FIVE Biodiversity Review

Impact Assessment and Action Plan

MARCH 31, 2023

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FIVE HOLDINGS

The Case

FIVE Global Holdings is an international, Dubai-based real estate and hospitality development group. The company owns and operates three hotels, namely the FIVE Palm Jumeirah, the FIVE Jumeirah Village and the FIVE Zurich, with a fourth hotel currently under construction.

FIVE Global Holdings is being characterized by extraordinarily high sustainability ambitions, with their hotels being LEED-Platinum awarded and several corporate sustainability strategies in place or under development. The company has approached AFRY for a small-scope biodiversity assessment of their current hotel operations. FIVE Global Holdings wishes to understand the topic better and identify the best opportunities for short-, mid- and long-term action.

EXECUTIVE SUMMARY

Dubai operations are exposed to biodiversity risks, but there are opportunities for value creation…

- Dubai is characterized by high development pressure. Biodiversity impacts include, among others, water scarcity, land conversion, climate change and pollution.

- Biodiversity risks for hotel operations include unknown supplier dependencies on nature provisions. In addition, water scarcity may disrupt operations. Coastal erosion and sea level rise may become material for Palm Jumeirah in the near future.

- Due to the distance, the hotels do not have any direct negative impacts on regional nature reserves and key biodiversity areas. However, indirect effect may occur through hotel guests unintentionally entering and disturbing these areas.

- The biodiversity offering of FIVE's competitors in Dubai appears to be limited to nature experiences that are in many cases not necessarily "biodiversity-friendly". There appears to be an overall confusion about the definition of the term "ecotourism". Sustainability is being embraced by many operators to a varying extent. Biodiversity has not been introduced as a corporate strategy yet and might become a unique selling point for FIVE.

- Biodiversity targets can be set both for operational aspects as well as in property development. Some operational aspects are being managed through sustainability strategy and EMS but could be expanded to further investigate biodiversity-friendly sourcing.

- A holistic visitor experience that entails a biodiversity narrative (hotel stay, nature tours, culinary experience and more) could create awareness and help approach new customer segments.

- In addition, property and landscape modifications can improve the attractiveness of the hotels for native wildlife. Measures include optimized lighting, maximizing the use of native plants and pollinating plants for insect and introducing landscape-enhancing features to attract local wildlife, both avian and terrestrial. Measures can be supported with environmental education concepts.

- New and biodiversity-friendly ecotourism experiences could create additional value. Reaching out to and collaborating with operators of the Dubai Desert Conservation Reserve or similar initiatives could help create such an offering.

- Large-scale measures such as coastal mangrove planting would achieve a massive biodiversity benefit while reducing flood risks, but it would require a coordinated and extensive, multi-stakeholder initiative including NGO's, other businesses and government agencies.

… the same applies to Zurich

- Zurich and its surroundings, while being characterized by a long history of human land use, has more natural "breathing space" when compared the development pressure of Dubai. The FIVE Zurich is situated in a suburban/rural area with pastures and access to a forest.
- While not being subjected to water scarcity, main environmental pressures are being caused by climate change, which, in Switzerland, causes cloudbursts and similar events with heavy rainfall, as well as heatwaves in summer.
- The biodiversity risks in Zurich include mass stabilization and erosion control, as soils with a healthy living environment and biodiversity are required to stabilize slopes under increasing climate change pressure. The main impacts on biodiversity are similar to those in Dubai and include the generation of waste, wastewater and unknown biodiversity impacts & dependencies along the supply chain.
- While situated in a suburban, almost rural landscape, the hotel borders a national forest reserve. However, it does not have any direct impacts on regional nature reserves and key biodiversity areas, although indirect effects may occur through hotel guests visiting and unintentionally disturbing the areas.
- Unlike Dubai, most investigated hotels in Zurich do not offer their own nature experiences. It is likely that these businesses rely on third-party operators that offer such tours.
- Biodiversity targets for the FIVE Zurich can be very similar those in Dubai, and it is recommended to introduce measures that focus on both operations as well as for property development/maintenance. In this case, the suburban location and proximity to areas of high recreational value can be considered an advantage. Exploring partnerships with the organization Pro natura, as well as investigating the potential of the Sihlwald Nature Discovery Park and the Langenberg Wildlife Park could help create a powerful nature experience portfolio.
- It has been highlighted that the Swiss tourism market appears to be missing out on offering nature experiences for the premium market [1]. Creating such an offering, which is being backed up by a certifiable and holistic biodiversity strategy for the built environment of the hotel as well as its supply chain and operations, may create not only a positive biodiversity output but a strong commercial advantage as well.

[1] Cartier & Schmid (2021)

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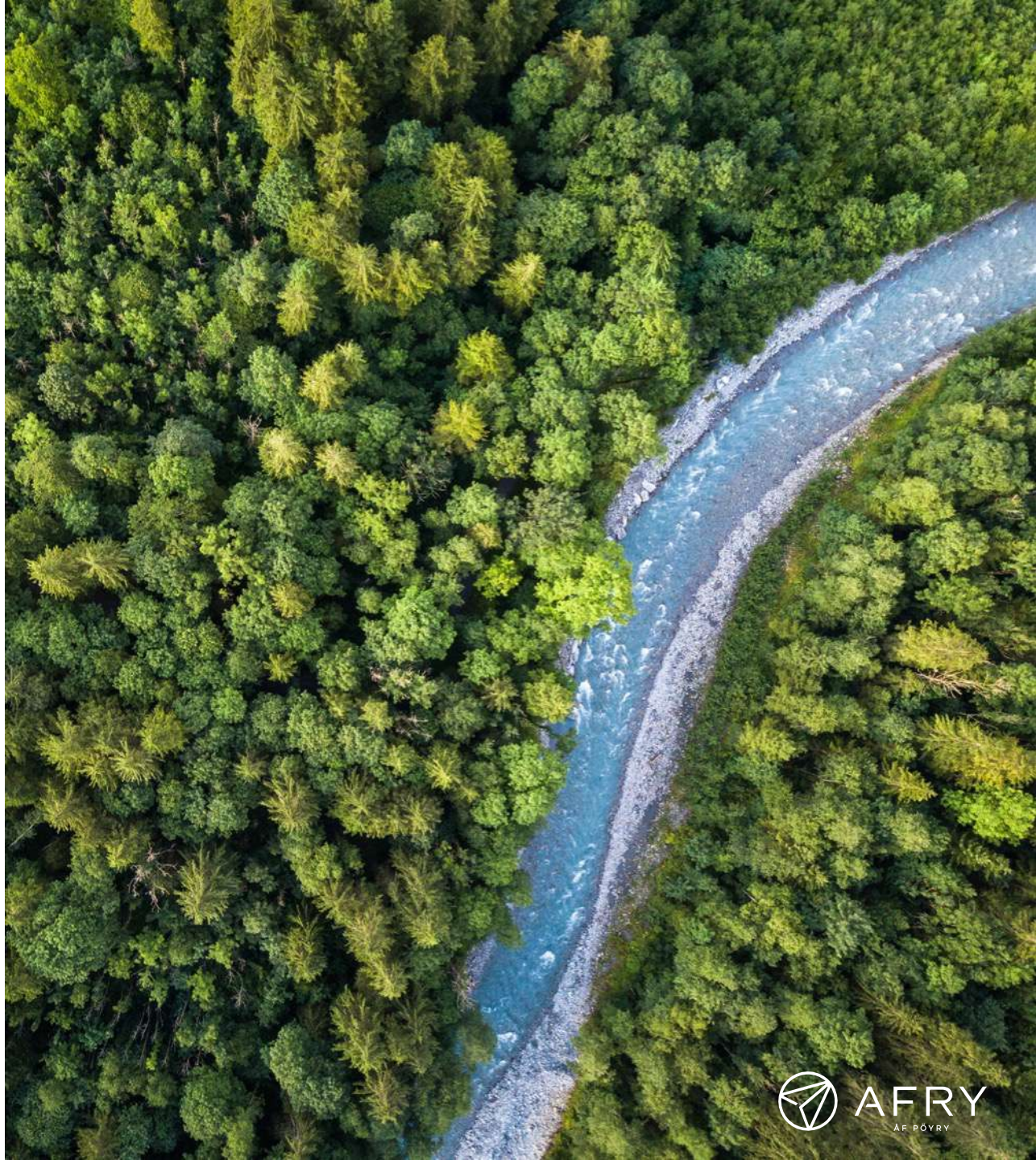


