020), with associated Aichi biodiversity targets.[6] Although some progress has been made towards meeting a number of these targets, in most cases this progress is insufficient to achieve them; the planet's most threatened species are getting worse rather than better. Furthermore, the CBD requires each contracting party to prepare a National Biodiversity Strategy and Action Plan[7] (NBSAP), to show how they will conserve their biodiversity.

The United Nations (UN) declaration adopting the 2030 Agenda for Sustainable Development and its

2 The CBD is one of the foundations of Sustainable Development. It is a multi-party treaty arising from the 1992 Earth Summit in Rio de Janeiro, Brazil. The Convention recognises that biological diversity is about more than plants, animals, and micro-organisms and their ecosystems – it is about people and our need for food security, medicines, fresh air and water, shelter, and a clean and healthy environment in which to live.

3 WWF 2016.

4 The 'ecosystem approach' is the primary framework for actions under the CBD. https://www.cbd.int/ecosystem/

5 Rockström *et al* 2009.

6 A set of 20 global targets under the CBD's Strategic Plan for Biodiversity 2011-2020. They were adopted by the 10th Conference of Parties of the CBD in Aichi Prefecture, Japan, in October 2010.

7 https://www.cbd.int/nbsap/introduction.shtml

17 global Sustainable Development Goals (SDGs) explicitly references biodiversity conservation in two of these goals, namely:

- SDG 14 – Life below water: Conserve and sustainably use the oceans, seas, and marine resources for sustainable development; and
- SDG 15 – Life on land: Protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.

Other SDGs (e.g. satisfying basic human needs and achieving sustainable resource use) rely in part on maintaining the benefits to people provided by ecosystems and biodiversity (ecosystem services); e.g. SDG 11.4 - Strengthen efforts to protect and safeguard the world's cultural and natural heritage.

2.2 Understanding biodiversity conservation

Biodiversity conservation covers ecosystems, species, and genetic resources, with the establishment of protected areas being a core means to conserve biodiversity. The CBD also recognises the importance of safeguarding biodiversity that supports human well-being by providing a range of ecosystem services.

Following on from the goals of the Convention, and of particular relevance to the development of sports venues and these guidelines, are key areas for conserving biodiversity:

- conserving species (including genetic resources);
- conserving ecosystems;
- conserving ecological processes;
- maintaining priority ecosystem services; and
- protecting areas of high importance for biodiversity.

2.2.1 Conserving species

The range and variety of species make up the natural fabric of life on earth. The wealth of species provides benefits to people on many levels (e.g. economic, medical, recreational, cultural, aesthetic, and scientific), and their loss would leave us poorer.

Species not only provide benefits to people, they also play a crucial role in the ecological processes essential to maintaining life itself. Conserving genetic diversity within a population or species is important, since it increases the ability to adapt to changing environments and conditions (such as climate change and disease) and evolve; a lower level of genetic diversity raises the risk of extinction. Safeguarding genetic diversity thus benefits people by helping to maintain ecological processes and their portfolio of ecosystem services, making both ecosystems and human communities more resilient.

Different species have different spatial needs or ranges for their survival. By respecting these needs, and safeguarding genetic diversity within a species by conserving a number of viable populations of species across their distribution range, the survival of that species is improved.

Ecosystems with a wider range of species are known to be more resilient and more productive than those with a depleted community of species,[8] underlining the need to conserve them. This need is reinforced by the wisdom of trying to maximise our resilience to climate change effects.

The IUCN Red List of Threatened Species™ is a resource that provides scientific information on the status of globally threatened species. The Red List system (Figure 1) uses criteria and categories to determine the risk of extinction of a species,[9] and highlights so-called threatened species, namely those plants and animals that are facing a relatively high risk of global extinction (i.e. those listed as Critically Endangered, Endangered and Vulnerable). Species that have been evaluated to have a low risk of extinction are classified as Least Concern.

8 Cardinale, et al., 2012.
9 IUCN, 2001.

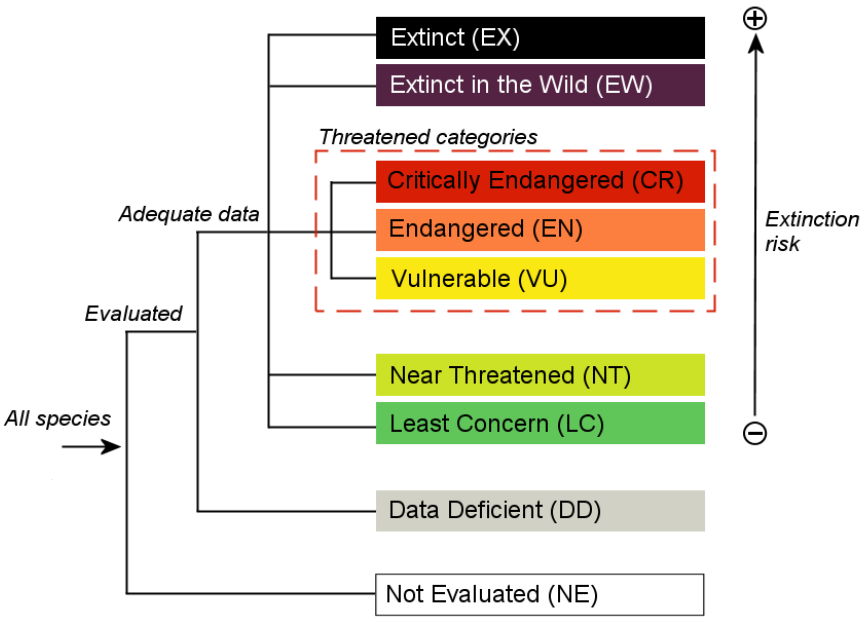

Figure 1: IUCN Red List categories of threat levels to biodiversity

Information on the conservation status and distribution of threatened species helps to alert planners and decision makers to risks to biodiversity posed by proposed developments, and informs the need for appropriate mitigation measures to conserve biodiversity, from local to global levels.

Several countries have their own national registers of species, either as Red Data Books or Red Lists, which reflect the conservation status of species occurring in those territories. Many – but not all – of these national registers use the IUCN Red List criteria. The National Red List Project site contains local, national and regional Red Lists from around the world as well as any resulting conservation Action Plans.

2.2.2 Conserving ecosystems

An ecosystem is a dynamic complex of living organisms (species) and their non-living environment, interacting as a functional unit.

The living and non-living components of ecosystems are linked through nutrient cycles and energy flows. As interconnected networks, ecosystems can be of any size; reference is often broadly made to terrestrial, marine, freshwater, and subterranean ecosystems. In practice, ecosystems are usually considered in recognisable biophysical units in a given area, such as a discrete vegetation type (e.g. patch of forest), a river basin, coral reef, estuary, or wetland.

The IUCN Red List of Ecosystems is a global standard for categorising the conservation status of ecosystems. It is applicable at local, national, regional, and global levels. The Red List of Ecosystems evaluates whether ecosystems have reached the final stage of degradation (a state of Collapse), whether they are threatened at Critically Endangered, Endangered, or Vulnerable levels, or if they are not currently facing significant risk of collapse (Least Concern). It is based on a set or criteria for performing evidence-based, scientific assessments of the risk of ecosystem collapse, as measured by reductions in geographical distribution or degradation of the key processes and components of ecosystems.[10]

In addition to applying internationally recognised criteria to determine the conservation status of ecosystems, and in countries where ecosystems have not been categorised, other approaches may be used. The IFC's Performance Standards[11], published in 2012 and since then adopted by the Equator Principles Financial Institutions,[12] define habitats as being either modified, natural, or critical (Table 1), depending principally on the extent of transformation and the conservation status of ecosystems and their associated species. The requirements of all parties

10 IUCN, 2016c.
11 Some international environmental standards (e.g. the International Finance Corporation (IFC)'s and the World Bank use the term habitat to mean the same thing as ecosystem.
12 These lending institutions have adopted the so-called Equator Principles, which are based on the IFC Performance Standards.

Table 1: Different types of habitat for biodiversity

Type of habitat	Description
Modified habitats	Areas where human activity has substantially modified the species composition, structure, and functioning of ecosystems. Although shaped by human activity, modified habitats can often support significant biodiversity value.
Natural habitats	Areas composed of viable functioning ecosystems of mainly indigenous or native species, and where human activity has not essentially modified an area's primary ecological functions and species composition.
Critical habitats	Areas known to have high biodiversity value, including habitat for highly threatened or range-restricted species, areas important for migratory species, threatened or unique ecosystems, and/or ecosystems associated with key evolutionary processes.

involved in the venue development process with regard to biodiversity conservation increase considerably with an increase in the value and importance of affected biodiversity.

2.2.3 Conserving ecological processes

Ecological processes that are essential to maintain ecosystem health[13] (e.g. carbon cycle, nutrient cycle, hydrological cycle) operate at a range of ecological scales, from the very small to large landscapes. For the conservation of biodiversity to be effective, therefore, it is essential to avoid the fragmentation of the ecosystem, and instead to take an ecosystem approach and conserve these ecological processes and ecological connectivity, rather than focusing solely on protecting individual sites.

Connections between ecosystems, from local to landscape-scale (e.g. along forest belts, streams or rivers, hills, and mountain ranges), are crucial for many ecological processes. Most species need to move from one place to another to feed, access new resources, breed, undertake seasonal migration, or disperse. With changing climates, the distribution of plants and animals is already shifting in response to changing temperatures and rainfall patterns.

Retaining or creating ecological connectivity through ecological corridors of native vegetation and 'stepping stones' of intact habitat across landscapes is important to link different ecosystems and help enable the movement and dispersal of species, and maintain genetic diversity (Figure 2). These landscape links are essential if biodiversity is to persist and adapt to changing conditions over time.

The direct modification of an intact natural area to enable development will result in loss of habitat for wildlife. In addition, the changed levels of noise, lighting, and activity associated with a development can increase the area of impact beyond its footprint, potentially affecting ecological processes and reducing the area of habitat available for species. These edge effects are illustrated in Figure 3.

2.2.4 Maintaining ecosystem services

Although ecosystems and species are important in their own right, they can also provide people with a range of benefits, referred to as ecosystem services. These services can be grouped[14] as provisioning services (e.g. food, water supply, medicines, and building materials), regulating services (e.g. pollination, water purification, and disease control), cultural services (e.g. recreational and spiritual benefits), and supporting services (e.g. decomposition and nutrient cycling).

Ecosystem services contribute to human well-being. For example, we can subsist on goods harvested from local areas, obtain medicines from local plants, or rely on a stream for clean drinking

13 e.g. https://www.epa.gov/sites/production/files/2014-08/documents/ecological-processes-eia-pg.pdf; Rouget et al., 2003.

14 e.g. Millennium Ecosystem Assessment, 2005. https://www.millenniumassessment.org/documents/document.356.aspx.pdf. The Common International Classification of Ecosystem Services (2018) covers provisioning, regulating, and maintenance, and cultural services. www.cices.eu.

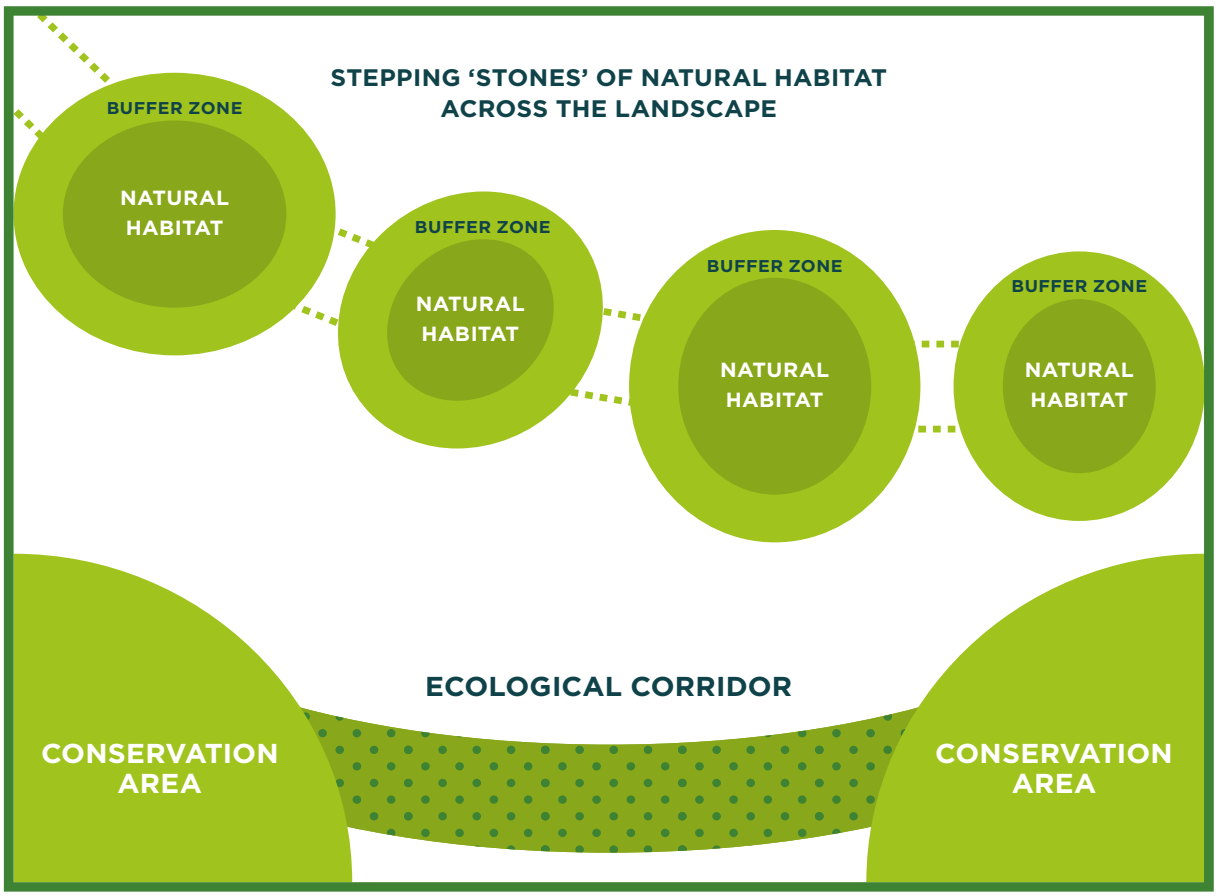

Figure 2: Examples of ecological connectivity: An ecological corridor and 'stepping stones' of natural habitat across the landscape

water. We benefit indirectly from insects that pollinate our crops, or from areas that provide grazing for livestock. Ecosystems can protect people from natural hazards; for example mangroves have been shown to protect coastal settlements from storm surges and floods.[15] In addition, people value natural landscapes or species for cultural reasons, such as for outdoor sport and recreation, nature-based tourism, and spiritual connections. Residents near or inside natural UNESCO World Heritage Sites depend on these sites for their homes, subsistence living, jobs, and ecosystems services, including climate regulation and flood prevention.[16]

2.2.5 Protecting areas of high importance for biodiversity conservation

The setting aside and management of protected areas is a core strategy for biodiversity conservation that contributes to achieving the targets of the CBD's Strategic Plan of Biodiversity (2011-2020) and the SDGs.

> *A protected area is a clearly defined geographical space, recognised, dedicated, and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.*[17]

IUCN has classified protected areas into different categories, according to their management objectives. These categories are recognised by international bodies such as the UN and by most national governments as the global standard for defining and recording protected areas (Box 1).

As well as the IUCN Protected Area Management Categories, there are international designations of areas worthy of protection, including but not limited to:

15 e.g. The Economics of Ecosystems and Biodiversity. http://www.teebweb.org/ e.g. Liberia country study.
16 WWF 2016.
17 Dudley, 2008

Box 1: IUCN Protected Area Management Categories

Ia. Strict nature reserve: Strictly protected areas set aside to protect biodiversity and also possibly geological/geomorphological features, where human visitation, use, and impacts are strictly controlled and limited to ensure protection of the conservation values.

Ib. Wilderness area: Usually large, unmodified, or slightly modified areas, retaining their natural character and influence without permanent or significant human habitation, which are protected and managed so as to preserve their natural condition.

II. National park: Large natural or near-natural areas set aside to protect large-scale ecological processes, along with the complement of species and ecosystems characteristic of the area. They also provide a foundation for environmentally and culturally compatible spiritual, scientific, educational, recreational, and visitor opportunities.

III. Natural monument or feature: Areas set aside to protect a specific natural monument, which can be a landform, sea mount, submarine cavern, geological feature, or even a living feature such as an ancient grove. They are generally quite small protected areas and often have high visitor value.

IV. Habitat/species management area: Areas designated to protect particular species or habitats and where management reflects this priority. Such protected areas will usually need regular, active interventions to address the requirements of particular species or to maintain habitats.

V. Protected landscape/seascape: Areas where the interaction of people and nature over time has produced a distinct character with significant ecological, biological, cultural, and scenic value. Safeguarding the integrity of this interaction is vital to protecting and sustaining the area and its associated nature conservation and other values.

VI. Protected area with sustainable use of natural resources: Areas that conserve ecosystems and habitats, together with associated cultural values and traditional natural resource management systems. They are generally large, with most of the area in a natural condition, where a proportion is under sustainable natural resource management and where low-level non-industrial use of natural resources compatible with nature conservation is seen as one of the main aims of the area.

- UNESCO Natural World Heritage Sites (WHS) that are recognised for their Outstanding Universal Value;
- Ramsar Wetlands of international importance;
- Natura 2000 – A network of sites established under the European Union; and
- Biosphere Reserves – a designation under the United Nations Educational, Scientific and Cultural Organization (UNESCO).

These designations may be in addition to the formal protected area status of an area (e.g. a national park may also be declared a WHS).

While some priority areas for biodiversity conservation have already been set aside for formal protection, others remain outside the protected area network. Key Biodiversity Areas (Box 2), for example, are sites that contribute significantly to the global persistence of biodiversity; many KBAs overlap wholly or partly with existing protected area boundaries, including sites designated under international conventions (e.g. Ramsar and World Heritage) and areas protected at national and local levels.

Furthermore, the CBD's Strategic Plan of Biodiversity (2011-2020) recognises that not only systems of protected areas but also 'Other Effective area-based Conservation Measures' (OECMs), can contribute to achieving the Aichi biodiversity targets (Box 3).

A country may have mechanisms to designate sites for local protection where they hold value for local people and organisations. Importantly, there may be high use or cultural values attached to local sites by surrounding communities and/or NGOs, although these sites may not have a protected area status. Local values, and the management objectives of

Box 2: Key Biodiversity Areas

Key Biodiversity Areas (KBAs) , sites that contribute significantly to the global persistence of biodiversity, are identified nationally using a Global Standard for the Identification of Key Biodiversity Areas which was adopted by IUCN in 2016, based on consistent application of global criteria with quantitative thresholds. These criteria encompass threatened biodiversity, geographically restricted biodiversity, ecological integrity, biological processes, and irreplaceability. They are applicable to species and ecosystems in terrestrial, inland water, and marine environments.

The KBA Partnership, comprising 12 international conservation partners, has prepared Guidelines on Business and KBAs, covering both project-level and corporate-level guidance (2018). These guidelines prioritise avoidance of impacts on KBAs and early implementation of impact minimisation measures, and highlight that there are limits to the success of restoration and use of offsets.

The business community can play a positive role in conserving KBAs, by supporting the World Database of Key Biodiversity Areas™, sharing biodiversity data collected during project planning and operations, and financing the conservation of KBAs through corporate social responsibility initiatives or offsets within KBAs for residual negative impacts on other project sites.

Box 3: Other Effective area-based Conservation Measures

An OECM[18] is an area that is not recognised as a formal protected area and does not necessarily have biodiversity conservation as an explicit management objective. It is governed and managed in ways that achieve conservation of its biodiversity, however, with associated ecosystem services values.

OECMs can be governed under a range of governance types, namely by governments, private individuals and organisations, indigenous peoples and/or local communities, or in combination (shared governance). They are expected to be managed in the long term.

Examples of potential OECMs include privately conserved areas, some Indigenous and Community Conserved Areas (Box 4), some KBAs, some permanently set aside forests, hunting reserves, and sacred natural sites with high biodiversity value.

the sites, are important to consider in any development proposals affecting such sites. Indigenous and Community Conserved Areas (Box 4) are an example of locally managed areas that benefit biodiversity conservation.

While countries are striving to meet targets under the CBD for areas of land and sea to be formally protected, simply meeting these targets may fail to meet biodiversity conservation goals for many reasons, including poor location of protected areas, inadequate management, and insufficient political and financial commitment to maintain the protected areas.[19]

To support the effective management of protected and conserved areas, IUCN has developed a Green List Programme and Standard (Box 5) for the optimum and equitable management of protected and conserved areas. This Standard could be used to inform the management requirements of conservation areas that may be set aside, for example, to compensate for the biodiversity loss caused by a new sports venue.

18 IUCN WCPA (2018).
19 e.g. Watson et al., 2016.

Box 4: Indigenous and Community Conserved Areas

The conservation of ecosystems and species by indigenous peoples and local communities is age-old. However, the idea that these areas may be equivalent to government-managed protected areas has only recently been recognised[20].

Indigenous and Community Conserved Areas (ICCAs) are natural and/or modified ecosystems containing significant biodiversity values, ecological services, and cultural values. They have three defining characteristics:

- a community that is closely connected to a well-defined ecosystem, species, or habitat, for cultural reasons or because of livelihood dependence or survival;
- the community's management decisions and efforts lead to conservation of biodiversity even when the objective of management (e.g. livelihood or water security, safeguarding spiritual places) may not relate directly to conservation; and
- the community is the major player in decision making and management in the area.

ICCAs are voluntarily conserved by indigenous peoples and local communities through customary laws or other effective means. In many cases, ICCAs are a way of life for communities, with a grounding in history and tradition. ICCAs can include ecosystems with minimum-to-substantial human influence by both sedentary and mobile communities. They can also include cases of continuation, revival, or modification of traditional practices or new initiatives taken up by communities in the face of new threats or opportunities.

Box 5: Green List of Protected and Conserved Areas: Programme and Sustainability Standard

The IUCN Green List of Protected and Conserved Areas Programme aims to encourage, achieve, and promote effective, equitable, and successful protected areas in all partner countries and jurisdictions. It aims to improve the contribution that equitably governed and effectively managed protected areas make to sustainable development, through nature conservation and provision of associated social, economic, cultural, and spiritual values.

At the heart of this Programme is the voluntary Green List Standard prepared by IUCN and the World Commission on Protected Areas (WCPA) in 2016. This Standard provides a global benchmark for effective management and governance quality that motivates improved performance and successful achievement of conservation objectives.