BIODIVERSITY

Biodiversity is the variety of all life on earth

Biodiversity is understood as the variability of living organisms from all sources and the ecological complexes of which they are part of (gene pool, species and ecosystems). In natural ecosystems, all these species and organisms form an intricate web, which balances and maintains life.

Biodiversity is crucial for human well-being, as it supports all aspects of nature that we require to survive and thrive. It is the key to healthy ecosystem services and a critical aspect for maintaining our diverse economic activities. All businesses rely on ecosystem services at some point along their value chains and the resources provided by nature.

However, habitat destruction, invasive species, overexploitation, illegal wildlife trade, pollution, climate change, and other risks have pushed our biosphere to the brink of collapse. For instance, since 1970, vertebrate wildlife populations have declined by 69% across the globe.[1]

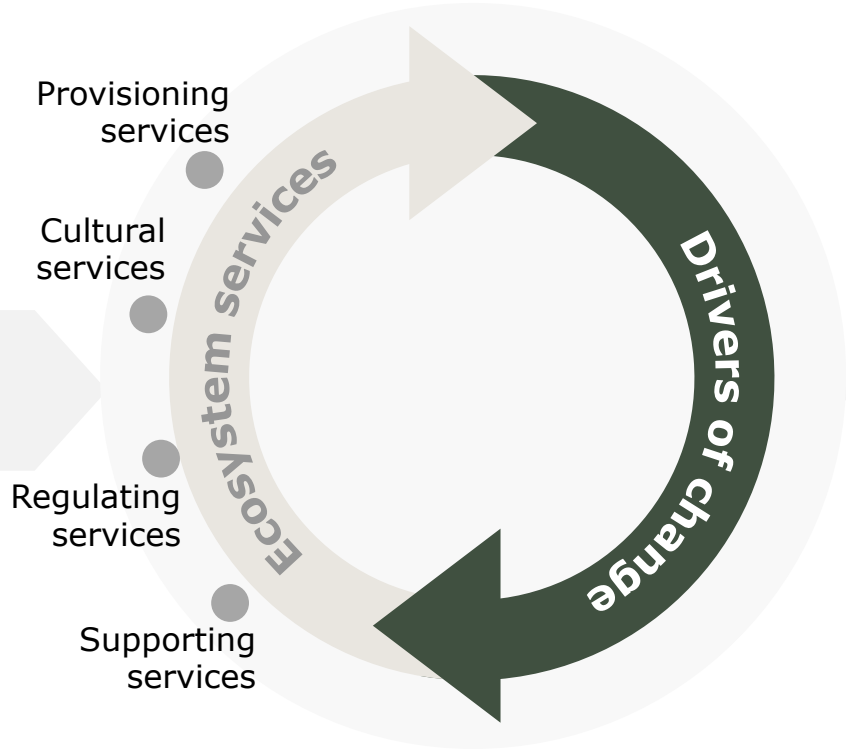
Just like the climate crisis, such loss of nature has, to a varying degree, increased the economic risks for businesses.

[1]WWF Living Planet Report (2022)

Biodiversity and nature strengthen the socio-economic system

Biodiversity & nature[1]

In addition to "biodiversity," many policy documents also refer to "nature" as a term to account for benefits provided by the living and non-living environment. In this assessment, the terms are being used in conjunction.



Socio-economic system

- Economic growth
- Jobs and skills
- Technology development
- Urban development and regeneration of living environment
- Public health and wellbeing
- Demographic change

[1]Science-based Targets for Nature – Initial Guidance for Business (2020)

Biodiversity and nature provide critical services to humanity

Natural capital assets[1]:

Natural capital assets are specific elements within nature that provide the goods and services that the economy depends on. They are the building blocks of ecosystem services.

Ecosystem services:

Combination of natural assets form ecosystem services. They enable production processes and represent the economic and socio-cultural benefits that nature provides to humanity.

Water:

Water includes surface water, ground water, ocean water, fossil water and soil water. Water is essential for a wide range of ecosystem services.

*In the **energy sector**, production processes such as **hydropower** are highly dependent on this natural asset.*

Climate regulation:

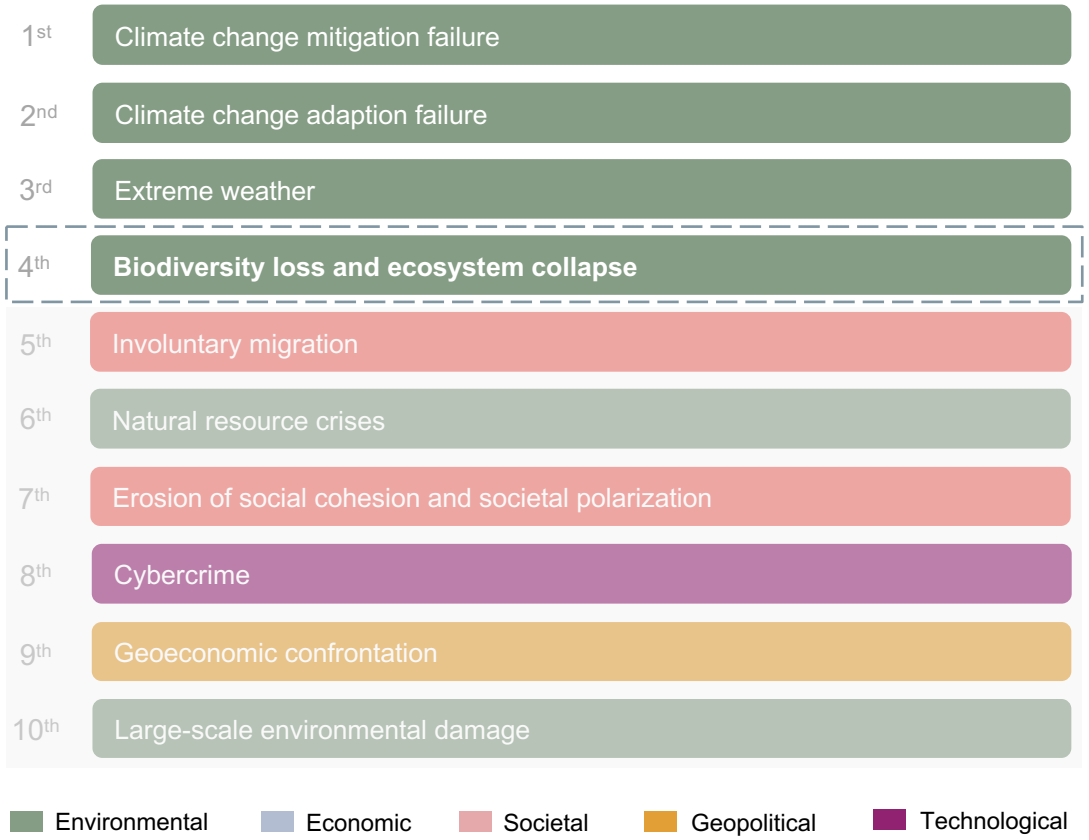
Global climate regulation is provided by nature through the long-term storage of carbon dioxide in soils, vegetable biomass, and the oceans. At a regional level, the climate is regulated by ocean currents and winds, while at local and micro-levels, vegetation can modify temperatures, humidity, and wind speeds.

***Renewable energies** such **as wind and solar power** are highly dependent on **climate regulation** to ensure continuous production.*

[1]ENCORE Methodology Guidance (2023) For more examples on natural capital assets and ecosystem services, please check the glossary

The global risk landscape is being dominated by environmental threats

Global risks ranked by severity over the long term (10 years)[1]



Biodiversity loss and ecosystem collapse ranked in the top 5 threats to humanity in the next 10 years

“ **50%+ of global GDP** ($44 Trillion) is threatened by **nature loss**[2]

Natural ecosystems have declined by 47% on average

25% of species (~1 million) are threatened with extinction

Ecological communities have declined by 23%

82% of global biomass of wild mammals have fallen

72% of indicators developed by indigenous people show ongoing deterioration

[1]WEF Global Risks Report (2023), [2]IPBES Global Assessment Report on Biodiversity and Ecosystem Services (2019)

IMPACTS AND DEPENDENCIES

Businesses rely on and affect nature's services

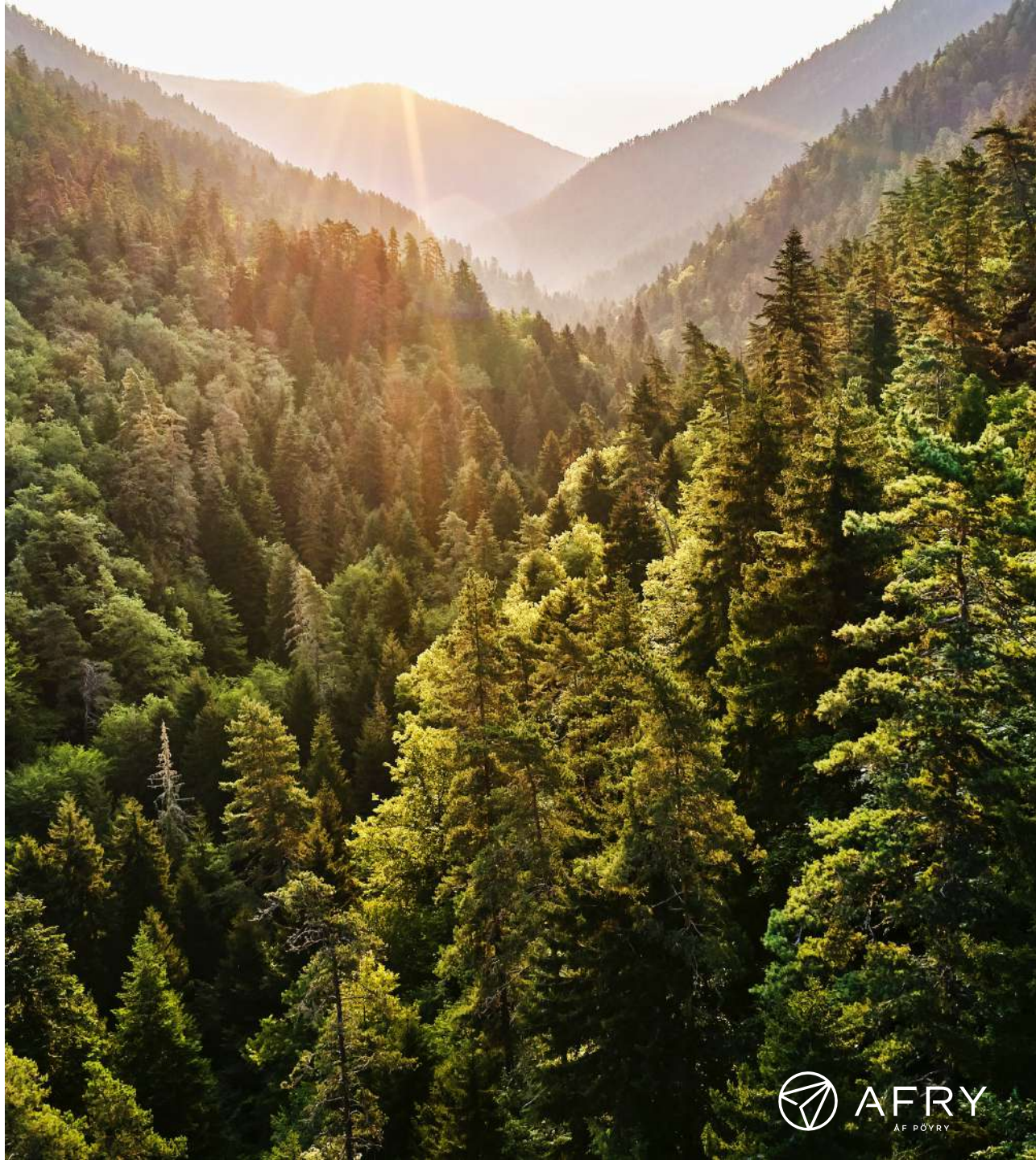
All businesses have dependencies and impacts on nature.

- **Dependencies** describe how economic activities rely on ecosystem services and natural capital
- **Impacts** are the way in which economic activities affect ecosystem services and natural capital

The loss of biodiversity can cause a disruption in ecosystem services. Depending on the degree of a company's dependencies on certain ecosystem services and the severity of their disruption, a business can be put at risk.

Investigating and managing impacts and dependencies on nature can help businesses to better understand their biodiversity risks and help to improve both resilience of the company and the world's biosphere.