Its objective is to encourage protected and conserved areas to measure, improve, and maintain their performance through globally consistent criteria that benchmark good governance, sound design and planning, effective management, and successful conservation outcomes. The Standard includes 17 guiding criteria that describe successful conservation and equitable governance in protected and conserved areas.

20 https://www.iucn.org/sites/dev/files/import/downloads/parks_16_1_forweb.pdf

3

3. Sport and biodiversity

This chapter introduces the linkages between sport and biodiversity. After highlighting how biodiversity loss can have a negative impact on sports, the section goes on to define what type of impacts new sport venues and temporary facilities could have on biodiversity (from direct, to indirect and cumulative). It dives deeper to illustrate the range of impacts of the different categories of sports venues on biodiversity and ecosystem services. In these guidelines, sports venues are grouped into four main categories: outdoor sports taking place in the natural landscape; outdoor sports taking place in purposely modified landscapes; urban sports parks; and sports buildings.

3.1 Why is biodiversity important to sport?

The health of ecosystems in which new sports venues are located can affect the quality of sporting events, and loss of nature can diminish the attraction of the sporting experience.

Some of the starkest examples of the effects of nature on sport are of levels of water pollution so severe that they can render it unsafe for the sport to take place. The World Rowing Federation, FISA, which boasts 151 national rowing federations, is committed to working with its national federations to help achieve clean water in line with the UN's SDGs. The President of FISA noted that rowers support the campaign for clean water, because they recognise that training and competing in dirty water is 'not fun', and polluted water resources are 'a matter of life and death'.[21]

The most significant phenomenon that is increasingly impacting on sport is climate change. A recent study in the UK[22] has shown that the number of days lost to bad weather and flooding (making the venues unable to be used) across several popular sports (football, cricket, skiing, and golf), has increased significantly in the last two decades. This situation is causing severe financial impact through lost revenue, higher maintenance costs, and disenchantment of the fan base, especially at grassroots levels.

A lack of natural snow is impacting the ski industry as a whole. Rising sea-levels are increasing coastal erosion to the extent that some traditional golf courses are losing land. Severe and continued drought is making it difficult to maintain good-quality playing surfaces for turf-based sports, despite advances in agronomy and use of grey water and other water-saving solutions. In India, a court order in 2016 forced Indian Premier League cricket matches to be moved due to drought conditions and restrictions on water use in the state of Maharashtra. The decision meant that 13 matches scheduled to be held in the cities of Mumbai, Pune, and Nagpur had to be moved.[23]

Ecosystems play an important role in regulating global climate patterns (i.e. 24% of anthropogenic greenhouse gas emissions globally come from the conversion of land for agriculture, forestry and other land uses[24]), so there is a strong link between damage to ecosystems and increasingly erratic weather patterns. There are implications for the development of sports venues in terms of choosing their location, designing drainage and irrigation systems, selecting turfgrass, considering the thermal properties of buildings, landscaping, and so on. All of these decisions imply costs and constraints that need to be assessed in the early stages of a project.

Not only can measures to conserve biodiversity prevent or reduce some of the impacts on sport mentioned above, but conservation of biodiversity can also enhance sporting interest and tourism potential, increasing the success of sports venues. Sport tourism is one of the fastest growing market

21 http://www.worldrowing.com/news/world-rowing-commits-unesco-world-heritage-sites.
22 "Game Changer: how climate change is impacting sports in the UK": https://static1.squarespace.com/static/58b40fe1be65940cc4889d33/t/5a79bac853450a7495861454/1517927115822/Game+Changer.pdf.
23 http://sport360.com/article/cricket/ipl/174819/court-orders-ipl-to-move-matches-due-to-maharashtra-drought.
24 https://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_chapter11.pdf

segments in the tourism industry, and sports venues are receiving increased attention about their environmental impacts. Efforts to conserve biodiversity can provide strong positive publicity to promote sporting industries as a whole.

The drive for sustainable development and conservation is increasingly shared by governments, the private sector, and NGOs - and conservation interventions in sport are often rewarded by interest in public-private partnerships, support from sponsors, and good media coverage. Sporting events can raise awareness of the links between people and nature, and increase participation in working towards sustainability and biodiversity conservation for local to global benefit. In addition, a commitment to leaving a positive biodiversity legacy in the area affected by a new sports venue can be attractive to local communities who would welcome an improvement in the quality of their natural environment.

3.2 Impacts of new sports venues and temporary facilities on biodiversity

New sports venues – including their associated supporting facilities, infrastructure, and services – and temporary facilities can potentially have a range of both positive and negative impacts on biodiversity.

The potential negative impacts on biodiversity from new sports venues can arise either directly through conversion of critical or natural habitat, or indirectly through pollution and the disturbance of wildlife. In general, however, the greatest impact on biodiversity and ecosystem services is linked to the siting of a new sports venue. Wherever a new sports venue is built, significant overlay[25] is required, or the refurbishment of an existing venue is undertaken, it is likely that biodiversity will be affected by that development. The importance of that biodiversity and the significance of impacts on biodiversity – both negative and positive – will vary enormously from sport to sport and location to location. In recognition of potential adverse impacts, a number of sports (e.g. golf, sailing, and mountain bicycling) have developed guidelines on good practice (Section 7.1.3).

The area affected either directly or indirectly by the venue itself, as well as the area affected by supporting facilities and infrastructure, together constitute the 'area of influence' of the new sports venue[26]. On the positive side, these venues can help to raise awareness of conservation issues and human dependence on nature. They can also contribute materially by protecting areas known to be important for biodiversity, increasing natural habitats for plants and animals, helping to restore degraded areas, supporting local efforts to conserve biodiversity, and encouraging the involvement of local communities in conservation activities. Where sports venues are carefully designed, impacts on biodiversity can be avoided and an overall gain of biodiversity can be achieved. Conversely, poorly planned and located venues can cause significant biodiversity harm.

3.2.1 Direct impacts

Generally speaking, the direct or 'footprint' impacts on biodiversity are likely to be lowest in modified habitats, higher in natural habitats, and greatest in critical habitats and protected areas (Section 2.2). Venues in modified urban and degraded areas are likely to present the greatest opportunities to make a positive contribution to conservation.

Direct impacts of new sports venues may include obvious changes such as physical alteration to habitats, loss of trees and other vegetation, and increased disturbance to wild animals from people and traffic, affecting their breeding or feeding patterns and general chances of survival.

Impacts on natural drainage systems, changes to soil conditions, fragmentation of habitats, and noise or light pollution may be less obvious effects, but can be equally detrimental to biodiversity. The artificial lighting, noise, or vibrations that may be associated

25 'Overlay' refers to temporary elements that are added to more permanent buildings to enable the operation of sporting events and provide additional facilities for the event's duration.
26 IFC Performance Standard 1. 2012.

Box 6: Invasive alien species in sport

Non-native species can be brought into an area deliberately, for use in landscaping or planting, or they may be introduced incidentally on construction equipment or when building materials are transported from outside the area to the site of the new sports venue. Invasive non-native species may also be brought into a sports venue accidentally as 'hitchhikers' by visiting athletes and their sporting equipment (e.g. on golf clubs, bicycles, or watercraft).

Invasive alien species, both plant and animal, are a major driver of biodiversity loss. As well as contributing to the extinction of species, they can cause changes in ecosystem functioning, leading to adverse effects on priority ecosystem services[27] – including sports and recreation. It is thus essential to guard against the introduction of invasive alien species through careful selection of landscaping and planting materials, the use of sterile construction materials and equipment, and rigorous biosecurity controls to minimise the risk of their accidental import by participants in sporting activities.

An example of the effects of introducing an invasive alien plant species[28] is provided by the impact on 'box' (*Buxus colchica*), an evergreen shrub or small tree native to the Caucasus region of Azerbaijan, Georgia, Russia, and Turkey. The species has been affected by habitat loss and is listed as Near Threatened on the IUCN Red List of Threatened Species™. When the Olympic Village was constructed for the 2014 Sochi Winter Olympic and Paralympic Games in southern Russia, the landscaping materials inadvertently carried the box pyralid moth (*Cydalima perspectalis*), a serious pest of *Buxus colchica*. Subsequently, the moth was found to have spread to the natural yew and box groves of the Sochi National Park.

As a result of the infestation, the ecological condition of the natural forest declined, resulting in it being less attractive for visitors, which could impact the ecotourism value of the area. Furthermore, there is a serious threat of dispersal of the pyralid moth beyond the forest landscapes of Sochi National Park. The moth has been recorded within 1 km from the borders of the main territory of the Caucasian State Nature Biosphere Reserve, a UNESCO World Heritage Site. In 2015, the Ministry of Natural Resources of the Russian Federation introduced a programme for the elimination of the pyralid moth through a biological control method using the Chinese eulofid, a parasitic wasp.

This is a stark example of how a lack of biosecurity measures can lead to significant ecological impacts on native flora and fauna, and have economic consequences. A biosecurity plan should be developed ahead of any new venue development, identifying measures to address all the potential pathways for invasive alien species.

with these venues and sporting events can disorientate animals or discourage them from staying in the area. Aside from the physical 'footprint' of a new sports venue, features associated with a sports venue, such as security fences, roads, and parking lots, can create barriers to the movement of wild animals to important breeding, watering, or feeding sites; overhead cables can present a collision or electrocution hazard to certain bird species; and the introduction of invasive and alien species and diseases can harm or oust native plants and animals (Box 6).

Changes to natural and modified habitats that are highly valued by local communities can also have negative effects on the ecosystem services and benefits they provide (e.g. water quality and availability, access to forest products and local farmland), and thus on local livelihoods and well-being.

3.2.2 Indirect impacts

Sport can also have indirect impacts on ecosystems and species, where the effects are felt some distance away or later in time.

For example, improved access to previously remote areas where new sports venues are located could result in an increase in negative impacts, as the new access to pristine area could support access by other users and lead to poaching and harvesting of natural resources or the conversion of natural habitat for agriculture. Conversely, in areas where game hunting is rife, sports venues could support

27 https://www.iucn.org/theme/species/our-work/invasive-species
28 Sochi 2014 Olympic Games Impact Study, post-Games Report, 2013. Moscow State University (unpublished).

biodiversity by providing refuge areas in the landscape for wildlife.

New water supplies to a sports venue (e.g. for drinking water, bathroom facilities, or snow-making) can affect relatively remote freshwater ecosystems from which water is taken (e.g. change in freshwater biota due to reduced water volume), and pollution arising from the venue can have downstream health impacts on fauna drinking that water.

3.2.3 Cumulative impacts

The effects of new sports venues and sporting activities, combined with the impacts of other developments in the same area, are described as cumulative impacts. They can either magnify the overall harm to affected ecosystems and species or, where all parties strive to restore or enhance habitat for biodiversity, they can achieve significant positive outcomes. The combined effect of negative impacts on biodiversity can harm other sectors, such as nature-based tourism, that rely on the diversity and health of ecosystems and species.

It is relatively rare for a new sports venue to be a stand-alone development. In many cases additional facilities and infrastructure are developed in response to a perceived market opportunity, which are seen to complement the venue (e.g. commercial outlets). In some cases, the impacts from the development of these additional facilities can be more harmful to biodiversity than development of the sports venue itself.

The development of a new sports venue and associated infrastructure can also be part of a much bigger development plan, such as an urban regeneration scheme, tourism resort, or planning for a sports mega-event. In these situations, the cumulative impacts on biodiversity and ecosystem services are going to be much greater than the impacts of the sports venue alone.

For all the above reasons, it is essential to address the combined impacts of new sports venues and their associated infrastructure and facilities in the planning stages and to assess the potential impacts of the whole project, not just the impacts of the sports venue itself.

3.3 Categories of sports venues and their potential impacts

Different categories of sports venues in different environments can have a range of impacts on biodiversity and ecosystem services. In these guidelines, the various types of sports venues are grouped into four main categories:

- outdoor sports taking place in the natural landscape;
- outdoor sports taking place in purposely modified landscapes;
- urban sports parks; and
- sports buildings.

The following sections provide examples of the typical impacts on biodiversity of each of these categories. These examples are not intended to be comprehensive, but rather to give an indication of commonly encountered impacts.

3.3.1 Outdoor sports in the natural landscape

This category of sport takes place on sites that are largely unmodified and often in a natural state. There is little, if any, permanent infrastructure associated with these venues (e.g. sailing, cross-country running). Because they may rely to a great extent on features of the natural landscape, sporting activities and the use of temporary infrastructure in these areas can harm natural or critical habitat for biodiversity.

Sports that take place without the need to install permanent infrastructure or the need to modify the terrain tend to have relatively minor, temporary impacts on biodiversity. Potential negative impacts include wildlife disturbance, soil erosion, and the trampling of – or other damage to – vegetation. In some instances, for broadcast events, broadcasters have asked for trees or other vegetation to be cut back, and occasionally even removed, in order to obtain clearer shots of the sporting action.

Marathons or cross-country trails through natural habitat can create a corridor of impact that is wider than the trail itself, due to edge effects (Figure 3). Apart from the direct impacts of the trail, spectators can spill over into adjacent areas, causing some damage. In addition, animals some distance from a trail can react negatively to human activity,[29] moving away from the source of disturbance. The consequence of these edge effects is that the area of habitat available to wildlife shrinks.

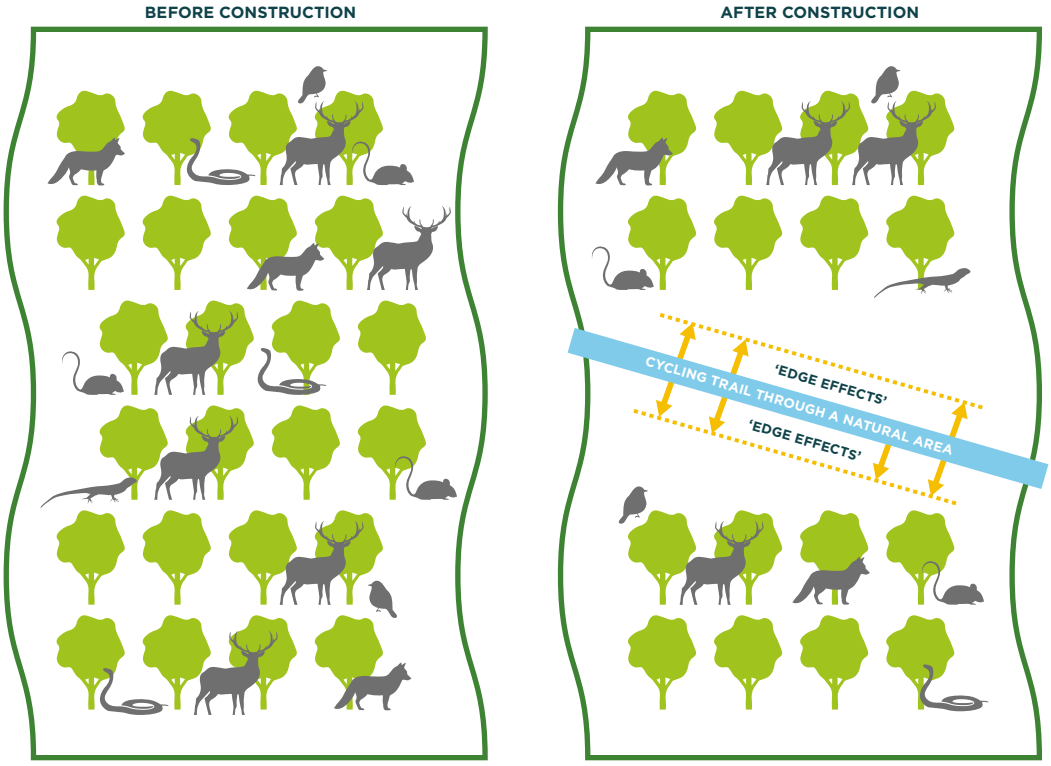

Figure 3: Edge effects

A subset of this category is water sports, in either freshwater, estuarine, or marine environments. The main impact of a sports venue in a river, lake, or sea is likely to be disturbance to wild animals living in or next to those ecosystems. Sailing and quiet water sports like rowing and canoeing present minimal impacts, although there can be risks (e.g. to marine mammals and birds) from flotillas of support boats at large sailing events. Shore-based infrastructure, from simple slipways and moorings to facilities for temporary sports venues or to accommodate spectators, can have greater ecological impact, with risks of fuel or oil spillages and leaks, damage to shorelines, uncontrolled waste disposal, and pollution from anti-fouling agents and other toxic materials.

Aquatic environments and their associated biodiversity can be sensitive to disturbance and pollution. For example, wetlands and saltmarshes, and the riparian areas next to rivers, provide important nesting and feeding areas for birds, and estuaries and reefs are known as nursery areas for fish breeding. Marine animals (e.g. whales, turtles) may be vulnerable to boat collisions. Powerboat sports are especially problematic in ecologically sensitive wetlands and coastal environments, because of noise, risk of leaks and spillages of fuel and lubricants, an increase in plastic waste entering the water (which, if ingested, may result in death of wild animals), and pollution from exhaust fumes.

Biosecurity is a concern where boats are moved from one water body to another, potentially resulting in the introduction of alien invasive or pest species.

3.3.2 Outdoor sports taking place in purposely modified landscapes

In this category, the landscape has been modified to create the desired layout for the field of play, for example, golf courses, ski slopes and trails, equestrian venues, canoe slalom, and all the playing-field

29 https://daily.jstor.org/outdoor-recreation-impacts-wildlife/

sports such as football, hockey, polo, cricket, and rugby.

Outdoor sports venues in purposely modified landscapes can still support considerable biodiversity. The variety of vegetation types and structures, from closely mown turfgrass to areas of long grass, scrub, trees, and ponds and other wetlands, can be attractive to a wide variety of species. In many cases, unused or less-managed areas of the property can be set aside as patches of wildlife habitat for nature conservation.

The development of new sports venues on unmodified natural sites can lead to significant impacts on biodiversity and ecosystems, due to the size of land-take and modification of the existing landscape. A golf course is one of the commonest examples of a sports venue that needs careful attention to ecological aspects if it is to avoid loss and fragmentation of wildlife habitats, alteration or damage to wetlands, and the replacement of natural plant communities with intensively managed turfgrass and non-native plants.

Turf-based sports facilities typically use pesticides, herbicides, and fertilizers, which can result in pollution of surface water and groundwater or harm non-target wildlife.[30] The use of large volumes of water for irrigation can seriously degrade freshwater ecosystems. Large tourist resorts with multiple golf courses situated in arid environments can place severe strain on natural water resources, to the extent of depleting aquifers and leading to saline water intrusion.

The development of winter sports venues such as ski resorts also presents major ecological challenges. Removal of trees and shrubs to create ski slopes and trails can lead to soil erosion and fragmentation and loss of natural habitat. The species richness and abundance of fauna in areas affected by winter sports has been found to be lower than in undisturbed areas.[31] For example, in the Swiss Alps, populations of Black Grouse dropped by 36% in the vicinity of a ski-lift site, probably due to a combination of habitat destruction, increased presence of scavenging birds attracted to ski huts, higher stress levels from disturbance, and deaths from collisions with ski cables.[32] Populations of grouse in Scottish ski areas similarly declined due to collisions with ski-lift cables and other wires, and from losing nests to scavenging crows, which became common at skiing venues.[33] Ski slopes that are machine-graded[34] can cause serious and often long-term changes to vegetation and soil structure.

The need for winter sports to use artificial snow, transport snow from other areas due to a shortage of natural snow, or store snow in order to host a winter event, has a range of implications for ecosystems. Artificial snow can have serious impacts, as it weighs up to five times as much as natural snow and requires considerable water to produce, possibly having negative impacts on the ecosystems that the water is sourced from. Imported snow can change the composition of local vegetation, particularly in arid areas, and the added nutrients from the use of wastewater to manufacture artificial snow is likely to affect local ecosystems well beyond the immediate footprint of the sports venue.

3.3.3 Urban sports parks

This category applies to situations where a group of sports venues has been constructed within a defined area. Typically, these venues are part of urban regeneration schemes and may be associated with hosting a mega-event. While sport can be a major driver for the development, it is also intended to provide multiple amenities and public uses. Setting aside areas for ecological management to support nature conservation can form part of these public uses.

As urban sports parks tend to be large sites connected to or surrounded by green space, they can present a major opportunity to create and improve habitats for wildlife and make a significant contribution to supporting biodiversity in cities. Biodiversity in cities is important for human well-being. While there may be few, if any, truly natural ecosystems in urban areas, the presence and variety of green spaces in cities provide people with opportunities for recreation, contact with nature, and respite from city living, contributing to improved quality of life, health, and well-being of local communities (Box 7).

30 https://www.audubоninternational.org/resources/Documents/Fact%20Sheets/Golf%20and%20Environment/G_E%20-%20Golf%20and%20the%20Environment.pdf
31 Roux-Fouillet et al., 2011.
32 http://www.cabi.org/environmentalimpact/news/18918
33 https://www.thoughtco.com/ski-resorts-and-the-environment-1203969
34 Machine grading removes rocks, natural vegetation, and organic topsoil, leaving an impoverished soil cover with low water-holding capacity, where recovery of natural vegetation cover is slow and difficult.

Box 7: Examples of biodiversity initiatives in urban sports parks

Promoting biodiversity in London's Olympic Park, London, United Kingdom[36]
The development of the main site for the London 2012 Olympic and Paralympic Games was designed to support the strategic regeneration of a key part of east London and to improve the ecological integrity of the lower stretches of the Lea Valley, a river corridor flowing through east London to the Thames River. Biodiversity conservation was a key aim for the new parklands established around the Games venues.

Large complexes of sport venues for mega-events are usually characterised by vast open areas of hard landscaping, with a relatively small amount of softening greenery installed just before the event. The London Olympic Park project took a different approach by creating a natural feel with large expanses of predominantly native plant species structured over sculpted earth forms and varied topography. The restored corridor of the River Lea, with a large wetland bowl incorporating wet woodlands and reedbeds, was a striking feature.

Importantly, much of the soft landscaping was planted more than two years before the Games, so that the vegetation would have a more established appearance by the start of the Games. Although annual wildflower mixes were used to create a spectacular effect for the Games, the core planting was based on native perennials. The landscaping and planting contributed to the special atmosphere of the Games setting, and has been the basis for the ecological enhancement of the site in the post-Games legacy phase.

Green Point Stadium, Cape Town – Biodiversity Showcase Garden[36]
Green Point urban park was one of the legacy projects of the FIFA World Cup 2010 in South Africa. Situated around the new Cape Town Stadium, the park offers a wide range of recreation activities, including learning, heritage exhibitions, craft markets, and various sports, arts, music, and milestone events. Within this area is a 12.5-hectare Biodiversity Garden for native Cape flora. This major tourist attraction is a specialist showcase garden that displays the biodiversity of the Western Cape's sensitive Fynbos Floral Kingdom and the history of the region's original inhabitants. The garden is separated into People and Plants, Wetlands, and Discovering Biodiversity sections.

New Nagyerdo Football Stadium, Debrecen, Hungary[37]
Nagyerdo is an old, but largely neglected, forest in the heart of Debrecen, the second biggest city in Hungary. As part of a complex development, the city supported a large-scale renovation of Nagyerdo, including replacing the original football stadium that was built in the 1930s. The aim was to preserve the key species in Nagyerdo and at the same time to draw the area into the city's circulation as a city park, providing a new, liveable, green environment. To encourage healthier life, the city authorities decided to create a new eco-friendly 20,000-capacity stadium and other sport and recreational facilities in the forest.

The project was completed in 2014, with the parkland and forest setting, including protected oak trees, integral to the visitor experience. The stadium notably features a transitional promenade that leads guests from the forest and park area into a man-made world, where they can access the stadium, as well as bars, restaurants, exhibition areas, and fitness and wellness facilities. One particularly intriguing feature allows visitors in the stadium's guest boxes to experience a view that not only opens up on to the football pitch, but also on to the enclosing forest and park space around the site.

StubHub Centre, Los Angeles, USA[38]
The StubHub Centre is a large multi-sports complex situated in one of Los Angeles's poorer neighbourhoods. It will be a major cluster of venues for the 2028 Olympic Games. The site's owners and managers are strong advocates for sustainability, with a focus on saving energy and water, recycling, purchasing environmentally preferable products, and helping raise awareness of environmental issues. Through a range of planting and set-aside areas, the site is attractive to a variety of wildlife. Of particular note, the site includes an LA Galaxy Greenhouse, a chicken coop, and a bee farm to provide local produce that can be used for on-site catering.

35 http://learninglegacy.independent.gov.uk/documents/pdfs/design-and-engineering-innovation/425009-165-promoting-biodiversity-aw.pdf
36 http://www.capetown.gov.za/capetownstadium/green-point-park
37 http://www.sportvenueconstruction.com/headline/hungarys-debrecen-welcomes-eco-friendly-football-stadium/
38 http://www.stubhubcenter.com/stadium-info/environmental-sustainability

There are particular opportunities in this respect when urban sports parks are developed in poorer neighbourhoods (which typically have less green space per capita than wealthier neighbourhoods), and/or on degraded and contaminated brownfield sites. Urban regeneration schemes are inevitably expensive undertakings, so a major sports facility with associated commercial development can be a significant driver for re-development. If, at the same time, sufficient attention is given to ecological landscaping and 'soft' amenities (walking and cycling paths, playgrounds, and formal gardens), there can be important opportunities for biodiversity gains. Selecting a degraded area within the urban fabric to develop a new sports complex can maximise the potential to leave a lasting positive legacy for both biodiversity and local communities.

Urban sports parks can present ideal situations for creating natural drainage features such as flood alleviation areas, to serve as amenity open spaces and wildlife habitat whilst also contributing to sustainable drainage systems in the wider urban landscape.

Provided that urban sports parks are not sited in critical habitat or a protected area, and do not harm threatened species, their overall ecological impact can be neutral or positive. However, there may be situations where the natural habitat on a site earmarked for development may be highly valued by surrounding communities or local NGOs as their 'nature patch'. In these cases, planners and developers need to show sensitivity to local concerns and engage thoroughly with all affected stakeholders.

Although many species of wildlife in urban areas tolerate disturbance, high levels of human activity will inevitably have some adverse impacts. Stadium floodlights may alter patterns of activity and feeding behaviour of a wide range of animals; insects, bats, and some bird species are particularly affected by artificial lights at outdoor stadiums. Generally, however, these venues are built on sites characterised by modified habitats and operate in an environment of existing noise, disturbance, traffic, and artificial lighting, making the incremental impact on biodiversity likely to be small.

3.3.4 Sports buildings

This category deals with buildings, arenas, and stadiums dedicated for sports. As with urban sports parks, these structures are likely to have minimal impact on biodiversity, as they are generally developed in modified habitats.

For sports practised indoors, biodiversity might seem to be an irrelevant consideration. This is not the case, however. There is an increasing trend to incorporate green elements in the design and construction or refurbishment of these buildings, including renewable energy systems, water-saving devices, low-carbon and energy-efficient materials, and vegetated green walls and roofs.

Even where there is limited space for landscaping around a new venue, there are opportunities to integrate vegetation and other features for biodiversity into the built structures: green walls and green roofs can help to regulate temperature and provide habitat for some animals and birds. Bird-friendly building designs have been developed in recognition of the risks to birds from certain types of glass and lighting.[39] Biodiversity can be encouraged through the provision of nest boxes for birds and bats, or by using specially designed bricks within the structure of the building itself. Roof-top beehives are becoming a feature in some urban areas and could easily be incorporated into sports buildings.

The additional impact of developing sports venues, with an increase in hard-surface runoff, can have a negative effect on downstream flood control and wetland ecosystems. Well-designed venues (Box 8), incorporating Sustainable Urban Drainage Systems (SUDS), permeable pavements, and other runoff mitigation measures such as the use of vegetated swales, can be important features of a wider flood-mitigation strategy and better for biodiversity.

The development of a new sports building on a degraded site would present considerable opportunities to improve on local biodiversity and benefit local communities' quality of life.

39 Sheppard, 2011.

Box 8: Example of a green sports building

Oval Cricket Ground London – living screen[40]

In 2005, the Oval Cricket Ground in London underwent a re-development project to increase seating capacity. Planning requirements included measures to improve benefits for the local community. One of the key features was the installation of a 'living screen', a vertical wall of vegetation to boost the aesthetics of the venue for local residents and workers.

The site had very limited ground-level planting space, so the solution was to use large elevated planting troughs to create a visually appealing cladding to the new stand that supports the growth of vegetation.

As people enter the ground, they pass underneath the 200m-long, 20m-high screen of climbing plants, where hundreds of clematis, honeysuckle, wisteria, and ivies are growing up stainless-steel wires. The screen creates a continuous and extensive green backdrop to the plaza, and offers pleasant views from neighbouring residential properties. It also prevents certain viewpoints in the pavilion from overlooking residential properties.

The trend of growing plants on buildings to form green cladding is becoming more widespread and is a good way to introduce vegetation in densely urbanised areas. This is an option new sports venues should consider. The advantages include improved visual appeal, noise dampening, better air quality, and potentially some biodiversity gains, depending on the types of plants used. Other architectural devices such as special bricks that provide nesting or roosting sites for birds and/or bats can also be incorporated.

40 http://weddles.co.uk/portfolio/oval/

4

4. Using the mitigation hierarchy to manage biodiversity impacts

This chapter introduces the mitigation hierarchy as the recommended framework to manage biodiversity impacts. It sets out what are the various biodiversity targets that can lead the development of new sport venues and temporary facilities, from no impact to net biodiversity gain; it then goes on the describe each of the steps in the mitigation hierarchy: mitigation hierarchy of avoidance, minimisation, restoration, and offsetting.

4.1 The mitigation hierarchy

The mitigation hierarchy of avoidance, minimisation, restoration, and offsetting provides an effective way to manage impacts on biodiversity. Preventive mitigation measures (avoidance and minimisation) are always preferable to corrective measures (restoration and offsets).

The mitigation hierarchy (Figure 4) is the main tool used in planning and Environmental Impact Assessment (EIA) to achieve desired biodiversity outcomes, with the goal of achieving no loss, no net loss, or net gain of biodiversity. By applying this hierarchy, negative effects of development on biodiversity can be fully mitigated to achieve no residual negative impact at a minimum (i.e. no adverse effect after measures to avoid and minimise impacts, and then restore or repair remaining damage, have been taken), and preferably an overall benefit for biodiversity. The mitigation hierarchy enables the approach to biodiversity issues to be scaled according to the characteristics of the site or area in question and prompts ongoing consideration of lower-impact alternatives in the planning and design of a new sports venue.

Avoidance of negative impacts is the most important step in the mitigation hierarchy,[41] followed by impact minimisation. Where biodiversity is of very high importance to conservation, highly threatened, or considered to be irreplaceable, project avoidance is the only mitigation option.

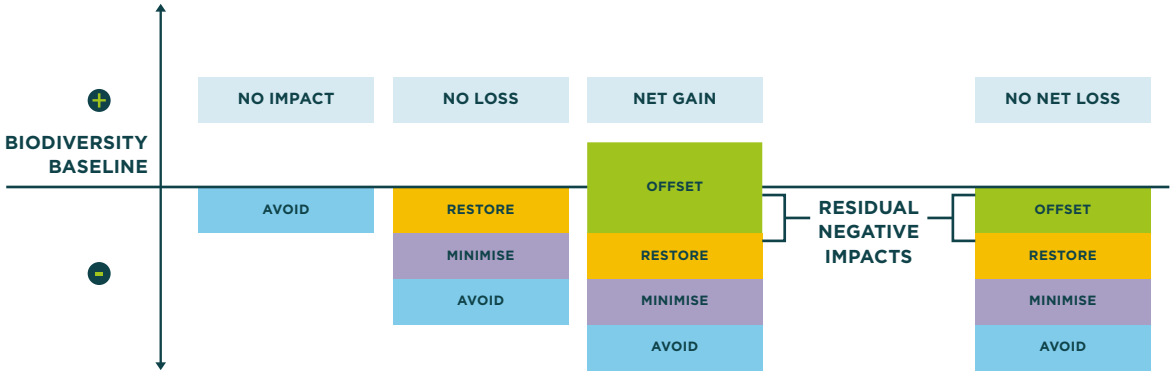

Figure 4: The mitigation hierarchy and the different targets

After measures to avoid and minimise impacts have been exhausted, mitigation involves restoring damaged or disturbed areas. As a last resort, offsets are used where needed to compensate fully for significant residual impacts that remain after restoration efforts, in order to achieve no net loss and preferably a net gain of biodiversity. Additional conservation actions to enhance biodiversity could also help to ensure a lasting positive legacy (Figure 4).

41 IUCN, 2016b.

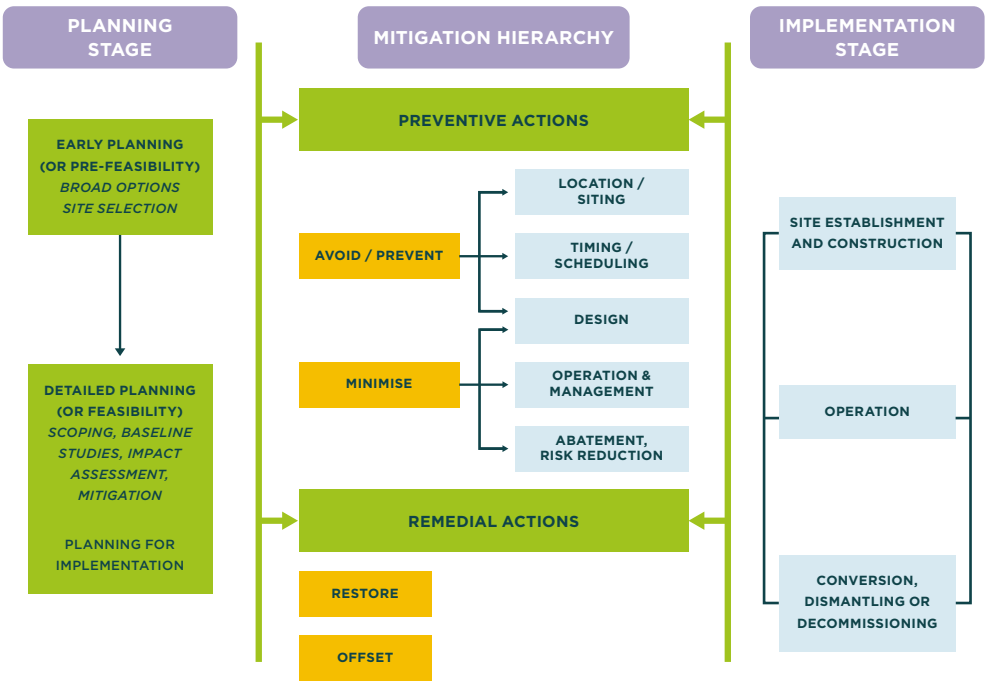

Figure 5: Applying the mitigation hierarchy during planning and implementation

Using the mitigation hierarchy means systematically considering different mitigation options and project alternatives during the planning and implementation stages of the project cycle for a new sports venue (Figure 5).

Measures to mitigate negative impacts are likely to be considerably more onerous for sports venues in natural and critical habitats (Table 1) than for venues in modified habitat or in degraded areas, making it more difficult to achieve no loss, no net loss, or net gain of biodiversity. Conversely, opportunities to gain or improve biodiversity are likely to be greatest in modified urban and rural ecosystems, and particularly in degraded areas (Figure 6).

The checklists for the early planning stage and site selection (Section 6.1), as well as for detailed planning (Section 6.2) provide useful prompts for consideration in implementing the mitigation hierarchy to achieve the desired biodiversity outcomes.

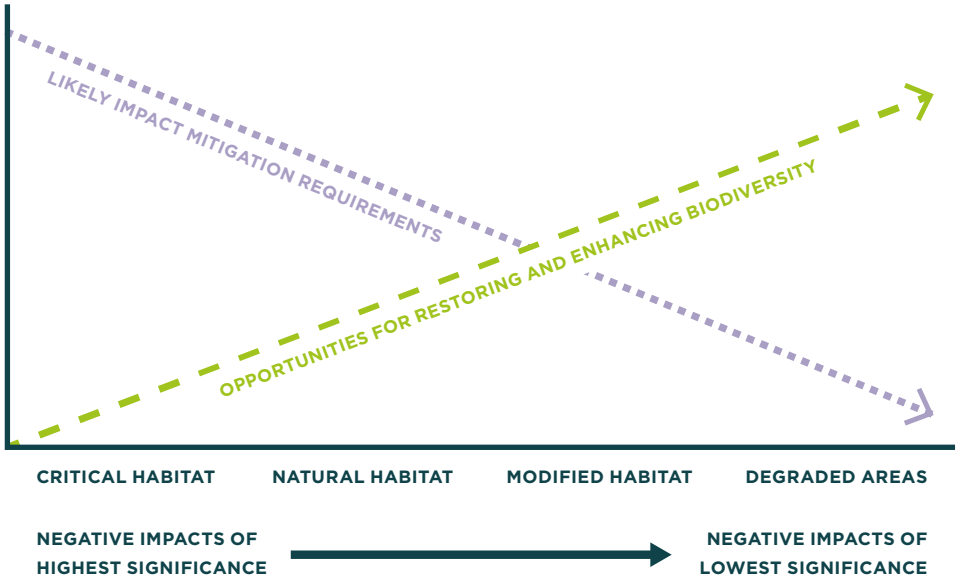

Figure 6: Broad implications for developing a new sports venue in different areas

4.2 Implementing the mitigation hierarchy

Step 1 in the mitigation hierarchy: avoiding negative impacts

Avoidance requires that measures are taken to anticipate and prevent adverse impacts on biodiversity before any actions are taken or decisions made that could result in these impacts.[42] The greater the potential significance of negative impacts on biodiversity and ecosystem services, the greater the need to avoid them.

Avoiding impacts on biodiversity of high importance for conservation and the provision of ecosystem services (Box 9) is thus of paramount importance when evaluating potential sites for new sports venues. New venues or expansion of existing venues should not jeopardise the conservation status or biodiversity values of any existing natural protected area, areas recognised as providing habitat for important or threatened species, or priority areas for conservation.[43]

In some situations, where ecosystems or species are highly threatened, unique, or have very restricted distributions, it is not possible to ensure their full recovery after harm. In these cases, only avoidance of impacts would be permitted.

A number of IUCN Resolutions and Recommendations emphasise the importance of avoidance:[44]

- Resolution 054 of 2004,[45] which calls for the integrity of designated protected areas and other areas of recognised natural or cultural importance to be respected when selecting the location for sporting events;

- Resolution 059 of 2016,[46] which notes explicitly that the mitigation hierarchy must identify and respect nationally and internationally recognised no-go areas and give priority to avoiding damage; and

- Recommendation 102 of 2016,[47] calling for all IUCN categories of protected areas and other areas important for biodiversity to be recognised as no-go areas for environmentally-damaging industrial activities by governments and businesses alike, and for avoidance of impacts on ICCAs to be prioritised.

In addition, the 2014 World Heritage Committee Decision (WHC14-Com 38) requests that all World Heritage properties are managed in such a manner that their Outstanding Universal Value is not placed at risk. According to IUCN's Advice Note (2013), an EIA for a project that could affect a natural WHS must ensure that the likely impacts on the Outstanding Universal Value of the site are fully considered in decision making, with the objective of preserving these exceptional places for future generations. Proposals that are not compatible with this objective should not be permitted within or around the boundaries of these sites, and alternative sites should be sought.

The early identification of impacts on ecosystem services on which there is high dependency, and the likelihood of obtaining free, prior and informed consent from local indigenous communities (Box 4), will inform the need to avoid impacts. Avoidance can be essential when there are no suitable substitutes for the affected ecosystem services, and/or no form of compensation is likely to be acceptable to affected communities.

Adverse impacts on protected areas, areas internationally recognised as being important for biodiversity conservation, and critical habitats can seldom be effectively mitigated and would make the ongoing global loss of biodiversity worse. For this reason, residual negative impacts on these areas should be avoided, as should development in other areas where impacts on biodiversity are likely to be of very high significance and where achieving a no net loss or net gain of biodiversity outcome is improbable. In essence, many of these areas are regarded as no-go areas (Box 10).

42 Cross-sector Biodiversity Initiative, 2015.
43 IUCN, 2004.
44 Resolutions and Recommendations are adopted by IUCN Members during the World Conservation Congress, which is convened every four years under the auspices of the IUCN.
45 On threats from Olympic Games and other major sporting events to protected areas and biodiversity.
46 IUCN Policy on Biodiversity Offsets (IUCN 2016b).
47 On protected areas and other areas important for biodiversity in relation to environmentally damaging industrial activities and infrastructure development (IUCN 2016a).

Box 9: Areas of high importance for biodiversity conservation

a) Internationally recognised areas of global significance for biodiversity, such as UNESCO World Heritage Sites, Ramsar wetlands, core areas of UNESCO Man and the Biosphere Reserves, and Key Biodiversity Areas (Box 2).
b) Existing protected areas, such as national parks and nature reserves, as well as areas that have been formally proposed by governments to be set aside as protected areas for nature conservation.
c) Areas that would qualify as Critical Habitat using the criteria set out in the International Finance Corporation standards and World Bank safeguards, including:
   → ecosystems that are highly threatened or unique;
   → habitat of significant importance for endemic or restricted range species, and/or globally highly threatened species (e.g. Critically Endangered or Endangered. See Figure 1 for an explanation of categories of threatened species);
   → habitat supporting globally significant concentrations of migratory or congregatory species; and
   → important wildlife corridors and areas associated with important ecological and evolutionary processes across landscapes (e.g. river corridors, indigenous vegetation corridors across altitudinal or climate gradients).
d) Areas conserved through Other Effective area-based Conservation Measures (OECM) (Box 3).
e) Indigenous and Community Conserved Areas (ICCAs) (Box 4).
f) Habitat for protected and highly threatened species in terms of national legislation.
g) Critical ecosystem services areas for the wider public good, e.g. critical catchment areas for water provision, and key areas for controlling erosion (e.g. coastal mangroves).
h) Areas and/or species that have high social or cultural importance to local communities and on which they may depend for livelihoods, health, or safety, and for which there are few if any acceptable substitutes.

Box 10: No-go areas

IUCN WCC Recommendation 102 of 2016[48] addresses no-go areas, calling on governments, decision makers, financial institutions, and the business community to prohibit or prevent environmentally damaging industrial activities and infrastructure development in, around, or negatively affecting all IUCN categories of protected area and areas of particular importance for biodiversity and ecosystem services, and to ensure that all activities are compatible with the conservation objectives of these areas. It also calls on governments not to downgrade, de-gazette, or alter boundaries of all categories of protected areas to facilitate damaging infrastructure development, or permit development that may have negative impacts on protected areas or on any areas of particular importance for biodiversity and ecosystem services that are identified by governments as essential to achieving the Aichi Biodiversity Targets.[49]

This Recommendation also urges avoidance of environmentally-damaging development that impacts on sacred natural sites and territories, and areas conserved by indigenous peoples and local communities (ICCAs). It also calls for restrictions on such development in areas that are recognised to be important for biodiversity and ecosystem services or essential to achieving international conservation targets.

48 On protected areas and other areas important for biodiversity in relation to environmentally damaging industrial activities and infrastructure development (IUCN 2016a).

49 The CBD's Strategic Plan for Biodiversity includes 20 time-bound, measurable targets to be met by the year 2020. These are referred to as the Aichi biodiversity targets.

Box 11: FISA's commitment to safeguard UNESCO World Heritage Sites

The World Rowing Federation (FISA) has become the first sporting body to announce its commitment to ensuring that activities under its control will not damage natural or mixed WHS.[50]

"*Safeguarding the planet's most precious natural sites for future generations is a collective responsibility we all share, and it is crucial to assess and avoid potential negative impacts of development associated with sporting activities*," says Tim Badman, Director of IUCN's World Heritage Programme. "*IUCN salutes the World Rowing Federation's commitment to respecting natural World Heritage – all international sports organisers should follow suit, and IUCN can support them in doing so*."

FISA has pledged to consult with IUCN and UNESCO's World Heritage Centre when rowing events and associated developments are proposed near a natural or mixed WHS or its buffer zone. New facilities, venues, and development proposals would be rejected if potential impacts on outstanding World Heritage values are identified. For existing facilities, the federation has committed to finding new locations unless risks can be addressed.

One international sporting body has made a public pledge to respect and safeguard WHS, recognising their significant global value (Box 11)[51].

Apart from avoiding development in no-go areas, negative impacts on biodiversity on a particular site can be avoided through careful layout and siting of infrastructure, appropriate timing and scheduling of development, and sensitive design. Examples include:

- spatial mapping of different types of ecosystems and/or habitats as a constraints assessment to guide the layout and design of sports venues, to help to identify areas and features that need to be avoided, such as sensitive ecosystems (e.g. wetlands); known habitat for threatened species; important breeding sites, waterholes, or feeding areas for animals; high risk areas (e.g. floodplains); and even individual trees;

- laying out and designing the venue to avoid damage to particularly sensitive ecosystems, habitats or features, e.g. using underground cabling rather than aerial cables and powerlines to prevent bird collisions, or routing powerlines away from known bird flyways; and

- careful timing of venue construction and hosting of sporting events to prevent disturbance to animals and plants during critical stages of their life cycles.