→ *A holistic biodiversity assessment includes investigations of both impacts and dependencies on nature*



[1]Task Force on Nature-related financial disclosures, v0.3 (2022)

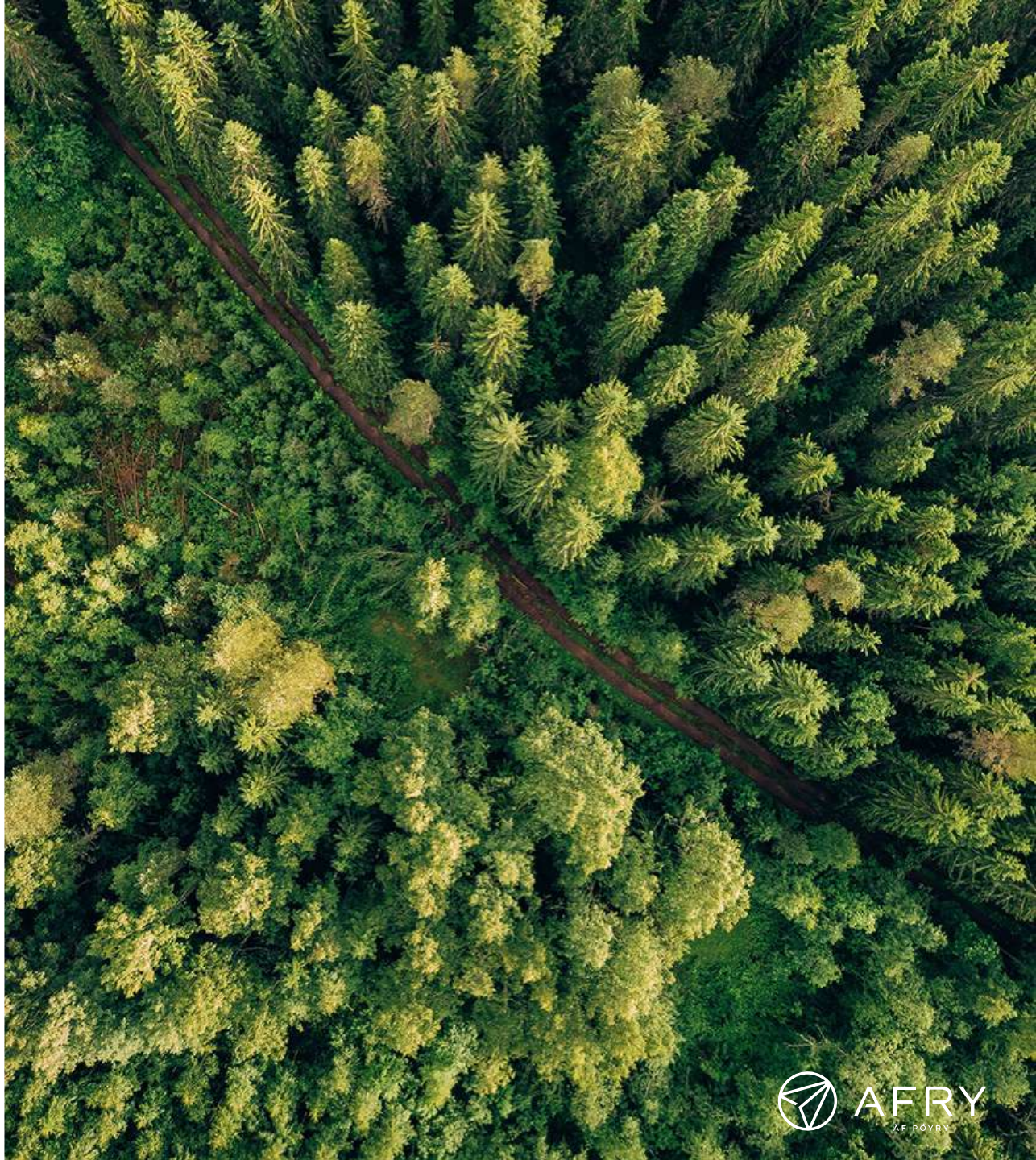
GLOBAL BIODIVERSITY ACTION

Decisionmakers react to nature loss by enacting new policies

The new **UN Global Biodiversity Framework**[1] includes 23 targets for halting the loss of biodiversity and nature by 2030. It is expected that these targets will gradually be implemented in global and national policies. Several of the targets introduce transitional risks for the tourism industry:

Relevant targets
***Target 1 - Integrated and inclusive spatial planning to address land and sea use change*:** • May re-define property development and planning for future FIVE projects (does not affect FIVE's operations)
***Target 6 - Reduce impact of invasive species*:** • May require species monitoring and control on FIVE's premises and could affect supply chain and supplier due diligence
***Target 7 - Reduce pollution risks and the negative impact of pollution from all sources, by 2030, to levels that are not harmful to biodiversity and ecosystem functions and services*:** • FIVE's EMS and other measures are already in place to reduce waste generation and promote recycling, but may require further optimization of sourcing and on-site waste management
Target 12 - Urban biodiversity (increase the area and quality and connectivity of, access to, and benefits from green and blue spaces) • May result in increased requirements for property development and landscaping adjustments to FIVE's premises
***Target 15 - Reporting on nature risks*:** • May enforce new reporting guidelines for own business as well as lenders. FIVE appears well prepared and experienced in sustainability reporting

[1]CBD Press Release – Final text of the Kunming-Montreal Global Biodiversity Framework (2022)



INTERNATIONAL BIODIVERSITY STAKEHOLDERS

Both public and private sector entities drive the global biodiversity agenda

PUBLIC SECTOR AND NGO'S

- Supranational bodies such as The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) and the International Union for Conservation of Nature (IUCN) aggregate research and knowledge on the state of nature
- The UN Environment Programme and the Convention on Biological Diversity (CBD) drive the development of new global policies

PRIVATE SECTOR

- Market service providers and industry leaders from a variety of sectors have been pushing the development of corporate biodiversity frameworks
- While the progress has been a few years behind climate reporting and management, the development on frameworks such as TNFD and SBTN is picking up speed and metrics are in active development

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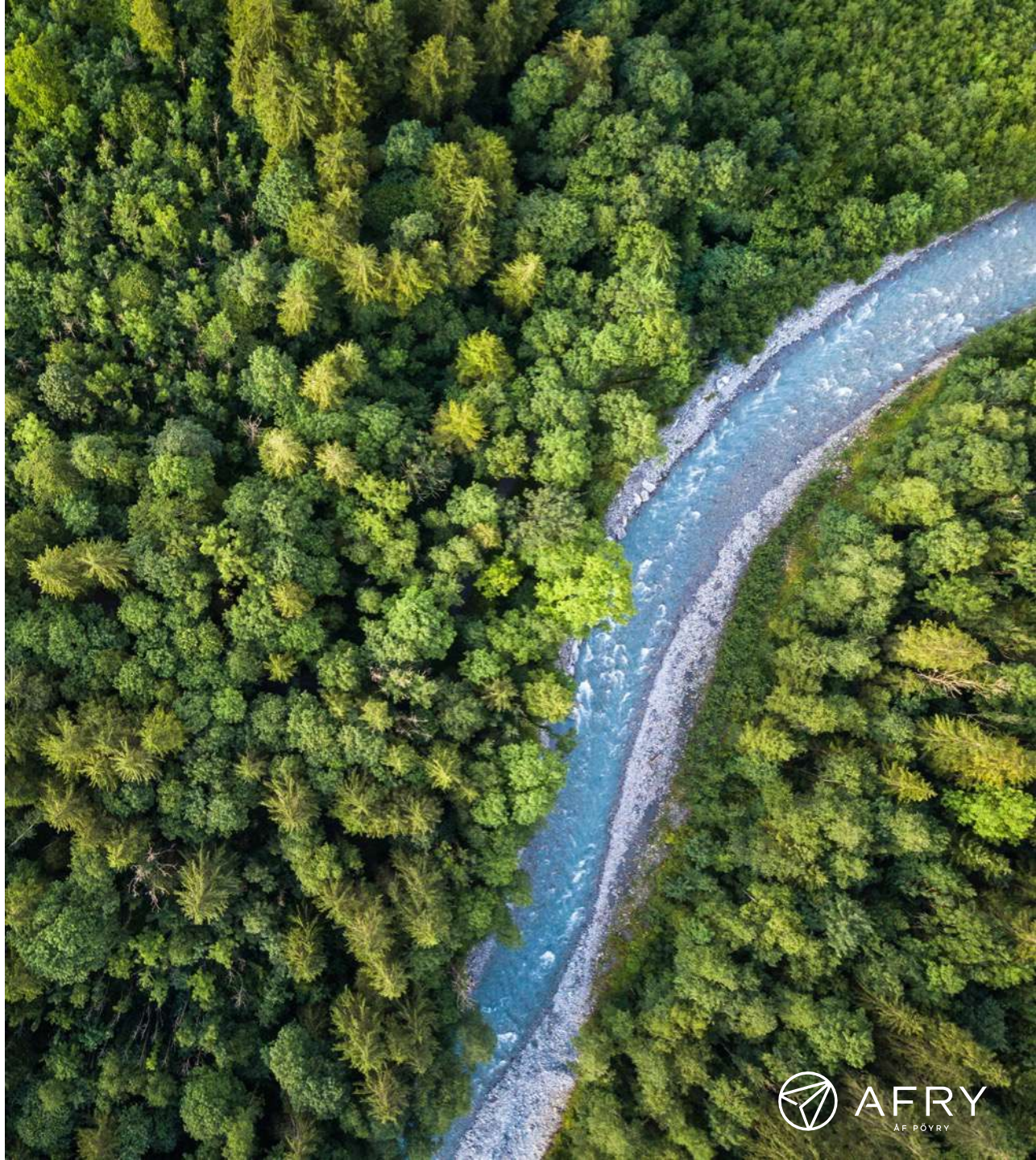


TOURISM AND NATURE

Tourism has a complex interface of dependencies and impacts on nature

With an estimated 11% of the world's GDP and 200 million employees, tourism is one of the largest, if not *the* largest industry in the world. For the past decade, nature-related tourism has been the largest growth driver within tourism across the world.

All forms of tourism – including those in urban areas – rely on natural resources for supply of food, clean water and other ecosystem services. For non-cultural tourism, biodiversity usually contributes to the attractiveness and quality of destinations – intact nature therefore creates a considerable value for associated tourism businesses.

Just as mass tourism around historic sites, any uncontrolled influx of large numbers of guests can become unsustainable and create negative impacts such as land conversion, pollution, waste, overexploitation of natural resources and disturbance of wildlife. Negative socio-cultural impacts can also occur when nature services that local communities rely on are being disrupted.[1]

[1]UNEP – Tourism and Biodiversity (2003)

In order to assess biodiversity impacts in the tourism industry, the screening is in line with the first steps of the Science Based Targets for Nature (SBTN)

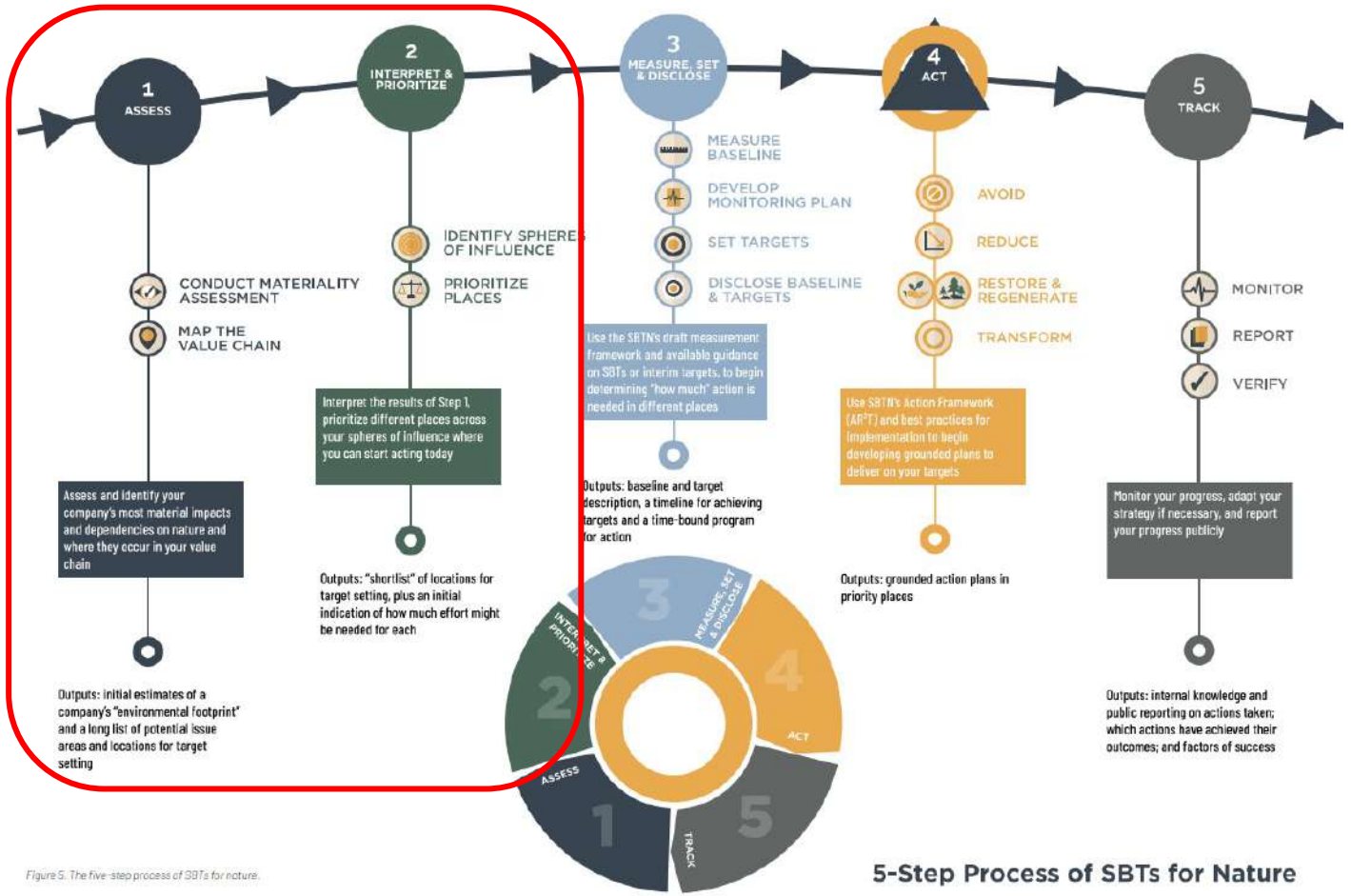


Figure 5. The five-step process of SBTs for nature.