Step 2 in the mitigation hierarchy: minimising impacts

After all feasible measures to avoid negative impacts have been adopted, actions to minimise remaining impacts should be identified. These actions should reduce the footprint of the new sports venue and its associated infrastructure, as well as the duration of impacts and/or their severity. Impacts can be minimised through careful layout and design of the sports venue, and rigorous management controls during construction and operation.

Examples of layout and design considerations to minimise negative impacts include:

- routing access roads, and siting compressors and generators, as far away as possible from wildlife habitats to minimise adverse noise impacts;

- use of mass transit and innovative transportation to avoid road construction;

- reducing fragmentation of natural habitat in the landscape, for example by clustering structures, avoiding the creation of barriers to wildlife movement, and maintaining green corridors

50 https://www.iucn.org/news/world-heritage/201801/iucn-welcomes-first-kind-world-rowing-pledge-avoid-impacts-natural-world-heritage

51 This pledge follows the World Heritage Committee's Decision to approach the IOC and Ski Federation with a view to putting in place an agreement regarding sporting events and World Heritage in order to ensure that sports facility developments do not adversely affect the Outstanding Universal Value of World Heritage properties. http://whc.unesco.org/en/decisions/4432/.

between areas of natural habitat and along watercourses;

- including buffers or setback areas around sensitive areas to reduce impacts;

- scheduling the timing of construction and event hosting to the least sensitive times of the year and/or day for wild animals, and minimising conflict with known wildlife activities, such as breeding and birthing, roosting or nesting, overwintering periods, or migration. In aquatic environments, construction activities may need to be timed to minimise impacts on fish spawning;

- limiting times of access to sensitive areas to minimise disturbance to wildlife. Good practice also involves restricting access to wildlife habitat during sensitive mating, nesting, or birthing seasons to protect animals from undue stress;

- reducing the risk of accidental fires spreading to surrounding areas;

- selecting the least-damaging methods of construction; e.g. by using helicopters to place towers for ski lifts and for removing trees from mountain areas, rather than cutting new access roads; and

- recycling of water in arid areas to minimise extraction from – and impacts on – aquatic ecosystems.

Where adverse impacts do occur, their severity and duration can be minimised by prompt response, such as by restoring any damaged or trampled areas as soon as possible after an event and/or after construction.

Before construction of a new sports venue begins, individual plants or animals that could be harmed by development activities may be able to be 'rescued' and moved to a suitable temporary or permanent receiving area. These translocations do not work for all types of species, and success rates for those that can be translocated are not always high. Therefore, such measures should be last resorts, rather than preferred options.

Zonation of different areas for different permissible uses and activities in the design stage of a new sports venue is a useful tool to minimise the impacts on biodiversity from athletes, broadcasters, workers, and spectators. Use can be made of biodiversity constraints, and red flag areas identified and mapped during the collection of baseline information for this purpose. The combination of barriers limiting access to fragile habitats and sensitive areas, good signage and information for spectators, and full briefing of stewards on habitat protection measures at sporting events, can help to minimise visitor impacts.[52]

Strict control over the use of biocides and other toxic chemicals and materials can help to minimise harmful effects on local and non-target species. In addition, checks on the introduction of non-native organisms (e.g. through incidental transport of plant seeds on sporting equipment[53] or accidental introduction of organisms in construction materials) can help to minimise the establishment of invasive or pest species (Box 12).

Step 3 in the mitigation hierarchy: restoring disturbed, damaged, or degraded areas

Habitat that would be damaged or destroyed during construction of a new sports venue can often be quickly returned to the pre-development condition or better by implementing appropriate restoration measures. In addition, areas temporarily disturbed or damaged during sporting events or by temporary sports venues can be helped to recover.

The aim of restoration is to ensure that the area regains its former biodiversity and is able to sustain itself. To improve the resilience of a restored area, it is best to connect it to other areas of natural habitat; restoration of degraded areas that currently act as barriers to connectivity is valuable.

Approaches to restoration are likely to differ, depending on the ecosystems and physical conditions; Section 7.5 provides useful guidance. A plan for the restoration of the site should be drawn up by a suitably qualified restoration specialist, using

52 Chapman & Duffus, 2012.
53 International Mountain Biking Association https://www.imba.com/resources/research/trail-science/environmental-impacts-mountain-biking-science-review-and-best-practices.

Box 12: Examples of impact minimisation

Impact minimisation by careful siting and design

The careful design of skiing runs at Whistler Blackcomb's ski resort in Canada reduced tree removal from an initial 40% of the project area to less than 5%, through innovative layout and design.[54] On ski slopes, allowing tree islands and some shrub cover and woody debris to be retained enables ground-dwelling small forest mammals to continue using these areas.[55] The building of fauna-crossing corridors and tunnels at ski resorts provides natural ground cover and allows small animals like rodents and reptiles to move across open areas and maintain wildlife movement.[56] In the development of new ski runs, avoiding sensitive areas such as bear denning sites and wetland areas reduces negative impacts.

Attaching devices such as bird flappers or spiral bird flight diverters, raptor protectors, and nocturnal devices to overhead cables and powerlines can help to minimise collision and electrocution impacts. Marking devices on aerial cables, such as floaters on button lifts, PVC coiled tubing on chairlifts, and checkered flags or red paint lines on overhead cables, have been used to good effect in minimising bird collisions and reducing mortality; experiments show that red markers are most effective.[57]

Avoiding excessive lighting of venues can reduce potential harmful impacts on nocturnal species.[58] At the London Olympic Park, the negative impact of artificial lighting on wildlife was reduced by creating a continuous dark corridor along watercourses. Landscape architects, ecologists, and lighting engineers made provision for this corridor to accommodate a range of light-sensitive species, particularly some species of bat known to use the watercourses as foraging habitat and commuting routes. Focused higher-level lighting was then used along key pedestrian routes to and from different venues.[59]

Impact minimisation through water conservation

The use of appropriate and efficient technology and landscaping, including water recycling, use of rainwater storage tanks, water-efficient fittings, and constructed wetlands to remove pollutants from stormwater to allow reuse, can minimise impacts on water resources. For example, the Melbourne cricket ground in Australia has cut internal water consumption by half since installing a water recycling plant that treats sewage water and removes pollutants, enabling recycled water to be used for a range of purposes.[60] The University of Washington's Husky Stadium used low-flow plumbing fixtures, dual-flush toilets, and native landscaping to reduce water use in the building by 40%.[61]

The development of Green Point Stadium in Cape Town, South Africa, for the 2010 FIFA World Cup, incorporated special measures to limit water use. Detailed modelling of baseline water consumption for a comparable stadium identified measures that would reduce potential water use by over 60%. These measures included using non-potable water for irrigation and water-saving devices within the stadium design, and planting drought-resistant, indigenous plants in external landscape areas to reduce typical irrigation requirements by as much as 20%.[62]

The new Mercedes-Benz Stadium in Atlanta, Georgia, the joint home of the National Football League's Atlanta Falcons and Major League Soccer's Atlanta United Football Club, is the first professional sports stadium in North America to achieve Leadership in Energy and Environmental Design (LEED) Platinum certification.[63] This stadium incorporates a wide range of sustainability features, including a large capacity cistern to capture and re-use rainwater. This water storage tank helps protect the neighbourhood from flooding and, in partnership with community organisations like Trees Atlanta, enables some of the captured rainwater to be used for tree irrigation.

54 De Jong, 2013.
55 Rolando et al., 2013.
56 https://www.perisher.com.au/resort-info/environment/biodiversity
57 Buffet & Dumont-Dayot, 2013.
58 Department of Environmental Affairs, South Africa (undated).
59 Shepherd, 2011.
60 http://www.sportsenvironmentalliance.org/blog/portfolio-items/mcc-mcg-2/
61 National Institute of Building Sciences and Green Sports Alliance, 2017.
62 https://www.environment.gov.za/sites/default/files/docs/greeningstadia_greenpint.pdf
63 http://mercedesbenzstadium.com/sustainability/

local native species and taking into account the particular habitat requirements of targeted floral or faunal species. The use of native vegetation on land is important, as it provides suitable habitat for indigenous animal species.

Restoration is difficult in some ecosystems. The ability to restore an affected ecosystem within an acceptable timeframe should be demonstrated, rather than assumed. In determining whether or not there will be residual negative impacts on biodiversity and ecosystem services, a precautionary approach should be taken to predicting the results of, and the time required for, restoration.

Step 4 in the mitigation hierarchy: offsetting residual negative impacts

Biodiversity offsets are defined as measurable conservation actions that result in no net loss or preferably a net gain of biodiversity[64] (Figure 4). Offsets typically consider species and their habitats, and ecosystem function, and may also take into account people's use and cultural values associated with biodiversity. They are only appropriate as a last-resort form of mitigation when earlier steps in the mitigation hierarchy have been exhausted and a full set of alternatives to the project has been considered.

It is of the utmost importance to note that negative impacts on some ecosystems, species, or ecological processes that remain after efforts to minimise and restore damage have been taken into account cannot be successfully offset or compensated, and must therefore be avoided altogether. According to IUCN's Policy on Biodiversity Offsets[65] biodiversity offsets must not be used when impacts will occur in internationally and nationally recognised no-go areas (Box 10), such as UNESCO World Heritage Sites and all IUCN categories of protected areas (Box 1). Where impacts would cause loss of irreplaceable or highly threatened biodiversity or drive species or ecosystems into a higher category of threat, or where there is a high risk of failure of proposed mitigation measures, the use of biodiversity offsets is not appropriate. In addition, there may be situations where impacts on biodiversity and/or ecosystem services cannot be offset or compensated, for technical, practical, financial, or other reasons, or where there is considerable uncertainty about the likely outcome of planned mitigation measures (e.g. restoration success has not been demonstrated). In such cases, it would not be possible to achieve no net loss or net gain of biodiversity, and the proposed new sports venue would not meet the requirements of sustainable development. In these situations, no development of a new sports venue would be justified.

In order to claim a no net loss or net gain outcome, biodiversity losses due to a proposed project and predicted gains of biodiversity through mitigation actions must be measured to ensure that the losses are counterbalanced by the gains. To design a biodiversity offset, the residual negative impacts have to be quantified, using a proxy (e.g. area and condition of affected ecosystem as a surrogate for biodiversity) or number of individuals of a population of a species. Losses due to the development impact and potential gains from the offset should be measured in the same way. There are many different ways to measure biodiversity impacts, ranging from simple to complex approaches.[66]

The offset activities must achieve conservation outcomes over and above results that would have occurred without the offset, and should avoid displacing activities that harm biodiversity to other locations.

Biodiversity offsets can take the form of:

i) positive management actions, such as restoration of degraded habitat (in another area not impacted by the development of a new sports venue) to gain biodiversity;

ii) protection of equivalent habitat to halt imminent or projected loss of biodiversity. For example, offsets could help to expand existing protected areas, link different natural or protected areas, and/or establish new protected areas on recognised priority sites for conservation where there are risks of conversion of these areas to land uses incompatible with biodiversity conservation. In some cases, an offset can be on the site of the sports venue, for example where areas can be set aside within a larger sports park specifically for conservation in perpetuity (through formal designation) and would deliver the required biodiversity gains. In other cases, the offset may need to be found off site; or

64 Adapted from BBOP, 2012a.
65 WCC Resolution 059 of 2016.
66 e.g. BBOP, 2009; BBOP, 2012.

iii) reducing the current causes of biodiversity loss, for example by stopping poaching or predation by pest animals, stopping harvesting of native vegetation for firewood by planting woodlots, or curbing the spread of invasive or non-native species.

Offsets would generally need to target the same biodiversity value as that being impacted, a so-called like-for-like exchange. When choosing a suitable offset, options that could make a positive contribution to local, national, or regional conservation plans, strategies, and goals would be most beneficial.

In some cases, where the biodiversity value affected by a new sports venue is relatively widespread and under minimal threat, it may be acceptable for offsets to target more threatened biodiversity value instead of the same biodiversity value as that impacted.[67] In these cases, offsets would best target threatened species and ecosystems, and might be located in KBAs which require restoration, or to secure areas identified in protected area expansion strategies, where they can make the greatest positive contribution to conservation. The management of these areas should follow the Sustainability Standard developed by IUCN's Green List Programme (Box 5).

Offsets must deliver long-term gains of biodiversity, designed to endure in the long term. Any activities being considered to offset residual negative impacts would need to result in gains of biodiversity or conservation benefits over and above outcomes that would have happened without them. Actions already required by law would thus not qualify as offsets. Offsets are best implemented before, or at the same time as, construction of the project starts, to avoid or minimise time lags between losing and gaining biodiversity.

When planning biodiversity offsets, it is important to check that they would be technically feasible, and socially and culturally acceptable. Sufficient resources – both material and financial – would need to be available to implement and manage them effectively. Funds to support their management could be generated from visitor fees and/or, where the offset area could be used as a venue for low-impact sporting events, competitor fees plus event sponsorships.

67 Offsets that target relatively more threatened biodiversity are referred to as 'trading up'.

Where measures to compensate for negative impacts on biodiversity are not intended to achieve net gain or have not involved measuring biodiversity losses from project impacts and gains from compensation actions, they are better described as additional conservation compensation rather than offsets. Box 13 gives a hypothetical example of a biodiversity offset, using a simple habitat-hectare approach.

Possible ways to compensate for negative impacts on ecosystem services on which there is high dependence by affected communities could include nature-based measures (e.g. through restoring degraded wetlands to improve water quality or planting woodlots), providing human-made substitutes (e.g. water treatment plants), or financial compensation. Where negative impacts on ecosystem services involve damage to productive land (e.g. for crop growing) rather than to biodiversity, other forms of acceptable compensation are needed.

The design of biodiversity offsets, and planning for their successful implementation, can be challenging and complex. Where achieving no net loss or net gain of biodiversity relies on offsets, it is best to appoint a biodiversity offset specialist to fulfil these tasks.

Additional step: enhancing biodiversity through additional conservation actions

Additional conservation actions to improve the quality and functioning of ecosystems and increase native biodiversity relative to pre-development levels can help new sports venues and sporting events leave a lasting and positive legacy. They can also apply to existing sports venues where expansion or refurbishment is planned. Measures to enhance biodiversity may appear similar to offset activities, but – unlike most (like for like) offsets – they do not need to target the same species, habitat, or ecosystem as is harmed by a development. In addition, they are not intended or designed to provide measurable gains to counterbalance residual negative impacts on biodiversity and are thus not quantified (Box 14).

Box 13: Hypothetical example of a biodiversity offset

The following hypothetical scenario provides an example of how a biodiversity offset could be used to address expected biodiversity loss from a new sports venue:

Development of a proposed new sports venue on the outskirts of a city would, despite efforts to avoid impacts on patches of natural habitat, result in the loss of 10 hectares of a native ecosystem in good condition (90% condition compared to a pristine site, which would represent a 100% condition score).

As an offset, it was proposed to conserve approximately 40 hectares of the same type of vegetation ecosystem close to the venue, for restoration and protection in the long term. The area to be set aside abutted and would enable expansion of an existing conservation area, a move that was seen to be desirable by the local authority and would bring open space and recreation benefits to local communities. This expansion would not have occurred without the sporting body's action.

This ecosystem's condition was somewhat degraded: about 60%, compared to a pristine state. Ecologists felt that it would be feasible to improve its condition by at least 30%, thus more than counterbalancing biodiversity losses with equivalent gains (i.e. biodiversity losses were 10 x 0.9, or 9 'habitat hectares', while biodiversity gains were 40 x 0.3; amounting to 12 habitat hectares). That is, this intervention would result in a net gain for biodiversity.

A restoration plan and programme was drawn up for the offset site, and a biodiversity offset monitoring and management plan was prepared for its long-term maintenance. The local authority agreed to incorporate the offset site in the local conservation area and to take responsibility for its management, provided that the developer of the new sports venue made adequate financial provision to cover the management costs.

The expansion of the existing conservation area was finalised, and work on its restoration began a year before construction work on the site of the new sports venue began, to minimise the time lag between the negative impacts on biodiversity and gains at the offset site.

Box 14: Example of enhancement and ecological compensation

London Olympic Park - Biodiversity Action Plan[68]

Although much of the site for the London 2012 Olympic Park was derelict, contaminated, and polluted, there were a number of pockets of existing wildlife habitat that would be damaged or lost due to the construction of the venues.

In recognition of these impacts, there was a planning condition to produce an Olympic Park Biodiversity Action Plan (BAP) to establish biodiversity targets for the site. The BAP included the creation of 45 hectares of new habitat to replace the loss of previously designated sites of natural conservation importance in the Park, as well as action plans for 28 species or species groups, including plants, invertebrates, fish, amphibians, reptiles, birds, and mammals.

Implementation of the BAP, including monitoring and reporting, is part of a ten-year post-Games management regime being delivered by the legacy owners, the London Legacy Development Corporation. Through the BAP, the aim is for the Olympic Park to become recognised as a site of importance for nature conservation and to help embed a community-led conservation focus in this part of east London.

Because the residual negative impacts of the proposed Olympic Park development were not quantified and the BAP did not necessarily aim to rectify loss of specific biodiversity, the above measures would not qualify as a biodiversity offset. Instead, this example illustrates ecological compensation for residual impacts, with additional conservation actions to enhance the Park.

68 http://learninglegacy.independent.gov.uk/documents/pdfs/design-and-engineering-innovation/307-bio-action-plan-dei.pdf

Box 15: Enhancement through restoration: West Cliffs Golf Course, Portugal

The West Cliffs golf course[69] was developed north of Lisbon, in Óbidos, Portugal. Situated on sandy clifftops adjacent to the Atlantic Ocean, this course occupies a former pine tree plantation.

Recognising that golf developments can provide ecological benefits by connecting ecosystems and enriching local biodiversity, plantation pines (Pinus pinaster and Pinus pinea) were selectively removed during construction of the golf course. As a result, the dormant native seed bank, which was stored in the topsoil beneath the plantation, was exposed. This change in the environmental conditions allowed the seeds to thrive, rapidly establishing a mosaic of over 15 hectares of coastal low-scrub communities, providing habitat for diverse native flora and fauna. These communities include species from the habitat described by the Natura 2000[70] classification as 'vegetated sea cliffs of the Mediterranean coasts', which is associated with a number of endemic and highly restricted-range plant species, such as Limonium, many of which face declining population trends and are in need of conservation action.

The restored area requires no irrigation and very low maintenance practices. Exotic or invasive plants found in the area are continually removed (e.g. acacia species and Cape Fig (Carpobrotus edulis)), to maintain the restoration results. The seeds of the regrown native plants are now being harvested and used to create a plant nursery on site, ensuring there is a local supply of these plants for any future revegetation needs.

The golf course is a GEO Certified® Development.[71] The certification process highlighted the restoration of natural habitat with native species and the responsible approach to ongoing habitat management as key achievements. This process also provided additional pointers to improve the performance of the West Cliffs golf course, namely to monitor use of the property by wildlife and maintain an inventory of at least bird and mammal species, to label the native plants, and to educate both golfers and visitors. These actions have been initiated.

Possible actions can take a range of forms,[73] such as:

- setting aside part of the site for new sports development and creating natural habitats for local wildlife;
- improving the protection and ongoing management of sensitive ecological areas that are not affected by the new sports venue;
- restoring and managing degraded areas to improve their condition, re-establishing native plants to boost local wildlife populations;
- consolidation or linking of remnants of natural habitats to promote ecological continuity and establish corridors or habitat stepping stones across the landscape to enable wildlife movement (Figure 2). In urban areas, these open spaces have the additional benefit of providing green areas for multiple use;
- increasing the width of buffers around development, to reduce any edge effects in areas that are important for biodiversity (Figure 3);
- expansion, diversification, and improved management of available habitat for threatened species;
- improving the reproductive success of target species by, for instance, introducing bird nesting boxes or bat boxes, providing specific habitat (e.g. ponds for frogs), or planting known food plants for particular species; and
- designing built structures or landscape features, and choosing construction materials, to provide and increase habitat suitable for targeted species (e.g. log walls for reptiles and insects, and natural drainage systems such as swales for frogs).

Restoration can be a useful mechanism to enhance biodiversity where development is taking place on already degraded or transformed sites (Box 15).

69 http://www.golfenvironment.org/assets/0004/9197/West_Cliffs_Cert_Report_webs.pdf
http://www.golfenvironment.org/assets/0004/9176/160330_Project_Appraisal_FINAL_WEB.pdf

70 Annex 1 of the Habitats Directive of the European Economic Community lists 'natural habitat types of community interest whose conservation requires the designation of special areas of conservation', and includes this habitat type 1240 http://www.central2013.eu/fileadmin/user_upload/Downloads/Document_Centre/OP_Resources/HABITAT_DIRECTIVE_92-43-EEC.pdf

71 GEO (Golf Environment Organisation) Certified® is a credible standard and certification mark recognising a facility, tournament, or development that has shown a commitment to sustainability.

72 https://www.iucn.org/theme/forests/our-work/forest-landscape-restoration/bonn-challenge.

73 e.g. Rajvanshi et al., 2011.

Box 16: The Bonn Challenge: restoring degraded and deforested land

The Bonn Challenge[74] is a global effort to bring 150 million hectares of degraded and deforested land into restoration by 2020, and 350 million hectares by 2030. To date, 45 governments, private associations, and companies have pledged more than 156 million hectares to the Challenge.

IUCN and the World Resources Institute (WRI) have produced the Restoration Opportunities Assessment Methodology (ROAM),[75] which provides a flexible and affordable framework for countries to quickly identify and analyse areas that are primed for forest landscape restoration, and to identify specific priority areas at a national or sub-national level.

Box 17: Examples of additional conservation actions

Leading figures in the sport of sailing are taking important steps to help protect the marine environment. Land Rover BAR (Ben Ainslie Racing), the British team led by Sir Ben Ainslie for the Americas Cup, has been particularly active in sustainability initiatives.

First, they partnered with the Blue Marine Foundation on the Solent Oyster Restoration Project.[76] This project aims to return the native oyster to the Solent, the strait that separates the Isle of Wight from mainland England.

Oyster beds are among the world's most imperilled marine habitats. They play an important ecological role both in removing waterborne impurities and contributing to biodiversity of inshore shallows by protecting nursery grounds for juvenile fish and other marine species.

The overall goal of the project is to achieve a healthy, self-sustaining oyster population that will improve ecosystem health, increase biodiversity, and enhance water quality. The project involves hanging cages with adult oysters in secure places such as under marina pontoons. In time, they will produce large quantities of juvenile oysters and re-seed and establish wild oyster beds. One thousand oysters have been housed in cages at the LandRover BAR dock since 2015.