Source: SBTN (2020)

Sectoral and geospatial data are being analysed to create a risk profile:

The **SBTN is a science-based framework for integrating biodiversity into business strategy.** It follows a similar rationale to the SBTi climate framework, and alignment helps companies to assess impacts and dependencies on nature, create risk profiles, set measurable biodiversity targets, and prioritize areas for action and opportunity.

Steps 1 & 2 can be applied using tools such as ENCORE and/or the IBAT datasets, both of which are part of the SBTN assessment toolbox.

SECTORAL IMPACT & DEPENDENCY SCREENING

ENCORE as a rapid, sectoral screening tool

Using the information on activities present in FIVE's direct operations, the ENCORE assessment identifies the projected *sectoral* impacts and dependencies on nature as well as their expected materiality.

ENCORE (Exploring Natural Capital Opportunities, Risks and Exposure) is a web-based platform that assists businesses in understanding, assessing and integrating natural capital risks in their corporate activities. It guides users in understanding how different economic sectors impact and depend on nature and how these impacts and dependencies might represent a business risk[1].

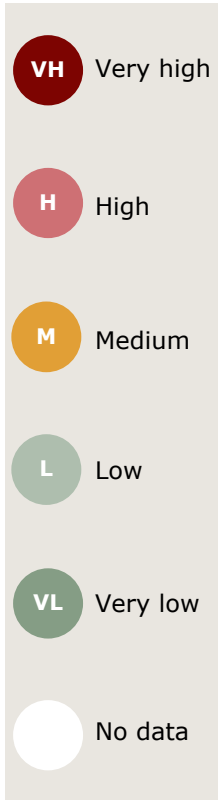
It is important to note that ENCORE only applies a sector-level and non-location specific perspective. Some impacts and dependencies may not apply in the context of FIVE Global Holdings or have a different materiality. The results of ENCORE will therefore be further refined in an additional analytical step.

ENCORE

[1]ENCORE

ASSESSMENT SYSTEM

ENCORE uses a materiality assessment system for impacts and dependencies



Impacts

- How frequently might the impact occur?
    1. **High:** The impact and its resulting effects on natural capital are expected to occur continuously throughout the project life cycle.
    2. **Medium**: The impact and its resulting effects on natural capital are expected to occur regularly throughout the project life cycle.
    3. **Low**: The impact and its resulting effects on natural capital are expected to occur only a small number of times in the project life cycle.

- How quickly might the impact start to affect natural capital?
    1. **<1 year**: The impact and its resulting effects on natural capital will occur within one year of the start of the production process.
    2. **1-3 years**: The impact and its resulting effects on natural capital will occur between one and three years after the start of the production process.
    3. **>3 years**: The impact and its resulting effects on natural capital will occur more than three years after the start of the production process.

- How severe might the impact be?
    1. **High**: The impact and its resulting effects are expected to cause major, irreparable, and long-lasting damage to natural capital.
    2. **Medium**: The impact and its resulting effects are expected to cause significant and lasting damage to natural capital.
    3. **Low:** The impact and its resulting effects are expected to cause minor, reparable, and temporary damage to natural capital.

Dependencies

- How significant is the **loss of functionality** in the production process if the ecosystem service is disrupted?
    1. **Limited loss of functionality**: the production process can continue as is or with minor modifications.
    2. **Moderate loss of functionality**: the production process can continue only with important modifications.
    3. **Severe loss of functionality**: Disruption in the service provision prevents the production process.

- How significant is the **financial loss** due to the loss of functionality in the production process?
    1. **Limited financial loss**: Disruption to the production process doesn't materially affect the company's profits.
    2. **Moderate financial loss**: Disruption to the production process materially affects the company's profits.
    3. **Severe financial loss**: There is a reasonable possibility that the disruption in the production process will affect the financial viability of the company.

[1]ENCORE

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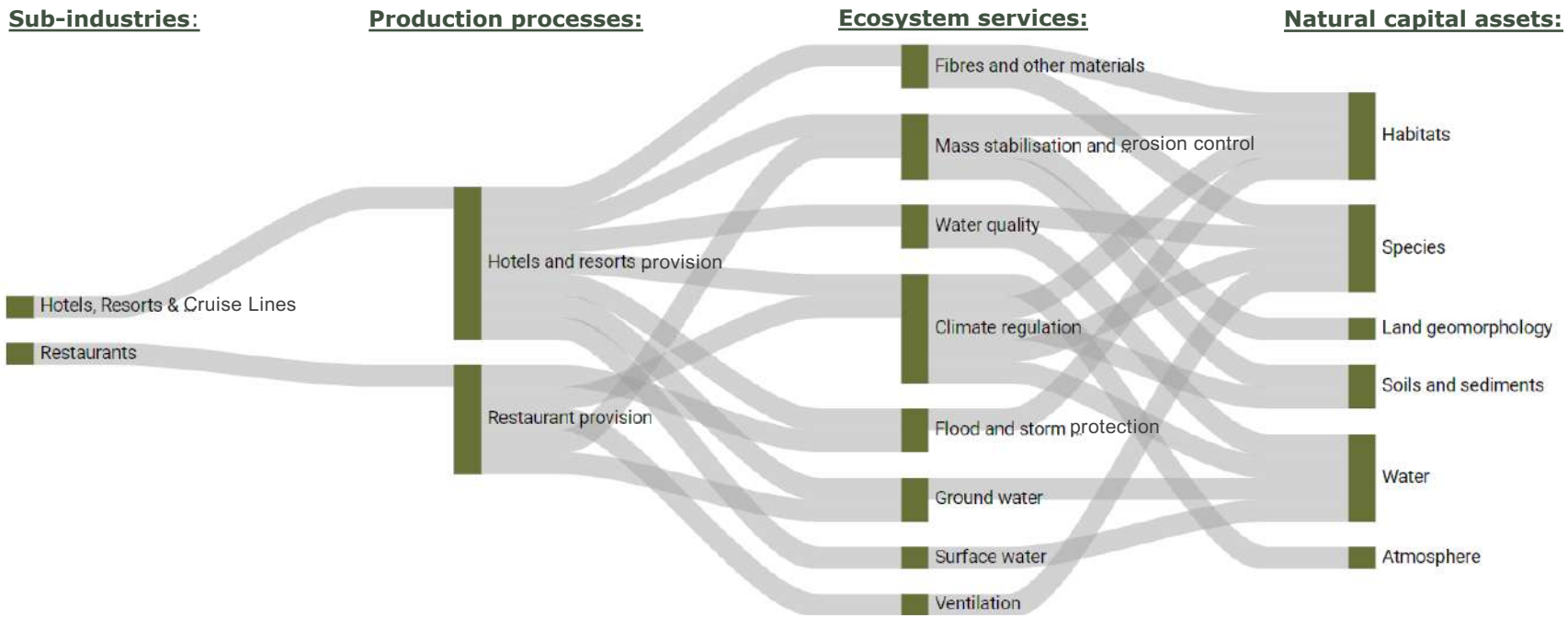
The expected industry-specific dependencies indicate high reliance on water...



H The production process is extremely vulnerable to disruption The degree of protection offered by the ecosystem service is critical and irreplaceable for the production process.