Alongside these oyster cages, LandRover BAR has also installed the UK's first Seabin,[77] an automated rubbish collection device to remove floating debris and micro plastics down to 2mm in diameter from the marine environment. Each Seabin has the capability to collect 83,000 plastic shopping bags or 20,000 plastic bottles per year. The team are expecting to remove half a tonne of debris each year, as well as remove pollutants such as oils and detergents.

Action on preventing plastic pollution and raising public awareness of the problem plastic waste is causing to ocean health is also a major focus of the Sustainability Programme of the Volvo Ocean Race 2017-18,[78] claimed to be the world's longest and most competitive professional sporting event. It takes place over a nine-month period in a race around the world. The Sustainability Programme leverages the opportunity of this high-profile race as a powerful global engagement and communications platform that can help spread understanding about the importance of ocean health and the urgent need to tackle plastic pollution.

The Bonn Challenge (Box 16) presents an opportunity for sporting bodies to contribute to this international movement and enhance biodiversity in the areas they affect.

Actions that could help to meet local, national, or regional conservation plans, strategies, and goals would make the best positive contribution to enhancing biodiversity. Engagement with conservation stakeholders and local communities is important to identify priority enhancement opportunities.

Examples of additional conservation actions are given in Box 17.

74 https://www.iucn.org/theme/forests/our-work/forest-landscape-restoration/bonn-challenge
75 https://www.iucn.org/theme/forests/our-work/forest-landscape-restoration/restoration-opportunities-assessment-methodology-roam
76 Solent oyster restoration project, http://www.bluemarinefoundation.com/project/solent/
77 http://land-rover-bar.americascup.com/en/news/422_Land-Rover-BAR-install-the-UK-s-first-Seabin.html
78 https://www.volvooceanrace.com/en/sustainability.html

4.3 Biodiversity targets

Ideally, all new sports venues should aim to have no negative impacts on biodiversity, but this target is not always feasible. In some cases, impacts on biodiversity may be minimal, and by immediately restoring temporary damage there would be no biodiversity loss.

In other instances, negative impacts on biodiversity may remain, despite efforts to avoid and minimise them, and to restore damage. These remaining impacts are called residual negative impacts.

Where residual negative impacts on biodiversity would be acceptable, a new sports venue or expansion of an existing venue should ideally strive for a net gain of biodiversity through the use of biodiversity offsets, even in cases where a no net loss outcome for biodiversity would be acceptable.

No net loss is achieved when residual negative impacts onbiodiversity are fully counterbalanced by offsets. Offsets must provide equivalent gains of the same type of biodiversity as that harmed, in a reasonable time frame. A net gain of biodiversity is achieved by designing and implementing offsets that provide biodiversity gains that are greater than the residual negative impacts.

In some instances, where there is high uncertainty about the feasibility of achieving no biodiversity loss, no net loss or net gain, the no-go option would be preferable to placing biodiversity at risk.

There are unique opportunities in sport to achieve an absolute gain in biodiversity if the venue is developed in pre-existing degraded areas, where it would be relatively easy to improve levels of biodiversity through the use of additional conservation actions.

The implementation of additional conservation actions can enable any project to increase its potential contribution to conservation beyond an intended and measurable biodiversity target.

Table 2 illustrates the biodiversity targets that would be recommended for new sports venues in different situations, assuming that in certain situations residual impacts would be acceptable.

Table 2: Recommended biodiversity targets based on the biodiversity characteristics of the site prior to the project

		Are residual negative impacts acceptable (i.e. after accounting for avoidance, minimisation and restoration)?	**Recommended biodiversity targets linked to the sports venue**
Biodiversity characteristics of the site prior to the project	Natural Habitat[79]	Yes, with conditions	No net loss of biodiversity**
	Critical Habitat[79]	Yes, with conditions	Net gain of biodiversity or no-go**
	Key Biodiversity Areas[80]	Yes, with conditions	Net gain of biodiversity** or no-go
	Protected Areas (IUCN Categories I to VI)[81]	No	No impact or no-go
	World Heritage Sites (Natural and Mixed)[82]	No	No impact or no-go

** No net loss and net gain can be achieved with biodiversity offsets. to compensate for residual impacts.

79 International Finance Corporation (IFC) (2012). Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources.
80 The KBA Partnership (2018). Guidelines on Business and KBAs: Managing Risk to Biodiversity. Gland: IUCN.
81 WCC-2016-Rec-102 "Protected areas and other areas important for biodiversity in relation to environmentally damaging industrial activities and infrastructure development".
82 2014 World Heritage Committee Decision (WHC 14-Com38)

In summary, it is recommended that:

- Overall, the recommended biodiversity outcome should be no negative impact on biodiversity, or no biodiversity loss (i.e. no negative impact remaining after avoidance, minimisation, and restoration actions) due to new sports venues or expansion of existing sports venues in area of high importance to biodiversity.

- New sports venues in degraded or disturbed areas in particular, but also in modified habitat, present relatively large opportunities to have low (if any) adverse impacts on biodiversity and ecosystem services and to achieve a biodiversity gain at the site level.

- In areas where residual negative impacts are acceptable, the development of new sports venues should achieve either no net loss or a net gain of biodiversity, depending on the conservation importance of the affected site.

- No infrastructure or other environmentally damaging activity should be permitted within or around the boundaries of any one of IUCN's Categories of protected area I to VI and natural/mixed UNESCO World Heritage Sites. That is, new sports venues in these areas would only be acceptable if there were no negative impact on biodiversity. Otherwise these areas should be considered no-go. This means that any new large-scale sporting venues or significant expansions of existing ones, would not be acceptable at these sites.

- In Key Biodiversity Areas and Critical Habitats, new sports venues with a predicted residual negative impact would be acceptable only if they can demonstrate that they will achieve a net biodiversity gain, otherwise these areas should also be considered no-go.

- For all new sports venues, consideration should be given to implementing additional conservation actions on the project or offset site, to increase the overall potential contribution to conservation beyond the measurable targets for biodiversity.

5

5. Good practices in managing impacts on biodiversity and ecosystem services

This chapter provides guidance on good practices for developing new sports venues with regard to the management of biodiversity and ecosystem services. In particular this chapter explains the value of taking a systematic approach to impact management, monitoring the effectiveness of implementation, and being transparent and accountable.

5.1 Integrating biodiversity and ecosystem services into the project cycle

Effective management of negative impacts on biodiversity requires consideration of potential impacts at all stages of development.[83] The assessment of potential impacts of new sports venues and their associated infrastructure on biodiversity and ecosystem services is best integrated into the project planning from the earliest possible stage, recognising the views of interested and affected parties. These two aspects are addressed in separate sections below.

The checklists for the early planning (pre-feasibility) stage and site selection, as well as for detailed planning (feasibility stage), provide useful support tools (Sections 6.1 and 6.2).

5.1.1 Integrating biodiversity and ecosystem services into project planning

Sports venues are best planned with the end in mind, including a vision of the legacy to be created and specific outcomes for biodiversity. It is thus desirable at the outset to have a clear commitment to maintaining or improving current levels of biodiversity in the area to be affected by a new sports venue. A formal commitment by top management levels of sporting bodies would set a clear goal to be worked towards by all parties involved in the planning and development of new sports venues. The adoption of these guidelines would strengthen and support that commitment.

All local and national biodiversity regulations, as well as any regional or international commitments, need to be considered during the planning of these venues and events, to ensure compliance.

Preparing for the effective management of biodiversity impacts of a new sports venue or sporting event on biodiversity and ecosystem services takes place during both the planning and implementation stages of a typical project cycle, as shown in Figure 7.

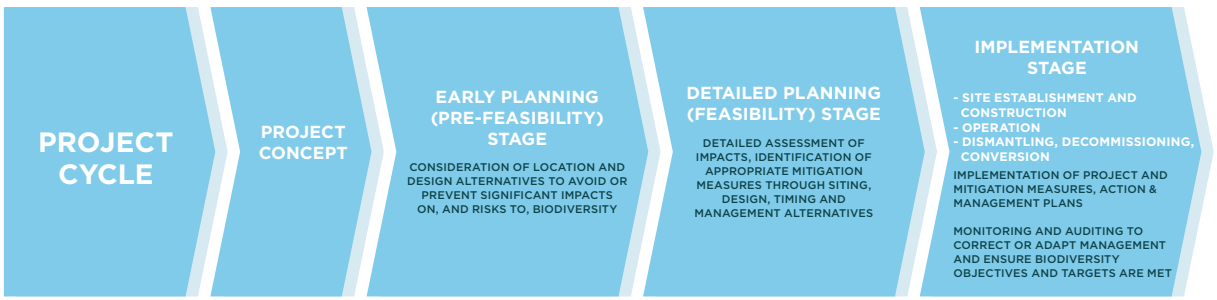

Figure 7: Stages for the effective management of biodiversity impacts in the development of a new sports venue

83 IUCN WCC Resolution 054 of 2004.

There may be a number of risks associated with any new sports development, including obtaining the necessary consent to develop from regulators and affected parties. Delays and rising or unforeseen costs are often an issue.

The earliest possible consideration of biodiversity and ecosystem services in the project cycle enables risks to be identified and addressed before the start of detailed planning. By addressing risks and impacts to biodiversity at the outset, unacceptable impacts can be avoided, and feasible alternatives can be adopted before commitments are made to ecologically unsustainable development.

Knowing the probable scope of mitigation requirements for biodiversity impacts of different development options and alternative sites can give a good indication of their likely feasibility and cost implications. It is useful, therefore, to identify those impacts for which mitigation is unlikely to be feasible or acceptable early on in the planning process. Impacts that would be extremely difficult to mitigate might include the risk of losing biodiversity in no-go areas or being unable to ensure no net loss of biodiversity, or impacts that would be unacceptable to stakeholders or the local community because of the use or cultural values of affected ecosystems or species. The early identification of biodiversity 'red flag' areas can help to develop timely measures to avoid and minimise negative impacts and inform the siting, design, and layout of a new sports venue.

Engagement with conservation authorities and organisations at this early stage, before making a decision on a particular alternative, can help to highlight major biodiversity risks and constraints. Likewise, engaging with local and indigenous communities can give useful pointers to possible impacts on ecosystem services.

The search for least-impact alternatives should start in the early planning stage and continue throughout detailed planning. Because the siting of a new sports venue is of the utmost importance in avoiding significant impacts on biodiversity, consideration of feasible location options in the early planning stage can help lead to the best development decisions.

The possibility of re-developing or converting brownfield sites as new sports venues should be explored as early as possible (Box 18). The use of these sites would present far fewer risks to biodiversity than the development of unmodified natural sites, and could offer substantial opportunities to enhance local biodiversity and ecosystem services. Many sports venues are inspiring examples of former industrial areas that have been brought back to use and converted into sports venues and urban parklands. These sites can, however, be expensive and complex to restore.

Consideration can also be given to using temporary facilities rather than permanent structures: the use of temporary facilities is gaining favour in some contexts, particularly for outdoor, grass-based sports with lower spectator demand. Construction companies for sporting events are now offering affordable temporary modular structures that can be erected and dismantled in a matter of days. In Germany, a soccer tournament made use of a prefabricated arena that accommodated over 20,000 people, was ready for use in six weeks, and could be dismantled in 30 days.[84] Industry experts think that modular, temporary, built components will play an increasing role in the venue portfolio at big sporting events, bringing a range of significant advantages.

It is important to embed biodiversity considerations in management plans for implementing the different phases of a new sports venue, so that all the recommended measures to mitigate and manage negative impacts and enhance benefits can be assured. Clauses setting out requirements for the treatment of biodiversity and related procurement of materials should be included in all contractor documentation. Consideration of biodiversity throughout the planning stages facilitates the identification and inclusion of these requirements in tender documents.

5.1.2 Engaging stakeholders

Involving key stakeholders with an interest in biodiversity, from the early planning stage and throughout the planning and implementation phases for new sports venues and sporting events, can have many benefits.

Early engagement with local communities is important to understand their ecosystem services needs and values, and to accommodate them in

84 http://www.spiegel.de/international/zeitgeist/here-today-gone-tomorrow-temporary-venues-storm-the-sporting-world-a-743087.html

Box 18: Site selection considerations

Conservation of the Green and Golden Bell Frog at the Sydney Olympic Park[85]

In 1993, during the planning phase for the Sydney 2000 Olympic Park, a colony of the Green and Golden Bell Frog (*Litoria aurea*), listed as Endangered in New South Wales, was discovered in a disused brickpit on the site. At that time, the brickpit was the proposed location for the Olympic tennis venue. However, due to the conservation status of this amphibian, plans to build the tennis centre on this site were scrapped, and the venue was moved to another location within the Olympic Park, where there were no ecological constraints.

By the start of the Games, more than AUD 1 million had been spent to protect the frog, including the construction of new ponds and suitable habitat areas within and near the brickpit. Both adult frogs and breeding activity were recorded in some of these ponds over three successive years, which showed that these new sites were successful in providing suitable habitat. Vehicle overpasses, frog underpasses, and frog fences around roadways and construction sites were constructed to ensure safe passage for the frogs.

Today, the brickpit is a popular attraction, featuring an elevated circular walkway (550m in circumference) that allows visitors to access and view the brickpit from above and learn about its industrial past, while preserving the fragile habitat of what is now one of the largest remaining populations of the Green and Golden Bell Frog.

the design of the venue. Engaging with these communities can help ensure a social 'licence to operate'. Where a new sports development is being considered either on indigenous communities' land or where it may affect their ecosystem services, it is essential to obtain their free, prior, and informed consent[86]; i.e. without any coercion, intimidation, or manipulation. Consent should be sought well in advance of any decision on a proposal, respecting and making provision for the time requirements of indigenous consultation processes. To ensure that the affected communities are well-informed about the proposed development, information needs to be provided on a wide range of aspects, including potential impacts and risks to biodiversity, and likely changes to ecosystem services on which the communities depend.

Stakeholders can play an important role in setting a long-term vision for biodiversity in the area to be affected, which can help to inform decisions about the future use of old or post-event sports venues. They can also assist in identifying biodiversity impacts and risks associated with a proposed sports development, provide valuable local knowledge on the affected ecosystems and species, and give input on the identification of appropriate mitigation (including compensation) and enhancement measures that should be incorporated in a Biodiversity Management Plan or equivalent.

Biodiversity stakeholders typically include conservation and/or environmental authorities, and a range of conservation organisations, from local to national and even international organisations. They also include local communities who value, and indigenous communities who depend on, ecosystems and biodiversity for their well-being. The level of engagement needed during different stages of the project is likely to be proportional to the significance of impacts and risks. Customary rights of people to the environment need to be respected at all times, and clear processes and avenues for conflict resolution should be established to address and resolve concerns or grievances.[87]

85 Sydney 2000 Environment Info Sheet – Green and Golden Bell Frog. https://www.sopa.nsw.gov.au/Environment/Biodiversity/Our-flora-and-fauna

86 IUCN, 2012.

87 e.g. Greenpeace, 2000.

5.2 Assessing biodiversity impacts and opportunities

Broadly speaking, there are three main factors that determine the potential significance of negative impacts on biodiversity and ecosystem services from new sports venues:

a) the nature, scale, and duration of the new sports venue;

b) the types of species and ecosystems affected, together with the importance of ecosystems and species for conservation; and

c) the dependence of affected people on ecosystem services.

Impact significance is likely to increase with the size of the new sports venue and the extent of supporting infrastructure, facilities, and services needed. In addition, the significance of negative impacts will grow with the increasing importance of the affected area for biodiversity conservation and ecosystem services.

The checklists for the detailed planning stage (Section 6.2), and for identifying appropriate mitigation and management measures to implement in the construction (Section 6.3), operation (Section 6.4), and decommissioning (Section 6.5) phases of a proposed new sports venue, provide concise points for consideration by the planning and impact assessment team.

5.2.1 Using impact assessment as the basis for good management

Appropriate, transparent, and rigorous pre-emptive appraisal processes, such as international best practice environmental impact assessments (EIAs) and environmental and social impact assessments (ESIAs),[88] are critical for the effective consideration and mitigation of potential impacts on biodiversity. An EIA is a fundamental planning tool to predict, mitigate, and plan the management of impacts and risks to biodiversity and ecosystem services before major decisions are taken and commitments made to new development. It is done to ensure that environmental considerations are explicitly addressed during planning and decision making, to promote development that is sustainable and optimises resource use and management opportunities.[89] In order to address impacts on biodiversity and ecosystem services, it is essential to consider both biophysical and social (including cultural) impacts.

In some jurisdictions, an EIA covers both biophysical and social impacts. In others, it is limited to assessing biophysical impacts and, where social impacts are also assessed, the term ESIA is used. In these guidelines, the term EIA is used to indicate an assessment that covers both biophysical and social impacts.

The systematic process used in EIA provides a tried and tested framework within which to address potential impacts and opportunities. Appropriate measures to avoid or minimise harm, restore and compensate for damage, and enhance potential benefits, cannot be identified and described without following this process.

An EIA process typically follows a number of stages, as shown in Figure 8, namely:

a) preliminary assessment;

b) scoping;

c) baseline studies;

d) assessing and mitigating impacts; and

e) preparing for effective implementation.

However, not all jurisdictions have strong legal instruments for environmental protection. Legal compliance should be a minimum requirement, not an excuse for failing to apply best practice through the development process.

It is assumed that in some cases, particularly where major sports venues are planned and the affected area is important for biodiversity, the assessment of impacts would be a formal requirement. For smaller events, and where EIA is neither a legal requirement nor a requirement of funders or sporting organisations, then the approach and sequence of

88 IUCN WCC Recommendation 102 of 2016.

89 IAIA, 1999.

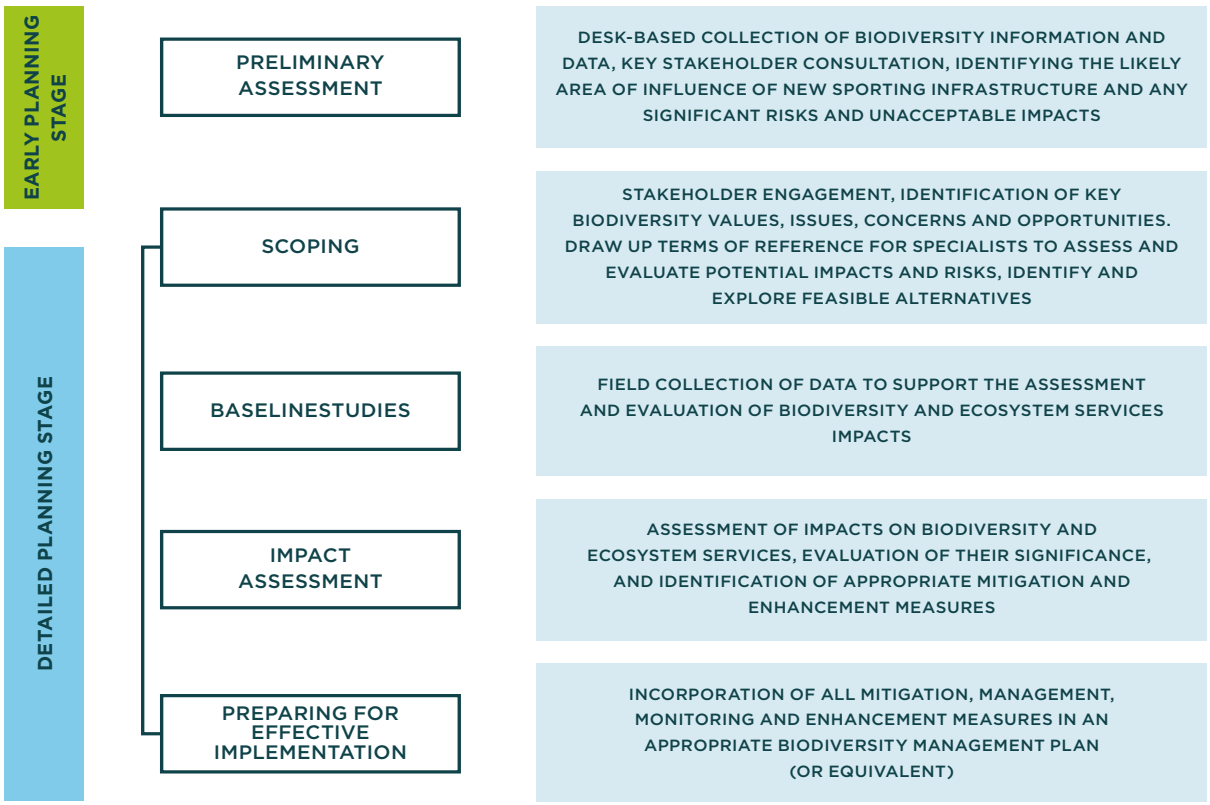

Figure 8: EIA stages in relation to the project cycle

considerations set out in these guidelines should be closely followed; in essence they reflect a typical EIA process. These considerations should form the basis for informing decisions on the location, siting, layout, design, scheduling, and other aspects of the proposed sports venues.

There are a number of useful guidelines available to parties planning new sports venues, on collecting biodiversity baseline data, ecological assessments, and species surveys, implementing the mitigation hierarchy, biodiversity-inclusive impact assessment, and ecological reporting, amongst others (Section 7).

5.2.2 Using the right experts

Appropriately qualified experts on biodiversity are essential in the EIA process.

The ecologist must be familiar with the species and ecosystems being impacted. This specialist can identify likely biodiversity impacts and risks, guide evaluation of development options and site selection, identify and assess potential impacts on biodiversity and evaluate their probable significance, and work with various disciplines within the planning team to determine appropriate mitigation measures during detailed planning.

There may also be a need to involve additional biodiversity specialists with relatively narrow expertise where particular threatened ecosystems or species could be harmed, to make recommendations on venue design and layout, and specific mitigation measures. For example, a bat specialist is best placed to give expert advice on bat impacts, and a bird specialist on birds. A restoration specialist can help formulate plans for restoration or re-creation of natural habitats, either to repair negative impacts, as a component of offsets, or as an additional conservation action. Where offsets are needed, experts with experience in designing and planning the implementation of offsets should be engaged. These specialists should be an integral part of the planning team for the new sports venue, working with all the other professional disciplines so that they can collectively resolve problems and lay solid grounds for mitigation measures to be implemented during the construction, operation, and decommissioning phases. Specialist biodiversity expertise is also likely to be necessary for auditing the performance of a sports venue from a biodiversity point of view.

Where globally threatened species or areas recognised internationally or regionally for their importance to biodiversity could be affected by sport proposals, it would be appropriate for international biodiversity experts or conservation organisations such as UNESCO (for World Heritage sites) and IUCN to be involved in planning and assessing impacts, and overseeing implementation of mitigation measures. Similarly, it would be advantageous to involve national biodiversity experts in cases where nationally threatened ecosystems or species, or important areas for biodiversity, could be negatively affected.