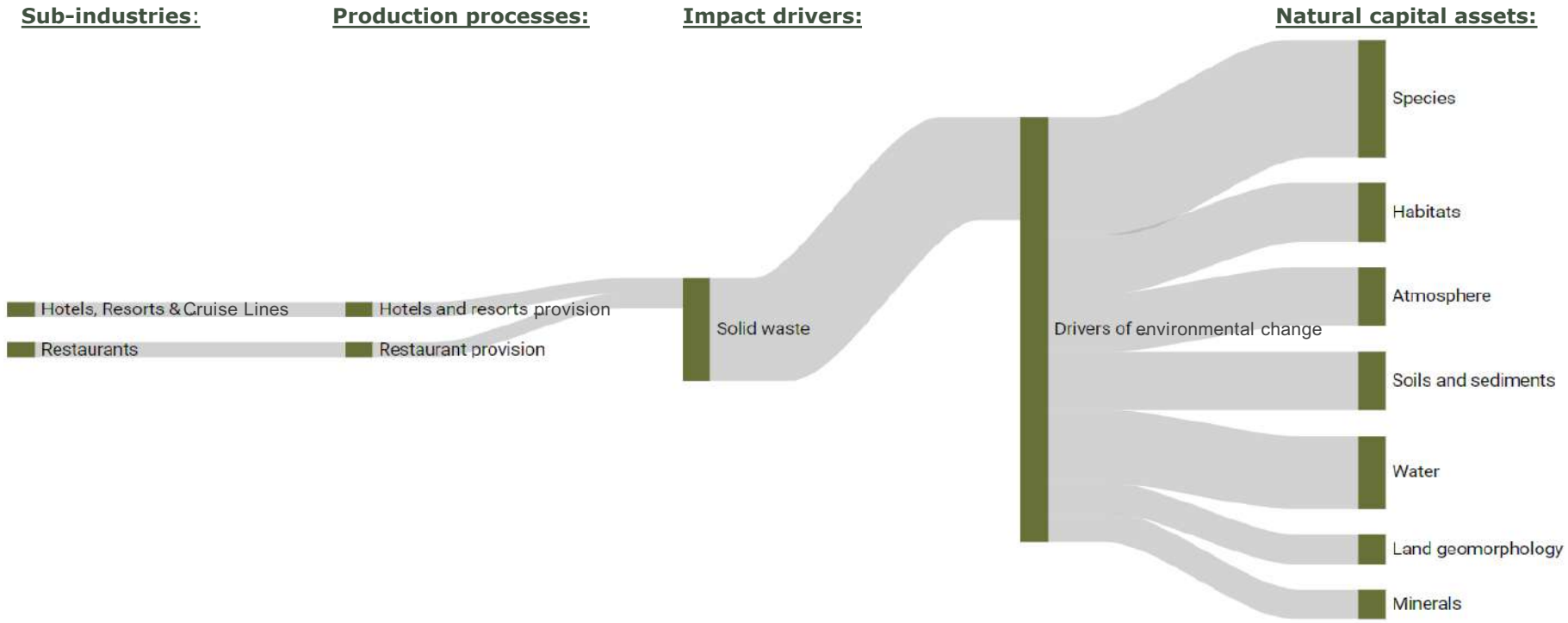
M Although less practical, production process can take place without the ecosystem service due to availability of substitutes

L **VL** Most of the time the production process can take place even with full disruption of the ecosystem service due to the resilience of the production process to disruption

		Ecosystem services							
Sub-industries	Production processes	Climate regulation	Flood and storm protection	Mass stabilisation and erosion control	Ground water	Surface water	Water quality	Fibres and other materials	Ventilation
Hotels, Resorts & Cruise Lines	Hotels and resorts provision	M	M	L	H	H	L	M	
Restaurants	Restaurant provision	M	M	L					VL

AFRY analysis using ENCORE. Please refer to the glossary for a description of ecosystem services and natural capital assets

…while waste and pollution drive the most significant operational impacts



		Pollution
Sub-industries	Production processes	Solid waste
Hotels, Resorts & Cruise Lines	Hotels and resorts provision	M
Restaurants	Restaurant provision	M

M Waste is produced and non-recycling of materials.

AFRY analysis using ENCORE. Please refer to the glossary for a description of ecosystem services and natural capital assets

IMPACTS OF THE TOURISM SECTOR

Managing sectoral impacts and dependencies on nature

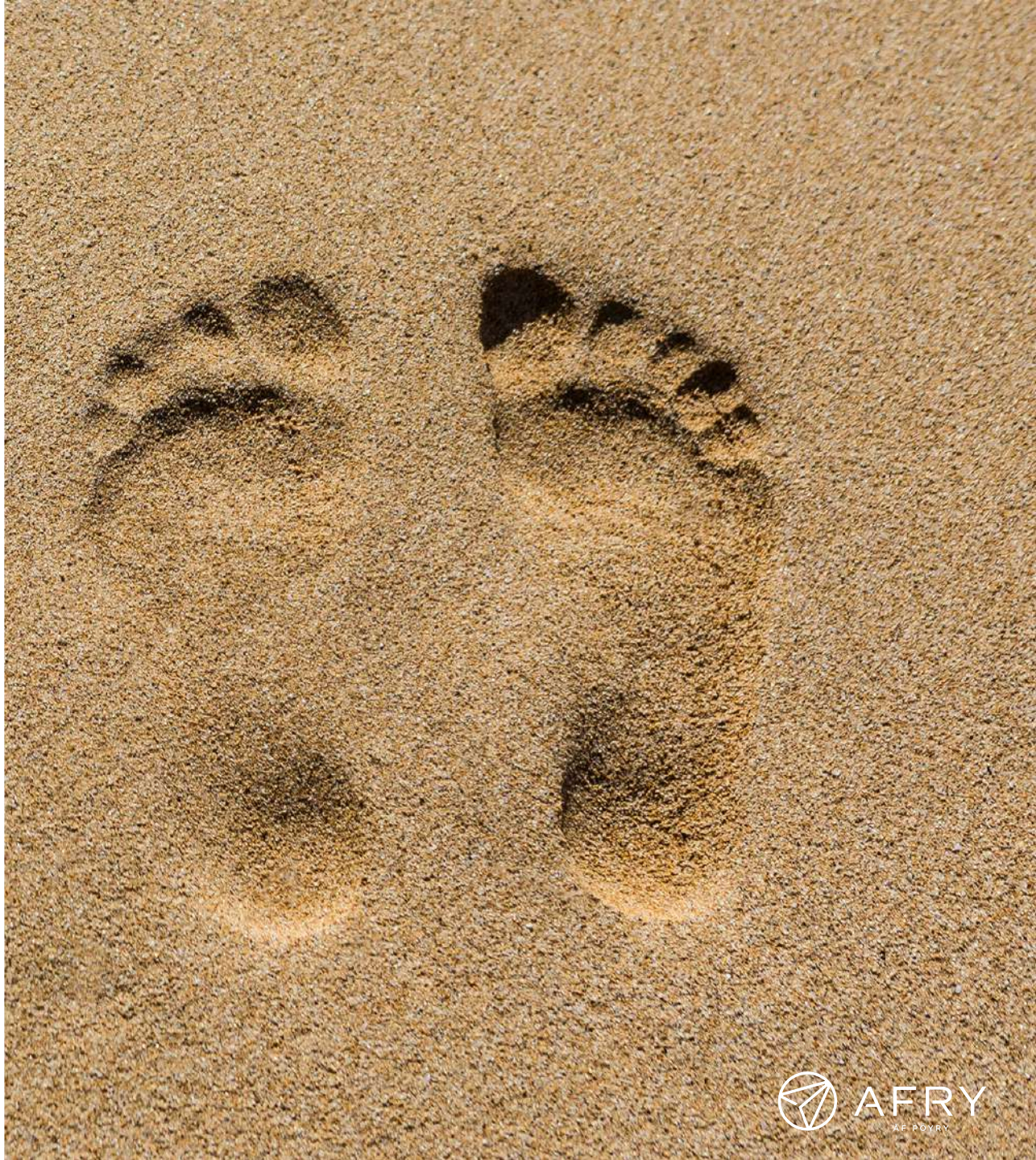
The ENCORE query indicates that tourist operations primarily **depend on water supply, climate regulation, supply of biomaterials and flood/storm protection**, **while waste and pollution have been identified as the most important impact drivers**. This is also being confirmed by the IUCN guidance which has identified different impacts of hotels on biodiversity at each stage of its life cycle[1].