5.2.3 Preliminary assessment and scoping

Consideration of potentially significant impacts on biodiversity in the early planning and scoping stages can play a central role in any EIA process, helping to identify key issues, risks, and opportunities associated with different alternatives and inform the development proposal.

It is important to define the area of influence of the proposed new sports venue and the boundaries of the EIA before undertaking scoping. In this regard, the following five considerations are key:

a) All associated infrastructure, facilities, and services that need to be developed to support a new sports venue must be taken into account when identifying and assessing possible biodiversity issues. In some instances, the impacts of associated developments can be greater than the impacts of sports venue structures.

b) The planned lifespan of the new sports venue will influence the potential duration and significance of impacts on biodiversity and ecosystem services, and mitigation options.

c) A landscape-scale perspective must be used to assess potential impacts on biodiversity and ecosystem services. Although new sports venues are developed at particular sites, the impacts on biodiversity are not restricted to those sites. Ecological processes occur across landscapes: species move between different ecosystems for food and water and to breed, and may depend on different resources at different stages of their lifecycles or at different times of the year. The healthy functioning of one ecosystem can depend on inputs from another ecosystem for its survival (e.g. recharge of wetlands from surrounding catchments). Similarly, the viability of a population of animals may depend on its having access to food plants some distance away. In addition, loss of habitat for a threatened species on one site may have severe consequences for the viability of the affected population – or species – as a whole. It is therefore essential to take into account the needs of, and interdependencies between, different species, and the ecological processes that sustain whole ecosystems. The implications for affected ecosystems and species beyond the site of a new sports venue must be addressed, to ensure that they would persist in a healthy, viable condition.

d) The development of new sports venues can affect both biodiversity and people who rely on ecosystems to provide them with a range of benefits that support their livelihoods, health, and well-being. For this reason, both biodiversity and ecosystem services need to be considered.

e) Other projects planned for, or underway in, the area can affect the same biodiversity and ecosystem services as the proposed new sports venue, posing a risk of significant cumulative impacts.

Information on biodiversity can be readily obtained from a range of available sources at the start of planning, from international to local websites and biodiversity data held by different conservation bodies and authorities. This information provides an early indication of likely sensitivities and no-go areas before any resources are allocated or commitments made to a specific project at a particular site. In addition, timely discussion in the early planning stage with key biodiversity stakeholders can help to flag issues relating to biodiversity and ecosystem services, and identify possible areas of risk and potential opportunities to improve biodiversity.

The issues and risks set the scope of negative impacts that would need to be mitigated, and the opportunities that could be explored to enhance biodiversity in planning a new sports venue or sporting event. They provide the basis for drawing up Terms of Reference for specialist studies during the impact assessment stage of EIA. They also guide the search for feasible alternatives that would cause the least harm and the most benefit to biodiversity.

Typical steps in the preliminary assessment and scoping stages for a news sports venue or sporting event include:

a) checking whether the area is inside, or likely to impact, a no-go area for biodiversity or an area of high importance for biodiversity conservation;

b) checking any relevant legal requirements and likely compliance;

c) identifying the key biodiversity issues and concerns of stakeholders, including local to international conservation groups, conservation authorities, and local communities;

d) determining the conservation status of affected species and ecosystems, any priorities for conservation, and the risks of harming important biodiversity;

e) identifying any important ecological processes that may be affected, as well as any links to other natural or critical habitats that may be severed;

f) determining whether an area is important for migratory species;

g) determining whether local indigenous human communities could be negatively affected, and identifying any particular species or ecosystem on which there is a very high dependence for livelihoods, health, safety, or cultural well-being;

h) assessing the risk of significant cumulative impacts, taking into account other planned or approved development in the same area;

i) considering possible effects of climate change; and

j) identifying any opportunities to restore or enhance biodiversity.

5.2.4 Gathering reliable baseline information on biodiversity

The ecological opportunities and constraints of a site for the development of a sports venue can have a major influence on where and how sporting events can take place, and on the siting, layout, and design of structures.

Some high-level information on biodiversity will be collected during the early planning stage and scoping. Where potential negative impacts are likely, there will probably be a need to supplement this information with site-specific data. The extent of field surveys will depend on the likelihood of significant impacts and risks, and the availability of existing data on the biodiversity of the area.

It may also be necessary to carry out seasonal sampling to detect plant species that only appear at certain times of the year, and/or the presence of migratory or seasonal concentrations of animals. Sufficient, reliable, and up-to-date baseline information on biodiversity is essential as it enables these opportunities and constraints to be identified early on; it documents what is there and provides a yardstick against which to measure the effectiveness of any mitigation or enhancement actions.

Where there is a high level of reliance on ecosystems that provide a range of use or cultural benefits, and in particular where local indigenous communities are affected, having enough baseline information to ensure a good understanding of the supporting ecosystems and their biodiversity will be essential.

Reliable baseline information can help with identifying where important ecosystems and species occur in the landscape, assessing potential negative impacts, and planning effective mitigation measures (Box 19). The findings of baseline studies during the planning stages should inform the scope of biodiversity issues that need to be addressed.

5.2.5 Assessing impacts and planning mitigation and enhancement, applying a precautionary approach

More thorough consideration of potential negative impacts, risks, and opportunities is best undertaken during the detailed planning stage, drawing on the findings of scoping. It is during this stage of the EIA that potential negative impacts and opportunities for enhancement are identified and assessed, and their likely significance is evaluated. Assessing impacts typically involves analysis of their nature, severity, extent, and duration; this exercise is done by specialists. The evaluation of impact significance takes into account both the views of specialists and the values that affected communities attach to biodiversity.

Box 19: Examples of gathering and analysing baseline information

The Weymouth and Portland National Sailing Academy in the UK

Construction of this sailing academy, along with an associated marina and other facilities, and the site's subsequent use as the sailing venue for the London 2012 Olympic and Paralympic Games, required considerable detailed information on both the marine and coastal environments.[90]

While the harbour was well-known as a place of high conservation significance, specific information on the marine environment was lacking. However, through partnership in the multi-agency marine management area C-scope (Combining Sea and Coastal Planning in Europe) project, detailed surveys of the seabed were carried out and provided essential undersea datasets.

The surveys revealed the presence of a colony of the extremely rare and protected lagoon sandworm, *Armandia cirrhosa*, which is just 5mm long. Measures to protect these tiny creatures during the construction process were described in the environmental statements prepared following the surveys. The data also helped the Games Organising Committee to ensure that temporary structures and moorings required for the sailing events did not impact sensitive marine habitats, such as the eelgrass beds, in which seahorses live.

Spatial mapping to inform ski routes and wildlife refuges in the European Alpine region[91]

Winter sports, especially ski tourism, have developed rapidly and play a major role in the economy of the European Alpine region. The expansion of skiing into the habitat of wildlife species like the Black Grouse, with declining populations in the Alpine timberline ecosystems, calls for measures to reduce negative impacts. The creation of wildlife refuges by controlling or limiting access to areas occupied by important species can be an effective tool.

Track data of both snow sports and birds' traces, obtained from aerial photographs taken over a 585km transect running along the timberline, were modelled and used to predict areas of human-wildlife conflict. Spatial mapping and modelling provided a powerful tool to prioritise and delineate areas for the designation of wildlife refuges and the planning of new skiing routes, and provide a focus for visitor management.

The precautionary principle should be applied through all stages of EIA and the planning of mitigation measures.[92] Applying a precautionary approach is important in assessing possible impacts on biodiversity and designing mitigation measures.[93] This approach acknowledges the fact that extinction is forever and underlines the irreversibility of many impacts on biodiversity: many ecosystems and habitats for species cannot be restored once damaged or destroyed. It is thus of the utmost importance to play it safe when predicting and evaluating the potential significance of biodiversity impacts, and in planning mitigation.

For these reasons, it is best to consider the full range of feasible development options, temporary rather than permanent facilities, and siting and design alternatives, in planning and implementing new sports venues, to avoid harm – or the threat of harm where there is uncertainty in predictions.

It is best to take a conservative approach when designing mitigation measures and predicting their outcomes. Similarly, a cautious approach should be taken when considering the implications of climate change and how it could affect the siting and design of new sports venues: flooding could be worse, as could droughts and extreme weather events. The need for planning to provide or maintain wildlife corridors or stepping stones across the landscape, connecting different natural habitats, becomes critical to allow biodiversity to adapt to changing climatic conditions.

In cases where modified habitat is to be used to develop a new sports venue, opportunities to enhance biodiversity and ecosystem services

90 http://learninglegacy.independent.gov.uk/documents/pdfs/sustainability/safeguarding-and-promoting-the-marine-v6.pdf (Stearn & Waldock, 2012).
91 Braunisch et al., 2011.
92 IUCN WCC Resolution 059 of 2016.
93 e.g. Greenpeace, 2000.

should be investigated during this phase and elaborated to the point where specific measures can be detailed for implementation.

The findings of the impact assessment are documented in an EIA report, along with the recommended measures to mitigate negative impacts and any additional conservation actions to enhance biodiversity. Any assumptions, big gaps in information, or key uncertainties that could affect the impact predictions and the outcome of mitigation measures need to be highlighted and steps to address them and reduce risks should be described.

The mitigation and enhancement measures for a new sports venue need to be incorporated into a Biodiversity Management Plan (BMP), or its equivalent.

5.2.6 Using spatial biodiversity information

It is essential to use up-to-date information on biodiversity at the earliest possible stage of planning to guide site selection, help identify important biodiversity, and plan appropriate mitigation. Spatial biodiversity information can be obtained from international, regional, national, and local data bases to provide an early warning of important areas that would best be avoided, and/or particular ecosystems and species that will need special attention in the planning of new sports venues and the mitigation of their impacts (Box 20).

5.3 Ensuring ongoing, accountable management of biodiversity, and monitoring of performance

Full consideration must be given to potential impacts at all stages; responsibility for biodiversity does not stop at the planning stage. Potential impacts on biodiversity require attention during construction, operation, and decommissioning, through the use of monitoring and adaptive management actions, auditing, and reporting. In this way, it can be demonstrated that mitigation measures associated with the development of a new sports venue have been (or are being) effectively implemented, and ultimately that a no net loss outcome, at least, has been achieved.[94]

The construction and operational phases, as well as decommissioning of a sports venue, will need regular checking and adaptive management to make sure that the performance of that venue continues to meet intended outcomes for biodiversity. The involvement of an ecologist, and specific biodiversity expertise where relevant, can help assist in monitoring and evaluating performance.

The checklists for the construction (Section 6.3), operation (Section 6.4), and decommissioning (Section 6.5) phases of a proposed new sports venue give prompts on measures to consider in mitigating and managing impacts on biodiversity and ecosystem services.

5.3.1 Taking a systematic approach to impact management

Without ongoing attention to biodiversity throughout the different phases of implementation, whether the sports venue is permanent or temporary, a long-term positive legacy for biodiversity is unlikely to be achieved.

Measures to mitigate negative impacts on biodiversity and ecosystem services, and to enhance benefits for biodiversity, emerge from the detailed planning stage of new sports venues and need to be captured in a BMP or equivalent, which sets out what must be done, when, by whom, and how often. This document includes the need to monitor and evaluate the effects of both impacts and mitigation measures, and to respond in a timely manner when mitigation and management do not achieve the intended goals or targets for biodiversity.

A range of terms in addition to a BMP can be used to describe different biodiversity plans, depending on their focus and purpose; for example, a Biodiversity Action Plan, a Habitat Action Plan, a Species Action

94 IUCN WCC Resolution 054 of 2004.

Box 20: Databases of important areas for biodiversity

Please refer to Section 7.2 for links to these sources of biodiversity information

Areas of high importance for conservation:[95]

- *Key Biodiversity Areas*: A compendium of sites contributing significantly to the global persistence of biodiversity. They represent the most important sites for biodiversity conservation worldwide and are identified nationally using globally standardised criteria and thresholds.
- *World Database on Protected Areas*: The most comprehensive global database on marine and terrestrial protected areas.
- *UNESCO World Heritage Sites*: Places on earth that are of Outstanding Universal Value to humanity and, therefore, have been inscribed on the World Heritage List to be protected for future generations.
- *Ramsar sites*: Wetland sites designated of international importance under the Ramsar Convention.
- *Alliance for Zero Extinction sites*: A global list of sites containing 95% or more of the remaining population of one or more species listed as endangered or critically endangered on the IUCN Red List of Threatened Species™. These areas are a subset of Key Biodiversity Areas.
- *Important Bird and Biodiversity Areas*: A list of globally important sites for the conservation of bird species. They are the sites needed to ensure the survival of viable populations of most of the world's bird species. This network also holds a large and representative proportion of other biodiversity. These areas are a subset of Key Biodiversity Areas.
- *Ecologically or Biologically Significant Areas*: Areas that have been identified as important for the healthy functioning of our oceans and the services they provide, using scientific criteria.
- *Indigenous and Community Conserved Areas*: Natural and modified ecosystems with significant biodiversity, ecological services, and cultural values that are voluntarily conserved by indigenous and local communities through customary laws or other effective means.
- *Other Effective area-based Conservation Measures:* A geographically-defined space, not recognised as a protected area, which is governed and managed over the long-term in ways that deliver the effective in-situ conservation of biodiversity, with associated ecosystem services and cultural and spiritual values.
- Priority areas identified in a country's National Biodiversity Strategy Action Plan, where available, from the national authority responsible for conservation.
- Priority areas identified in systematic conservation plans covering the proposed development area, where available, from the national, regional, or local conservation authority.
- Red Lists of Threatened Ecosystems, where available, from the national conservation authority.

Important species:

- The IUCN Red List of Threatened Species™ (IUCN 2015).
- National-level Red Lists or Red Data Books of threatened species, or equivalent species assessments at a national level, where available, from the national conservation authority.

The Integrated Biodiversity Assessment Tool or IBAT[96] is a multi-institutional programme of work involving BirdLife International, Conservation International, IUCN, and UNEP-WCMC. It helps users to incorporate biodiversity considerations into project planning and management decisions, such as siting a project or drawing up plans to manage biodiversity impacts and risks. It aims to be a one-stop shop for users seeking biodiversity information.

IBAT draws together information on globally recognised biodiversity from the IUCN Red List of Threatened Species™, Key Biodiversity Areas, and the World Database on Protected Areas (covering nationally and internationally recognised sites, including IUCN categories I–VI, Ramsar Wetlands of International Importance, and UNESCO World Heritage sites).

Through an interactive mapping tool, decision-makers are able to easily access and use this up-to-date information to identify biodiversity risks and opportunities within or close to a project boundary.

Plan, or a Biodiversity Offset Management Plan. These plans are all intended to reduce the consequence and/or risks of impacts on biodiversity. They can be drawn up for a specific venue, or for several sports venues in close proximity needing similar management. Offset sites and related activities can need their own management plans where they are not on – or close to – the same site as the new sports venue.

The plans are explicit about the particular stage of implementation they cover: site establishment and construction; operation; or decommissioning, dismantling, or conversion. To give assurance of achieving the intended biodiversity outcomes, tender documentation for a new sports venue should include explicit biodiversity requirements, and contractors must demonstrate that they have taken full account of – and can deliver – the requirements of the BMP (or equivalent) by providing adequate method statements. Penalties should be built into contracts for any non-compliance with these plans.

The BMPs (or equivalent) are important because they provide a clear frame of reference against which key stakeholders can check on mitigation actions and monitor performance in relation to explicit goals and targets. They also give ecologists working on the planning and implementation teams a baseline against which to measure results.

Sufficient financial provision to implement these measures must be assured; without that assurance, there are considerable risks that the intended long-term legacy for biodiversity would not materialise.

5.3.2 Monitoring the effectiveness of implementation

Monitoring and evaluation is crucial to the successful development and operation of a new sports venue.

Impacts on biodiversity can affect ecosystems, the habitat of important species (thus affecting their population size and viability), ecological processes, and/or ecosystem services. The impacts are predicted in an EIA, and measures are proposed to mitigate and manage them. Monitoring should target all biodiversity components on which potentially significant impacts are predicted, and which underpin the recognition of an area's importance for biodiversity conservation. It requires the identification of appropriate indicators to track the predicted impacts; the most sensitive components to predicted changes must be chosen in order that even minor negative effects can be detected.

It is essential to monitor both the actual impacts of implementation of a new sports venue or sporting event, and the effect of mitigation measures adopted to avoid and minimise impacts, restore damage, and offset remaining impacts. The results of monitoring must be analysed to evaluate the effectiveness of mitigation and management measures being used in relation to their intended outcomes.

Monitoring checks the predicted impacts in an EIA against actual impacts, and enables the appropriateness and adequacy of planned mitigation and management measures to be evaluated. It can also identify any unforeseen impacts on biodiversity or ecosystem services that need to be addressed.

Where it seems likely that the measures prescribed in the BMP (or equivalent) are failing to achieve the intended results, this document can be revised to introduce additional corrective or adaptive management measures to ensure that biodiversity outcomes will be achieved.

Temporary sports venues may have transient impacts only; monitoring requirements would thus be relatively low. Where new sports venues are intended to be permanent, management to safeguard biodiversity and monitoring of performance would need to be ongoing throughout the construction and operational phases. The involvement of affected local communities in mitigation and management actions can help to build long-term support for maintaining biodiversity and ecosystem services.

In all cases, there should be follow-up checks on performance with regard to the intended biodiversity outcomes. Regular and independent auditing of biodiversity performance during the implementation stages is essential to ensure credibility; independent audits provide useful third-party verification of performance.

95 The International Finance Corporation's Performance Standard 6 Guidance Note and the World Bank's Environmental and Social Standard 6 provide useful information on many of these particular attributes in describing Critical Habitat and Natural Habitat. In addition, the UN's Environment and the World Conservation Monitoring Centre's Biodiversity A-Z website provide useful information.
96 https://www.ibatforbusiness.org/

Box 21: Examples of partnerships and collaboration with conservation organisations

These guidelines derive from the partnership agreement between IUCN and the IOC. There are many other examples of collaborative projects, some of which have already been highlighted in the case studies in this document. Additional examples are listed below.

- Conservation International is working with the America's Cup Event Authority (sailing) and other leading voices in ocean conservation to develop a large communication outreach programme focused on improving ocean health.[97]
- The Green Sports Alliance, formed to help sports venues and leagues enhance their environmental performance, partners with a government environmental agency as technical advisor.[98]
- The WWF joined up with the World Rowing Federation, FISA, in 2011 to promote good water management and nature stewardship.[99]
- When the New York Mets (an American baseball team) developed their new stadium, Citi Field, they entered into a formal partnership with the United States Environmental Protection Agency (EPA),[100] to ensure that the construction and operation of the venue would follow environmental stewardship principles. As a result, Citi Field has reduced energy and water use, as well as solid waste production across their entire operations. Ecological measures included installing a green roof and porous paving.

5.3.3 Being transparent and accountable

The EIA and information on planned mitigation and management measures for new sports venues should be made available for comment to key stakeholders and the public, to promote transparency, credibility, and accountability.[101]

Where thedevelopmentofproposed sports venues is likely to be contentious, complex, and/or unprecedented, independent peer review of the EIA is advisable for quality assurance and confidence in its findings and mitigation measures. In addition, if the assessment of impacts and identification of mitigation measures was done solely by an in-house ecologist, independent review is advisable for added credibility. The results of independent audits of the performance of sports venues should also be made available to the public.[102]

It would be beneficial to conservation organisations and academic and research institutions if the biodiversity information collected during the planning and/or implementation of a new sports venue were shared with them. Sharing biodiversity inventories, baseline information, and monitoring results would help to increase the available biodiversity data and knowledge for biodiversity conservation. In the interests of transparency and accountability, it would be beneficial for new sports venues and their operations to comply with applicable certification schemes, for example for sustainable golf course development (Box 16 and Section 7.1.3) or sustainable sourcing of materials (Section 7.1.10). In addition, it may be constructive to forge partnerships or collaborate with conservation NGOs in the planning and implementation of new sports venues (Box 21).

97 https://mission-blue.org/category/americas-cup-healthy-ocean-project/
98 https://www.thesolutionsjournal.com/article/the-environmental-awakening-in-sport/
99 http://wwf.panda.org/about_our_earth/about_freshwater/freshwater_news/?299251/Champions-of-Clean-Water
100 http://newyork.mets.mlb.com/nym/community/green.jsp
101 WCC Resolution 054 of 2004.
102 e.g. Greenpeace, 2000.


6

6. Taking action

This chapter includes five checklists providing numerous considerations to refer to when the development of a new sports venue is being planned and implemented. They are intended to support the integration of biodiversity considerations into the sequence of planning and implementation phases of these venues and events, and promote adherence to the good practices set out in these guidelines.

Use of the list of questions for early planning (Section 6.1) and detailed planning (Section 6.2) can help the proponents of the new venue or event and their planning teams to identify potential risks and impacts to biodiversity, and explore ways to mitigate negative impacts and exploit opportunities to benefit biodiversity. The checklists can prompt consideration of possible development options, and guide choices on the siting, layout, design, and management of these facilities. The mitigation and enhancement measures are then carried through into the implementation stage by incorporating them into a BMP or equivalent, with a greater level of practical detail to assist implementing agents.

The construction (Section 6.3), operation (Section 6.4), and decommissioning or dismantling (Section 6.5) checklists are intended to provide examples of typical measures to be applied during these phases. These checklists are by no means comprehensive; in most cases measures specifically tailored to the particular venue or event would emerge from detailed planning. Rather, they are meant as a memory check for the planning and implementation team of possible actions that can be incorporated into a BMP or equivalent for these different phases.

6.1 Checklist for the early planning stage and site selection

This checklist is for use by the party or team proposing the new sports venue or sporting event.

	Question	Key considerations and information requirements
1.	Has a commitment been made to explicit and measurable biodiversity outcomes to be achieved by the new sports venue?	1) Has a commitment been made to avoid negative impacts on areas, ecosystems, and species of high importance for biodiversity conservation, in line with IUCN Resolutions and Recommendations? 2) Have the goals and performance targets for biodiversity been decided, for example to maintain (no net loss) or improve (net gain) biodiversity relative to current levels? (Reference should be made to Table 2 in this guideline.)
2.	Is the scope, proposed location, and nature of the new sports venue clear?	1) What are the major components of the new sports venue: its physical footprint, built structures, areas required for sporting activities? 2) Is the venue to be permanent or could it be temporary? 3) What are the main infrastructure requirements of the venue?
3.	Does the planning team have ecological and biodiversity expertise?	1) Does the planning team have a reputable and respected ecologist with knowledge of the proposed affected area to advise on biodiversity matters? 2) Does the ecologist (and/or biodiversity specialist) work closely with other specialists, including, e.g. engineers and architects on the planning team, to ensure cross-cutting issues are addressed?
4.	Has relevant and available biodiversity information been gathered to inform planning?	1) Have the legal requirements with regard to biodiversity been determined? 2) Has available information on the biodiversity importance of the area (or areas) being considered for developing a new sports venue or sporting event been collected?
5.	Have key biodiversity stakeholders been involved in the early planning process?	1) Have key biodiversity stakeholders (e.g. international, regional, national, and/or local conservation organisations and NGOs; transboundary biodiversity conservation bodies; biodiversity conservation authorities at national or local levels) been identified and engaged? 2) Has due consideration been given to key stakeholders' views in formulating a biodiversity conservation vision, with goals and performance targets for biodiversity? 3) Have the major concerns or issues of key stakeholders with regard to the proposed sports venue or sporting event, which must be resolved during planning, been identified and documented? 4) Where indigenous communities, their management areas or their ecosystem services will be affected, have they been engaged?

	Question		Key considerations and information requirements
6.	Have impacts on critical habitats, in and around protected areas and globally recognised sites, and on other areas of high importance for conservation been avoided through consideration of feasible alternatives?		
	6.1	Has information been gathered on the importance to biodiversity of areas being considered for sports development?	1) Have international biodiversity databases, information systems (e.g. Word Database on Protected Areas, Ramsar Site, UNESCO World Heritage Sites, Important Bird and Biodiversity Areas, Key Biodiversity Areas, etc.) been consulted to identify and enable avoidance of these priority areas? 2) Have international NGOs been consulted about the biodiversity significance of areas where globally important biodiversity could be affected? And have areas of high significance been avoided? 3) Have regional or transboundary databases (e.g. river commissions) been accessed to identify priority areas for biodiversity? And have these areas been avoided? 4) Have available data on migratory animals and birds (e.g. Migratory Soaring Birds sensitivity maps) been consulted, to enable planning to prevent risks to these species? 5) Have regional conservation bodies been consulted about the biodiversity significance of areas where regionally important biodiversity could be affected? And have areas of high significance been avoided? 6) Have data on existing protected areas and protected area expansion plans been accessed to identify key areas for biodiversity? Have these areas been avoided? 7) Have any ICCAs or OECMs been identified in the area? Have these areas been avoided? 8) Have data on nationally important or threatened ecosystems (i.e. not currently protected) been used to identify and avoid impacts on these areas? 9) Have data on protected and threatened species (Red List/Red Data Books or equivalent within country) been used to identify key risks and impacts that need to be prevented? 10) Have national conservation bodies been consulted about the biodiversity significance of areas where nationally important biodiversity could be affected? And have areas of high significance been avoided? 11) Have biodiversity spatial plans, NBSAPs and/or strategies (where they exist) that identify and prioritise conservation or sensitive areas that would need to be avoided been considered?
	6.2	Have the policy implications of considering developing a new sports venue in a particular area been addressed?	1) Have any requirements of international biodiversity agreements or conventions been identified and considered? 2) Have any requirements of regional or transboundary conservation agreements and strategies been identified and met? 3) Have any requirements of national biodiversity laws, regulations, and conservation strategies been identified and considered? 4) Will development of a new sports venue be compatible with the conservation objectives and/or outcomes of the affected area? 5) Have all feasible alternative locations for the new sports venue that would avoid significant impacts been considered, including the use of brownfield or degraded sites? 6) Has due consideration been given to using a temporary rather than a permanent venue, to reduce impacts?

6.2 Checklist for the detailed planning stage

This checklist is for use by the team planning and assessing the impacts of the new sports venue or sporting event, and formulating appropriate mitigation and enhancement measures.

	Questions	Key considerations and information requirements
1.	Have the scope and area of influence of the new sports venue and associated infrastructure or services been considered?	1) What are the different components of the new sports venue: its physical footprint, built structures, and areas required for sporting activities? 2) What supporting infrastructure, facilities, and services (e.g. fencing, power supplies, water, access roads, etc.) are needed? 3) Will these different components be limited to the site of the new sports venue or extend further afield (i.e. what is the likely area of influence of the venue on biodiversity beyond the development site or sites)? 4) Are there local communities, and in particular local indigenous communities, who could be negatively affected by any changes to the ecosystem services on which they depend?
2.	Does the planning team have adequate ecological and biodiversity expertise?	1) Does the planning team have a reputable and respected ecologist with knowledge of the proposed affected area to advise on biodiversity matters, someone who works closely with other team members to ensure cross-cutting issues are addressed? 2) Have biodiversity specialists been brought on board during the EIA stage to address any ecosystem- or species-specific issues and concerns? 3) Where indigenous communities and their ecosystem services may be affected, have appropriate specialists been brought on to the planning team?
3.	Is there enough baseline biodiversity information to be able to predict impacts reliably?	1) Have available data on the biodiversity importance of the site and wider landscape been collected? 2) Have data on threatened ecosystems (where available and/or contained in NBSAPs) been collected and used to identify priority areas to avoid? 3) Have data on protected and threatened species (Red List/Red Data Books) been used to identify priority areas to avoid? 4) Have national ecological/biodiversity experts been called on for advice and help in identifying, assessing, and mitigating key issues and risks (as relevant)? 5) Have additional baseline surveys been undertaken by biodiversity specialists to improve the confidence of impact predictions where there are major gaps in biodiversity information and/or to gather seasonal data? 6) Have the use and/or cultural values of biodiversity to local communities or other sectors (e.g. nature tourism) been identified, to enable impacts and risks to be assessed?
4.	Have all legal requirements pertaining to biodiversity been addressed?	1) Will any applicable requirements of international biodiversity agreements or conventions be met? 2) Will any requirements of regional or transboundary conservation agreements and strategies be met? 3) Will any requirements of national biodiversity laws, regulations, and conservation strategies be met? 4) Will there be compliance with any local conservation by-laws?

	Questions	Key considerations and information requirements
5.	Have all potentially significant impacts and risks to biodiversity been identified and assessed?	1) Have all possible impacts and risks to biodiversity within the area of influence of the new sports venue been identified and assessed by appropriate specialists? 2) Have the possible direct, indirect, and cumulative impacts of all the different components of the new venue, including supporting infrastructure and facilities, been considered? 3) Have potentially significant impacts on biodiversity that has high use and/or cultural value been assessed (involving both biodiversity and social specialists)?
6.	Have key biodiversity stakeholders been involved in the detailed planning process?	1) Have the major concerns or issues of biodiversity stakeholders, which must be resolved during planning, been identified and recorded? 2) Have the stakeholders been involved in determining a biodiversity conservation vision and desired outcomes for the venue? 3) Have they been given an opportunity to give input to, and comment on, proposals for the new sports venue, the assessment and mitigation of probable negative impacts on biodiversity, and potential enhancement measures? 4) Where there are local indigenous communities, are steps being taken to address the need for – and obtain – free, prior, and informed consent? 5) Has the potential for establishing partnerships with biodiversity conservation NGOs been identified and discussed, to contribute to the planning and implementation of the new sports venue or sporting event? 6) Have key biodiversity stakeholders been given an opportunity to provide input to formulating an appropriate BMP (or equivalent)?
7.	Have impacts in No-go areas and other areas of high importance for biodiversity conservation been avoided or prevented?	1) Have all feasible alternative sites been given due consideration, including the use of brownfield or degraded sites, to ensure that no-go and surrounding areas would not be negatively affected? 2) Has avoidance or prevention of negative impacts on other areas of high importance for conservation been prioritised? 3) Has consideration been given to alternative spatial layout options to avoid or prevent negative impacts? 4) Has consideration been given to temporal/scheduling options and design options to avoid or prevent negative impacts on these areas, including the use of a temporary venue?

	Questions	Key considerations and information requirements
8.	Have negative impacts been minimised?	1) Have issues and concerns raised by stakeholders been addressed? 2) Has the team's ecological specialist, and – where required – species-specific biodiversity experts with local expertise, assessed potential impacts and risks, and recommended appropriate mitigation and enhancement measures? 3) Where negative impacts on ecosystem services are likely, has the ecological specialist worked with a social specialist and/or community representatives to find ways to minimise possible harm? 4) Have feasible physical/spatial options, operational/design options, scheduling options, management options, and pollution- or threat-reduction options to minimise negative impacts been explored? 5) Have feasible options been considered to minimise impact on freshwater resources through, e.g., water-efficient fittings, systems for the use of harvested rainwater, water recycling, and sustainable landscaping and irrigation practice? 6) Has consideration been given to a temporary rather than a more permanent venue, to reduce potential negative impacts, and/or limitations on use of the venue at specific times to minimise impacts?
9.	Have plans been prepared to restore areas affected by unavoidable impacts during construction, and areas post-decommissioning/ dismantling?	1) Has ecological expertise and/or a restoration specialist been used to advise on the best way to restore areas temporarily affected by construction activities? 2) Have adequate financial provision and arrangements been made for successful restoration, to ensure lasting benefit?
10.	Have offsets and/or compensation to mitigate remaining negative impacts on biodiversity been planned?	1) Have the remaining negative impacts of the new sports venue or sporting event, after avoidance, minimisation, and restoration measures have been exhausted, been measured or quantified? 2) With reference to Table 2 in this guideline, would residual negative impacts be permissible, or would these residual negative impacts make the proposed development a no-go? 3) Has the team's ecologist confirmed that these remaining impacts would not be irreversible or push the affected ecosystem or species into a more threatened conservation status, making the current proposal unacceptable? 4) Only in cases where a biodiversity offset would be appropriate and would achieve biodiversity targets, has the team's ecologist and/or a biodiversity offset specialist helped to design and plan the offset, prioritising offsets that would best contribute to conservation plans, strategies, and goals? 5) Has the team's ecologist confirmed that there would be a low risk of the proposed offset measures or compensation failing to achieve the intended outcomes? (Where there would be a high risk of failure, the current proposal would not achieve no net loss or net gain of biodiversity, implying that lower-impact project alternatives should be explored.) 6) Have opportunities been created for key biodiversity stakeholders and partners to be involved in the design and implementation of biodiversity offsets? 7) Have in-nature compensation or substitute resources, acceptable to affected parties, been identified to remedy significant negative impacts on people's use or cultural values of biodiversity?

	Questions	Key considerations and information requirements
11.	Have opportunities for enhancing biodiversity through additional conservation actions been identified and exploited?	1) Has the team ecologist identified opportunities to enhance biodiversity, striving to support local or national conservation plans, strategies, and goals? 2) Have degraded areas (excluding areas affected by the proposed sports venue) that could be restored or better managed been identified for improvement? 3) Have isolated areas that could be re-connected to other natural or critical habitats or protected areas been identified for additional conservation actions? 4) Has the use of green buildings, roofs and walls, landscape structures, and technology been given due consideration, to provide suitable habitat for native wildlife and deliver environmental benefits?
12.	Is there assurance of the quality of planning, assessment, and mitigation of potential impacts and risks to biodiversity?	1) Has consideration been given, where particular biodiversity is at risk, to appointing independent peer reviewer(s) to check the assessment of impacts on biodiversity, and the appropriateness, adequacy, and quality of recommended mitigation and enhancement measures to be included in the BMP (or equivalent)? 2) Has consideration been given to involving reputable conservation NGOs as partners and/or to review and advise on mitigation and enhancement measures? 3) Have conservation stakeholders or partners had the opportunity to review the EIA and the BMP (or equivalent) before its finalisation?
13.	Is there assurance that all mitigation measures would be effectively implemented in the different stages of development?	1) Have all mitigation and enhancement measures been incorporated into a BMP (or equivalent)? 2) Have clear goals for biodiversity management and measurable, realistic targets to be reached or maintained as a result of mitigation or enhancement measures by a specific date been given? 3) Is it clear at what stage of development the mitigation or enhancement measures must be implemented? 4) Are the timing, frequency, and responsibility for mitigation or enhancement measures explicit? 5) Has adequate provision been made for monitoring and evaluation using appropriate indicators, to check impacts against EIA predictions, evaluate the adequacy of mitigation measures, and enable adaptive and corrective action as and when needed?
14.	Has adequate financial provision been made for effective implementation?	1) Has adequate financial provision been made to implement the BMPs (or equivalent) effectively in every stage of implementation, including all mitigation and enhancement measures? 2) Will the financial arrangements and provision be audited regularly to ensure sufficient financial provision through all implementation phases?

	Questions	Key considerations and information requirements
15.	Are there sufficient checks to ensure that mitigation and enhancement measures will be successfully implemented to achieve the intended results?	1) Will the procurement process take into account the biodiversity credentials of companies? 2) Will tenders and contracts incorporate mitigation and/or enhancement measures for biodiversity as specified in the BMP (or equivalent)? 3) Will contractors need to demonstrate through method statements that they could and would comply with the requirements of the BMP (or equivalent)? 4) Will penalties for non-compliance with the BMP (or equivalent) be included in contracts? 5) Is there a clear monitoring programme to check and report back on biodiversity performance, and revise management measures where necessary to ensure intended outcomes will be met? 6) Are key biodiversity stakeholders or partners involved in monitoring and evaluating performance? 7) Has an independent auditor been appointed to evaluate and report on biodiversity mitigation and performance in relation to the stated goals and targets? 8) Has consideration been given to the establishment of a biodiversity committee or panel to oversee the development process and advise on optimum implementation?
16.	Are there any major gaps in biodiversity information or uncertainties in assessing impacts?	1) Is the information base used to predict and assess likely impacts on biodiversity reliable and adequate? 2) Has information on seasonal presence of species, or migratory species, been gathered and used? 3) Where there are major gaps, has the need for additional biodiversity surveys and/or monitoring been included in the BMP (or equivalent) to improve predictions and management?
17.	Has provision been made for transparent and accountable communication and reporting?	1) Will there be open and transparent reporting on performance and progress with implementation, drawing on independent audits? 2) Is it clear when and how often the results of monitoring and/or independent audits should be reported on, and communicated to stakeholders and the public?
18.	Has provision been made for awareness-raising on the importance of biodiversity conservation?	1) Do plans include communication of the importance of biodiversity conservation to participants and spectators, and the public? 2) Will measures to be taken to benefit biodiversity be publicised? 3) Have opportunities been created for the public to get involved and participate in conservation activities?
19.	Have probable climate change risks and impacts been avoided?	1) Has the siting and design of the venue taken into account anticipated major climate change risks and natural hazards (e.g. increasing flooding, droughts, land instability, increased risk of wildfire)?

6.3 Checklist for the construction phase of permanent and temporary venues and overlay installations

Site establishment and construction activities will vary widely, depending on the particular sports venue and its nature (i.e. permanent or temporary) and the sporting event. This checklist provides examples of typical activities that could be included in the Biodiversity Management Plan (or equivalent) for the construction phase. It is intended for use by the planning team, project manager, and environmental officer or ecologist on site.

	Objective	Example of good practice mitigation measure
1.	Minimise the development footprint	1) Clearly demarcate the outer boundaries of areas permitted to be affected by construction activities, including material storage areas, equipment laydown sites, parking areas, ablution facilities, etc. The minimum areas needed for all construction activities should have been determined during planning, to inform this demarcation. 2) Clearly demarcate areas or features that should not be affected during construction. These areas should include: ✓ important ecosystems or vegetation (e.g. wetlands, forest, large trees); ✓ areas known to provide habitat for important animal species - including their movement paths; ✓ buffer or set-back areas around particularly sensitive ecosystems (e.g. wetlands, riparian areas next to streams or rivers); and ✓ areas particularly susceptible to erosion or instability. 3) Use footprint areas as temporary storage sites for any waste or excavated soil (to be re-used in restoration), rather than clearing and creating additional storage areas. 4) Provide education, information sharing, and awareness raising about biodiversity issues to construction teams, to ensure that they are aware of areas to avoid (including sensitive areas), and why their avoidance is needed.
2.	Restore areas that will be affected by unavoidable construction impacts	1) Employ ecological experts and/or restoration specialists to advise on the best way to restore areas temporarily affected by construction activities. 2) Implement effective measures to restore impacted areas as soon as possible after disturbance or damage, to ensure a lasting, positive biodiversity legacy. 3) Rescue plant material (seeds, cuttings, whole plants) for use in post-construction restoration and landscaping. 4) Consider establishing a plant nursery to store seeds and plants, and propagate new plants for use in restoration and landscaping.
3.	Minimise harm to fauna in the development footprint	1) Rescue and relocate animals on the construction sites to appropriate receiving areas, on the advice of the team or a specialist ecologist (e.g. in Vancouver, hundreds of tadpoles and frogs were collected and relocated to a suitable protected area before construction began).
4.	Avoid and/or minimise harm to migrating or breeding species	1) Schedule construction during the appropriate season to minimise negative impacts on migrating or breeding species. 2) Do not allow domestic animals to be introduced to construction sites. 3) Attach bird flight diverters to overhead cables and powerlines. 4) Ensure that, where fencing is used, it is permeable to wide-ranging animal species, so as not to impede movement.

	Objective	Example of good practice mitigation measure
5.	Avoid and/or prevent destabilisation of soils and erosion, sediment mobilisation into water, and dust	1) Time construction activities to coincide with the dry season where there is a risk of washaways and erosion, or where there is snow cover to protect against soil damage. 2) Retain as much soil and natural vegetation as possible when clearing areas (e.g. remove only rocks and level only the roughest, most dangerous surfaces for skiing). 3) Minimise the time that excavated soil is exposed to water and wind, and use this soil in restoration; restoration should be carried out immediately after construction is complete. 4) Manage dust mobilisation through appropriate dust-suppression measures. 5) Prohibit use of heavy machinery within a defined setback from watercourses to clear vegetation; any essential clearing should be done by hand. 6) Set aside a buffer of natural vegetation between construction activities and watercourses and/or use silt fencing to control erosion and sedimentation.
6.	Avoid and/or minimise noise and vibration disturbance to fauna	1) Schedule construction activities that generate vibrations and noise carefully to avoid damage and/or disturbance to sensitive animals (e.g. crocodiles are particularly sensitive to vibrations). 2) Avoid noise and vibrations at dusk and during the night. 3) Whenever feasible, schedule different noisy activities (e.g. blasting and earthmoving) to occur at the same time, thus reducing their duration. 4) Minimise the use of explosives; where feasible, avoid blasting through use of directional drilling. 5) Restrict hours of operation of heavy and noisy equipment. 6) Use sound insulation, exhaust silencers, quiet cooling fans, acoustical wrapping, etc. on noisy equipment and machinery.
7.	Avoid and/or minimise harm to animals from artificial lighting	1) Schedule construction to take into account and minimise interference with diurnal patterns of important biodiversity. In particular, avoid or minimise lighting at night. 2) Avoid, where possible, or minimise use of lights at night. Where unavoidable, use directional and/or down-lighting to minimise harmful effects. Planting of vegetation can shield sensitive areas against light; the use of light-absorbent rather than reflective surfaces can reduce spread of light. Altering the intensity and/or wavelength of lighting can also help to minimise harm.[5]
8.	Avoid and/or minimise pollution of water resources	1) Minimise use of all potentially harmful chemicals, e.g. in clearing of sites, hardening ice for skiing, etc. 2) Site fuelling facilities well away from sensitive areas to prevent contamination of ecosystems. 3) Prevent movement of silt-laden waters into environmentally sensitive areas by using sediment control techniques. 4) Direct any potentially contaminated runoff away from sensitive aquatic habits. 5) Keep concrete and concrete equipment wash water away from the drainage areas and freshwater ecosystems. 6) Have an emergency response plan and equipment in place to contain any accidental spills of pollutants.

	Objective	Example of good practice mitigation measure
9.	Avoid and/or minimise changes to water flow	1) Avoid altering natural drainage patterns or the course of a river or stream. 2) Avoid encroaching on floodplain, riparian, and wetland areas. 3) Ensure that there is an appropriate stormwater or surface water management plan, encouraging drainage into subsoils (e.g. through swales) rather than impermeable surfacing, minimising surface runoff. 4) Consider using green or permeable pavements and swales to minimise runoff, rather than using hard structures or pipes. 5) Consider using green roofing (i.e. a roof partly or completed covered with vegetation) to reduce the volume of surface water being lost to public sewerage systems. 6) Recycle and reuse water; explore use of wastewater in construction.
10.	Avoid and/or minimise fragmentation of natural or critical habitat and the creation of barriers to animal movement	1) Retain wildlife corridors or 'stepping stones' of natural habitat to allow animal movement across the development area. 2) Avoid erecting structures across, or barriers on, known movement routes (e.g. security fencing, roads, etc.). 3) Where stream or river crossings are required, make sure that they continue to provide passage for fish and wildlife. 4) Where roads or fences will act as a barrier to wildlife, provide under- or overpasses to allow continued movement, or permeable barriers to allow passage.
11.	Avoid and/or minimise the import or introduction of alien and invasive species or pests	1) Use sterile materials in construction and landscaping. 2) Clean vehicles and equipment before use on site.
12.	Promote the use of local native plants in landscaping and design	1) Use locally occurring indigenous (native) plant species in restoration work in disturbed areas and other open spaces.
13.	Promote the use of restored or re-created habitat by native animals	1) Incorporate nest boxes or bat boxes to enhance local restored areas and bring back local animals.
14.	Prevent unplanned wildfires and/or contain them on site	1) Implement controls to minimise risks of accidental fires. 2) Ensure that there is a fire plan, and the necessary equipment and resources in place, to extinguish accidental fires and prevent them from spreading.
15.	Prevent road kills of native animals	1) Control the speed of construction vehicles. 2) Avoid construction at night.
16.	Prevent poaching or illegal harvesting of wildlife	1) Implement strict penalties for illegal offtake of animals and plants.
17.	Raise awareness of the importance of biodiversity	1) Educate construction workers about the value of local biodiversity, and of the 'dos' and 'don'ts' during construction.
18.	Ensure that use of biodiversity during construction is sustainable	1) Ensure that sourcing and procurement of materials is biodiversity-friendly and appropriately certified.

	Objective	Example of good practice mitigation measure
19.	Involve key biodiversity stakeholders in construction where feasible	1) Consider creating opportunities for key biodiversity stakeholders to be involved in monitoring performance in relation to mitigation of biodiversity impacts.
20.	Provide offsets for residual negative impacts on biodiversity (where relevant)	1) Make sure that arrangements and adequate financial provision have been made for biodiversity offsets to be successfully implemented, to ensure lasting benefit. 2) Create opportunities for key biodiversity stakeholders to be involved in the implementation of biodiversity offsets and their management.
21.	Ensure that impacts and the effects of mitigation and management are being monitored	1) Ensure that adequate provision has been made for monitoring and evaluation using appropriate indicators. 2) Ensure that, where monitoring identifies probable shortcomings in the achievement of biodiversity goals or targets, there is corrective or adaptive management to ensure biodiversity goals or targets would be met.
22.	Communicate openly on performance	1) Report openly and transparently on biodiversity performance and progress with implementation, drawing on monitoring results and independent audits.

6.4 Checklist for the operation of sports venues

Operational activities will vary depending on the nature of a particular sports venue (i.e. permanent or temporary) and/or sporting event. This checklist provides typical activities that could be included in a Biodiversity Management Plan (or equivalent) for the operational phase of a sports venue or sporting event. Where new sports venues are intended to be permanent, management to safeguard biodiversity and monitoring of performance would need to be ongoing. The involvement of affected local communities in mitigation and management actions can help to build long-term support for maintaining biodiversity and ecosystem services. This checklist is for use by the planning team, venue management, and environmental officer or ecologist on site. Although aimed at the development of new sports venues, and expansion or refurbishment of existing venues, the points covered could apply to good biodiversity management at existing venues.

	Objective	Example of good practice mitigation measure
1.	Avoid and/or minimise impacts and risks to breeding or nesting animals	1) Avoid holding sporting events during nesting, birthing, or breeding seasons of threatened animals.
2.	Avoid and/or minimise harm to biodiversity by effective management of competitors and spectators	1) Control movement of visitors across natural spaces by using clear signposting of venues and guides, and by providing adequate route maps and path networks. 2) Create and monitor a buffer zone between priority conservation or sensitive areas and event venues to limit access to – and impacts on – these areas. 3) For aquatic sports venues, declare certain sensitive areas off-limits (e.g. banks of watercourses) and stipulate activity routes to reduce streambank erosion. 4) Control access to, and stipulate permissible activities and behaviour of visitors and spectators in, sensitive biodiversity areas. 5) Fully brief event stewards. 6) Clearly demarcate different zones to manage visitors,[6] for example: ✓ Strictly protected, where tourism and tourism infrastructure are prohibited; ✓ Restricted tourism zone, where limited access to tourists is permitted, usually on foot; ✓ Moderate tourism zone, where diverse, low-impact activities are allowed which are consistent with the natural environment; and ✓ Semi-intensive and intensive tourism zones, which accommodate a range of facilities and activities.
3.	Prevent and/or minimise the introduction or import of alien and invasive species and pests – both plant and animal	1) Use biosecurity protocols where there is a high risk of introducing alien or invasive species (e.g. for imported materials or equipment), and/or strict quarantine periods where there is a known risk of bringing in disease (e.g. equestrian events and risks of introducing disease). For example, plans for the 2010 FISA World Rowing Championships in New Zealand included a comprehensive bio-security strategy for inbound equipment.[7] 2) Eradicate invasive, alien, and pest species on a regular basis.

	Objective	Example of good practice mitigation measure
4.	Prevent and/or minimise pollution of land and water, and associated animal mortality	1) Manage litter through clear demarcation of litter bins and bins for hazardous waste. 2) Dispose of wastes in licenced disposal sites. 3) Direct any potentially contaminated runoff away from sensitive aquatic habitats and erect litter-retaining barriers between water and the venue to prevent litter entering the water. 4) Have an emergency response plan and equipment in place to contain any accidental spills of pollutants. 5) Avoid use of non-specific and persistent pesticides and herbicides. 6) Minimise use of fertilizers. 7) Minimise use of potentially toxic or hazardous chemicals, e.g. anti-fouling agents on boats, paints, etc. 8) Ensure that boats have spill kits to manage accidental spills.
5.	Prevent and/or minimise harm to animals from artificial lighting	1) Avoid, where feasible, or minimise use of lighting at night where there are fauna (terrestrial, freshwater, or marine) sensitive to, or disorientated by, night lights.
6.	Prevent and/or minimise disturbance to fauna from noise and vibration	1) Minimise noise by using quiet cooling fans, acoustical wrapping, and sound insulation. 2) Use temporary noise barriers during sporting events to prevent noise reaching sensitive areas.
7.	Minimise use of water (and thus indirect impacts on aquatic ecosystems)	1) Maximise efficient water use by using best-available equipment. 2) Recycle and reuse irrigation water. 3) Make use of rainwater storage tanks. 4) Use underground tanks to store treated wastewater (where quality is suitable for re-use). 5) Use constructed wetlands to remove pollutants from stormwater to allow reuse of water.
8.	Ensure that the procurement of biodiversity-based goods and materials is sustainable	1) Ensure that sourcing and procurement of goods and materials is biodiversity-friendly and appropriately certified.
9.	Prevent poaching and/or illegal harvesting of wildlife	1) Implement strict penalties for illegal offtake of animals and plants.
10.	Prevent unplanned wildfires and/or contain them on site	1) Implement controls to minimise risks of accidental fires. 2) Ensure that there is a fire plan and adequate equipment and resources in place to extinguish accidental fires and prevent them from spreading.
11.	Maintain key ecological processes	1) Undertake, as appropriate to the ecosystem, controlled burns, vegetation clearing, or mowing.
12.	Provide opportunities for key biodiversity stakeholders to partner or be involved in biodiversity management and monitoring	1) Give key biodiversity stakeholders the opportunity to be involved in monitoring and evaluation of performance in relation to mitigation of biodiversity impacts. 2) Give key biodiversity stakeholders an opportunity to partner in implementing biodiversity management during operation.

	Objective	Example of good practice mitigation measure
13.	Ensure that offsets (where relevant) are effectively secured and managed	1) Make sure that arrangements and adequate financial provision have been made for biodiversity offsets to be successfully implemented, to ensure lasting benefit. 2) Create opportunities for key biodiversity stakeholders to be involved in the implementation of biodiversity offsets and their management.
14.	Enhance biodiversity not directly affected by the sports venue	1) Ensure that robust arrangements for enhancement measures to be effectively implemented have been made, targeting: ✓ degraded areas that could be restored; ✓ isolated areas that could be better managed or re-connected to other natural or critical habitats or protected areas; and ✓ new areas to set aside for conservation.
15.	Check that mitigation and enhancement measures are being successfully implemented to achieve the intended results	1) Rigorously implement mitigation measures and actions set out in the BMP (or equivalent). 2) Check that the procurement process has taken into account the biodiversity credentials of companies, and that contracts have incorporated mitigation measures for biodiversity as specified in the BMPs (or equivalent plan). 3) Ensure adequate financial provision has been made to implement all mitigation measures successfully. 4) Appoint an independent auditor at regular intervals to evaluate and report on biodiversity mitigation and performance in relation to stated goals and targets.
16.	Ensure that impacts and the effects of mitigation and management are being monitored	1) Ensure that adequate provision has been made for monitoring and evaluation using appropriate indicators. 2) Ensure that, where monitoring identifies probable shortcomings in the achievement of biodiversity goals or targets, there is corrective or adaptive management to ensure biodiversity goals or targets would be met.
17.	Communicate openly on performance	1) Report openly and transparently on biodiversity performance and progress with implementation in relation to stated goals and targets, drawing on monitoring reports and independent audits.
18.	Raise awareness of the importance of biodiversity conservation and involve communities in conservation efforts	1) Communicate the importance of biodiversity conservation and the value of local biodiversity to competitors, participants, and spectators, and to the wider public. 2) Educate the public, competitors, and spectators about appropriate behaviour and compliance with signage. 3) Educate sporting event stewards about the value of local biodiversity, and of ‘dos’ and ‘don’ts’ during operation. 4) Publicise measures that are being taken to benefit biodiversity conservation. 5) Create opportunities for the public to get involved and participate in conservation activities.

6.5 Checklist for decommissioning or dismantling

Permanent or temporary sports venues and overlays will need to be decommissioned or dismantled when no longer in use, or converted to another use. This checklist provides typical activities that could be required during decommissioning and dismantling. It is for use by the planning team, venue management, and ecologist (as needed).

	Objective	Example of good practice mitigation measure
1.	Involve key biodiversity stakeholders in planning decommissioning	1) Involve key biodiversity stakeholders in determining an optimum post-decommissioning vision or after-use of the venue site. 2) Seek opportunities for key biodiversity stakeholders to be involved in planning biodiversity restoration and/or enhancement measures.
2.	Protect natural and any critical habitat from impacts during decommissioning	1) Clearly demarcate existing areas of critical habitat, natural habitat, and sensitive areas (e.g. wetlands, drainage lines, mobile sands), to avoid damaging them during dismantling, decommissioning, or conversion.
3.	Prepare plans to restore and enhance areas post-decommissioning	2) Use ecological experts and/or restoration specialists to advise on the best way to restore areas after decommissioning or dismantling of particular infrastructure, to leave a positive legacy. 3) Eradicate invasive, alien, and pest species as part of site restoration. 4) Make adequate financial provision to implement restoration and enhancement measures. 5) Ensure adequate provision for monitoring and evaluation of restoration and enhancement actions, using appropriate indicators, to enable corrective or adaptive management and ensure biodiversity goals would be met.
4.	Ensure sufficient checks to ensure that mitigation and enhancement measures are successfully implemented to achieve the intended results	1) Implement all mitigation measures in a BMP (or equivalent) for this decommissioning, dismantling or conversion phase, where stipulated. 2) Involve key biodiversity stakeholders in monitoring and evaluating performance. 3) Appoint an independent environmental auditor to report on biodiversity performance in relation to the stated goals and targets.
5.	Ensure that impacts of decommissioning or dismantling and the effects of mitigation, management and restoration are being monitored	1) Ensure that adequate provision has been made for monitoring and evaluation using appropriate indicators. 2) Ensure that, where monitoring identifies probable shortcomings in the achievement of biodiversity goals or targets, there is corrective or adaptive management to ensure biodiversity goals or targets would be met.
6.	Communicate transparently and accountably on performance	1) Report openly and transparently on performance, drawing on monitoring results and independent audits.

7

7. Useful links

7.1 Useful sources of guidance and information

7.1.1 Net Gain of biodiversity, Net Positive Impact

NPI Alliance (2015). *Net Positive Impact for biodiversity: The business case.* Gland, Switzerland: IUCN. https://portals.iucn.org/library/node/45848

NPI Alliance (2015). *Net Positive Impact for biodiversity: The conservation case.* Gland, Switzerland: IUCN. https://portals.iucn.org/library/node/45847

7.1.2 Good practice assessment of impacts on biodiversity

Business and Biodiversity Offsets Programme (BBOP) (2009). Resource Paper: *The Relationship between Biodiversity Offsets and Impact Assessment*. https://www.forest-trends.org/publications/resource-paper-limits-to-what-can-be-offset/

Chartered Institute of Ecology and Environmental Management (CIEEM). Technical Guidance Series. Includes: *Guidelines for Ecological Impact Assessment (EcIA), Guidelines for Preliminary Ecological Appraisal (GPEA), Guidelines for Ecological Report Writing and Competencies for Species Survey (CSS)*. Available at https://www.cieem.net/publications-info

Convention on Biological Diversity (CBD) (2006). *Voluntary guidelines on biodiversity-inclusive impact assessment*. https://www.cbd.int/doc/publications/imp-bio-eia-and-sea.pdf

Cross-sector Biodiversity Initiative (CSBI) (2015). *A cross-sector guide for implementing the Mitigation Hierarchy*, prepared by The Biodiversity Consultancy, Cambridge. http://www.csbi.org.uk/tools-and-guidance/mitigation-hierarchy/

Flora and Fauna International. The mitigation hierarchy and net positive impacts. https://www.google.com/webhp?ie=UTF-8&rct=j#q=bbop%2C+mitigation+hierarchy

Gullison R.E., Hardner, J., Anstee, S., and Meyer, M. (2015). *Good Practices for the Collection of Biodiversity Baseline Data*. EBRD/CSBI Good Practices for the Collection of Biodiversity Baseline Data. Prepared for the Multilateral Financing Institutions Biodiversity Working Group & Cross-Sector Biodiversity Initiative. http://www.csbi.org.uk/our-work/good-practices-for-the-collection-of-biodiversity-baseline-data/

Hardner J., Gullison, R.E., Anstee, S., and Meyer, M. (2015). *Good Practices for Biodiversity Inclusive Impact Assessment and Management Planning*. Prepared for the Multilateral Financing Institutions Biodiversity Working Group. https://publications.iadb.org/bitstream/handle/11319/7094/Good_Practices_for_Biodiversity_Inclusive_Impact_Assessment.pdf?sequence=1

International Association for Impact Assessment Biodiversity Assessment (IAIA) (2013). Fastips. http://www.iaia.org/uploads/pdf/Fastips_5Biodiversity.pdf

International Association for Impact Assessment Biodiversity Assessment (IAIA) (2017). *Biodiversity and ecosystem services in impact assessment: principles for best practice*. Consultation draft, April 2017.

International Finance Corporation (IFC) (2012). Performance Standards.

- Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts. https://www.ifc.org/wps/wcm/connect/3be1a68049a78dc8b7e4f7a8c6a8312a/PS1_English_2012.pdf?MOD=AJPERES

- Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources. http://www.ifc.org/wps/wcm/connect/bff0a28049a790d6b835faa8c6a8312a/PS6_English_2012.pdf?MOD=AJPERES

World Bank (2016). *Environmental and Social Framework: Setting Environmental and Social Standards for Investment Project Financing*. August 4, 2016. Environmental and Social Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources. http://www.worldbank.org/en/programs/environmental-and-social-policies-for-projects

7.1.3 Specific sports and sporting organisations that consider biodiversity

Commonwealth Secretariat (2017). *Enhancing the Contribution of Sport to the Sustainable Development Goals*. Authors: Iain Lindsey and Tony Chapman. Commonwealth Secretariat, London. https://www.sportanddev.org/sites/default/files/downloads/enhancing_the_contribution_of_sport_to_the_sustainable_development_goals_.pdf

EventScotland (2010). Sustainable Sport and Event Toolkit. http://www.eventscotland.org/files/ES3024_SSET_DIGITAL_2.pdf

FISA (International Rowing Federation). (2012). *Environmental sustainability policy and guidelines*. http://www.worldrowing.com/mm//Document/General/General/12/22/76/FISAEnvironmentalSustainabilityPolicyandGuidelines_English_Neutral.pdf

Golf Environment Organisation (GEO) (2017). *Sustainable Golf Development Guidelines*. http://www.golfenvironment.org/assets/0004/7963/GEO_Dev_Guide_Web.pdf

Golf Environment Organisation (GEO) (2017). *Voluntary Sustainability Standard for Golf Development*, plus Handbook. (This Voluntary Standard underpins golf course certification.) http://www.golfenvironment.org/vision/action/standards/developments

International Mountain Bicycling Association. *Environmental Impacts of Mountain Biking: Science review and best practices*. https://www.imba.com/resources/research/trail-science/environmental-impacts-mountain-biking-science-review-and-best-practices

International Olympic Committee. *Sustainability Strategy*, December 2016. https://www.olympic.org/sustainability

International Water Ski Federation. *Environmental Handbook for Towed Water Sports*. http://www.iwsf.com/EnvironmentalHandbook/iwsfecpartb.htm

Rixen, C. and Rolando, A. (2013). *The Impacts of Skiing and Related Winter Recreational Activities on Mountain Environments*. Bentham eBooks. http://ebooks.benthamscience.com/book/9781608054886/

Sport and Sustainability International. http://www.sandsi.org/#/home Sport England (2007). *Environmental Sustainability: promoting sustainable design for sport*. https://www.sportengland.org/media/4213/environmental-sustainability.pdf

The Initiative for Global Environmental Leadership, NRDC and Green Sports Alliance (2013). *Special Report: The Green Sports Movement*. http://knowledge.wharton.upenn.edu/article/reducing-sports-impact-environment/

World Sailing: Sustainability Agenda 2030, October 2016. http://www.sailing.org/tools/documents/SustainabilityAgenda2030-[23247].pdf

7.1.4 Mitigating impacts of development on biodiversity: best practice

Notice Nature. *Wildlife, Habitats and Development: Guidelines for the protection of biodiversity in construction projects*. http://www.noticenature.ie/files/Construction_v12.pdf

British Columbia Ministry of Water, Land and Air Protection Ecosystem Standards and Planning Biodiversity Branch (2004). *Environmental Best Management Practices for Urban and Rural Land Development*. Includes:

- Section Five: Environmentally sensitive areas.
- http://www.env.gov.bc.ca/wld/documents/bmp/urban_ebmp/EBMP%20PDF%204.pdf
- Section Seven: Aquatic and riparian ecosystems
- http://www.env.gov.bc.ca/wld/documents/bmp/urban_ebmp/EBMP%20PDF%206.pdf
- Section 8: Pollution prevention and management
- http://www.env.gov.bc.ca/wld/documents/bmp/urban_ebmp/EBMP%20PDF%207.pdf

The KBA Partnership (2018). *Guidelines on Business and KBAs: Managing Risk to Biodiversity*. Gland: IUCN.

IUCN (2004). *Threats from Olympic Games and other major sporting events to protected areas and biodiversity*. (WCC-2004-RES 054-EN) https://portals.iucn.org/library/sites/library/files/resrecfiles/WCC_2004_RES_54_EN.pdf

IUCN (2016). *Protected areas and other areas important for biodiversity in relation to environmentally damaging industrial activities and infrastructure development*. (WCC-2016-REC 102-EN) https://portals.iucn.org/library/sites/library/files/resrecfiles/WCC_2016_REC_102_EN.pdf

IUCN (2016). *Best practice for industrial-scale development projects*. https://portals.iucn.org/library/sites/library/files/resrecfiles/WCC_2016_RES_067_EN.pdf

7.1.5 Ecological restoration

Keenleyside, K.A., Dudley, N., Cairns, S., Hall, C.M., and Stolton, S. (2012). *Ecological Restoration for Protected Areas: Principles, Guidelines and Best Practices*. Best Practice Protected Area Guidelines Series no. 18. Gland, Switzerland: IUCN. https://portals.iucn.org/library/node/10205

Society for Ecological Restoration. 2000. *Guidelines for developing and managing ecological restoration*. http://www.iucnsscrsg.org/STORAGE/RSG%20CD/PDFs/SERGuide.pdf

7.1.6 Integrated biodiversity management systems and plans

Integrated Biodiversity Management System, IBMS, cement and aggregate sector, developed by IUCN, for Holcim. https://portals.iucn.org/library/sites/library/files/documents/2014-008.pdf

ISO 14001 (2015). http://www.dnvba.com/fi/DNV%20%20Downloads/ISO%2014001%202015%20GUIDANCE%20DOCUMENT.pdf

7.1.7 Biodiversity monitoring

Werner, Florian A. & Gallo-Orsi, Umberto. 2016. *Biodiversity Monitoring for Natural Resource Management. An Introductory Manual*. GIZ, Eschborn and Bonn, Germany. https://www.researchgate.net/publication/303814279_Biodiversity_Monitoring_for_Natural_Resource_Management_An_Introductory_Manual

7.1.8 Reporting on biodiversity performance

GRI G4 sustainability reporting principles and standard disclosures. https://www.globalreporting.org/information/g4/Pages/default.aspx

IUCN (2014). *Biodiversity management in the cement and aggregates sector: Biodiversity Indicator and Reporting System (BIRS)*. https://portals.iucn.org/library/node/44917

7.1.9 Biodiversity offsets

IUCN Policy on Biodiversity Offsets (2016). (WCC-2016-Res-059-EN) http://cmsdata.iucn.org/downloads/iucn_biodiversity_offsets_policy_jan_29_2016.pdf

Business and Biodiversity Offsets Programme (BBOP) – various publications on biodiversity offsetting. https://www.forest-trends.org/bbop/

- Business and Biodiversity Offsets Programme (BBOP) (2012). *Standard on Biodiversity Offsets*. BBOP, Washington, DC, https://www.forest-trends.org/publications/standard-on-biodiversity-offsets/
- Business and Biodiversity Offsets Programme (BBOP) (2012). *Guidance Notes to the Standard on Biodiversity Offsets*. BBOP, Washington, DC, https://www.forest-trends.org/publications/standard-on-biodiversity-offsets/
- Business and Biodiversity Offsets Programme (BBOP) (2012). *Biodiversity Offset Design Handbook-Updated*. BBOP, Washington, DC, https://www.forest-trends.org/publications/biodiversity-offset-design-handbook/
- Business and Biodiversity Offsets Programme (BBOP) (2012). *Resource Paper: Limits to What Can Be Offset*. BBOP, Washington, DC, https://www.forest-trends.org/publications/resource-paper-limits-to-what-can-be-offset/

7.1.10 Use and certification of green buildings, products, materials, approaches

BREEAM certification, 'from energy to ecology'. http://www.breeam.com/

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7.2 Useful sources of biodiversity information on important biodiversity areas

BirdLife International Data Zone

- Important bird and biodiversity areas. http://datazone.birdlife.org/home; www.birdlife.org/datazone/site
- Endemic Bird Areas. http://datazone.birdlife.org/ebas
- Soaring Bird Sensitivity Maps. http://migratorysoaringbirds.undp.birdlife.org/en/sensitivity-map

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Red List of Threatened Species: http://www.iucnredlist.org/; https://www.iucn.org/resources/conservation-tools/iucn-red-list-threatened-species

UN Environment and World Conservation Monitoring Centre's 'biodiversity a-z' website. Includes information on protected areas, AZE, IBA KBA, IPA, Ramsar sites, etc. http://www.biodiversitya-z.org/.

- Alliance for Zero Extinction: http://www.biodiversitya-z.org/content/alliance-for-zero-extinction-sites-aze.
- Important Bird and Biodiversity Areas: http://www.biodiversitya-z.org/content/important-bird-and-biodiversity-areas-iba.
- Important Plant Areas. http://www.biodiversitya-z.org/content/important-plant-areas-ipa
- Key Biodiversity Areas: http://www.biodiversitya-z.org/content/key-biodiversity-areas-kba
- High Value Conservation Value Areas: http://www.biodiversitya-z.org/content/high-conservation-value-areas-hcva.

Indigenous and Community Conserved Area: http://www.biodiversitya-z.org/content/indigenous-peoples-and-community-conserved-territories-and-areas-icca.

World Database on Key Biodiversity Areas. http://www.keybiodiversityareas.org/home. Key Biodiversity Areas™, managed by BirdLife International on behalf of the KBA Partnership, includes an interactive online map of KBAs with links to documentation for each site.

World Database on Protected Areas. https://www.protectedplanet.net/c/world-database-on-protected-areas. A joint project between UNEP and IUCN. Compilation and management of the WDPA is carried out by the UNEP World Conservation Monitoring Centre (WCMC). Covers international, regional, and national protected areas.

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