In the context of operations in the UAE, aspects such as climate regulation and water supply appear to be highly significant, given the overall scarcity of water in the region vs. demand.

To address these sectoral impacts & dependencies, the following **general, location-independent principles** can be followed, including:

- Resource efficiency (building)
- Resource efficiency (operations)
- Customer awareness
- Sourcing optimization

[1]IUCN – Building and operating biodiversity-friendly hotel (2012)



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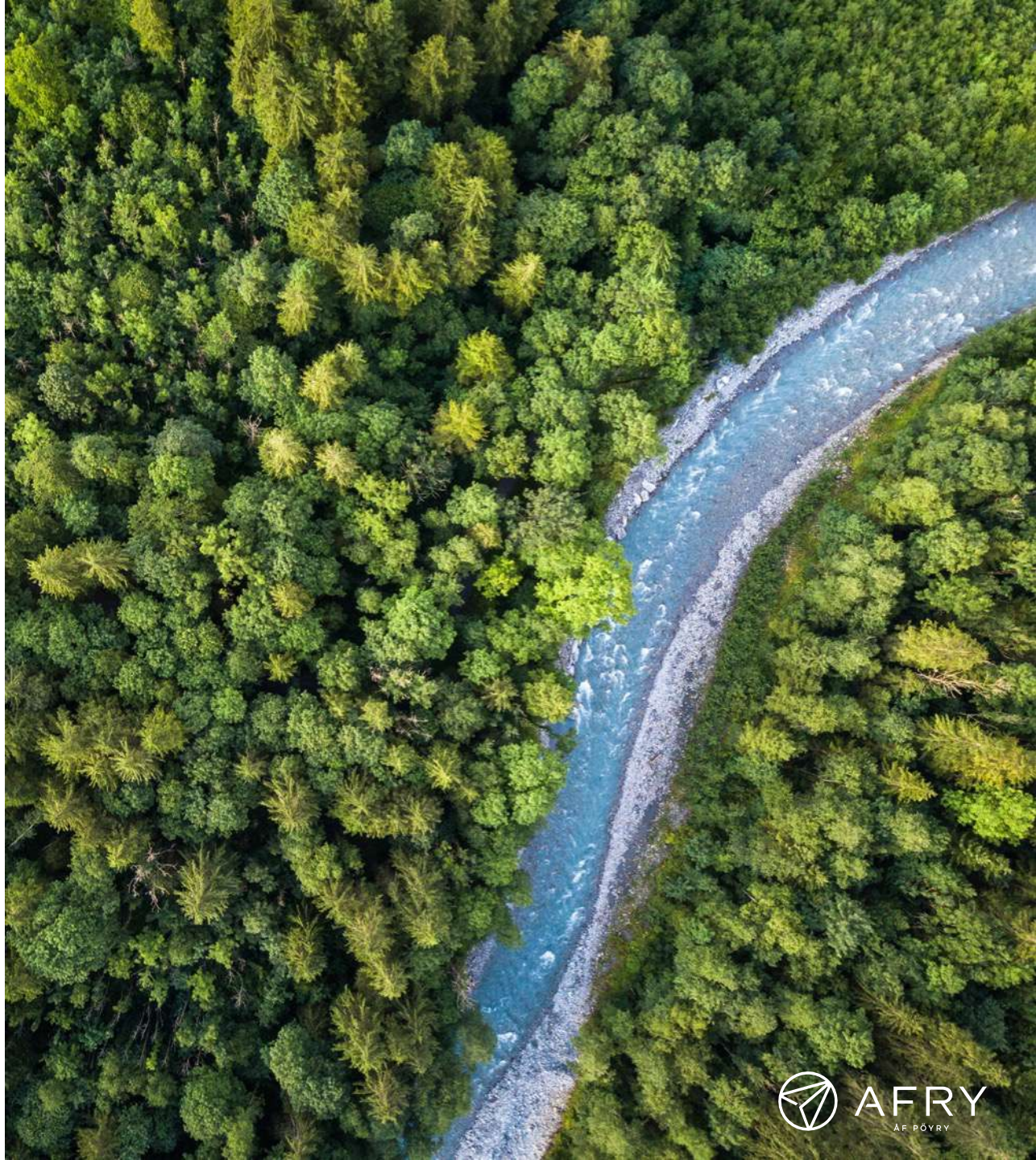


What is FIVE’s current approach to biodiversity?

At the forefront of sustainable tourism, FIVE’s strong commitment to sustainability and responsibility is present across all hotels and resorts by addressing and managing several impacts and dependencies on nature. These include for example:

- **Resource efficiency**: FIVE has obtained the LEED Platinum Certificate for all three hotels, as well as a 3 Star SPIRE Smart Building Rating for the hotels in Dubai. These cover initiatives such as greywater-based landscaping irrigation, capturing rainwater and other water saving measures. Additionally, ISO50001:2018 Energy Management Systems and ISO14001:2015 Environmental Management Systems have also been obtained.
- **Customer awareness**: FIVE engages with guests in hotel premises and online, to encourage involvement and participation in sustainability initiatives. These are mainly incentives to save resources, e.g., by choosing not to have bed and bath linen changed every day. They also actively monitor customer satisfaction regarding its sustainability programs.
- **Sourcing optimization**: FIVE works with MSC-certified seafood suppliers and uses organic gardens on own property to supply restaurants and bars.

Most of the actions described **support the sustainable use of natural resources** but appear to be broad and generic **without a specific focus on biodiversity**.

Assessing the current state of FIVE's impacts and dependencies on nature will help to identify risks and provide opportunities to develop a comprehensive target plan.

Source: Five Hotels JVC Sustainability Initiative; Sustainability Initiatives. Image by FIVE

APPROACH

A holistic review for FIVE assesses both impacts and dependencies

There is a large variety of biodiversity assessment tools available. A simple Google search of the term “Biodiversity Impact Assessment” yields more than 46.000 results.

Given that biodiversity is a relatively new topic in sustainability management to many businesses, methodological steps have been chosen in line with the SBTN that produce high quality and applicable results.

The assignment has the following characteristics:

- Consideration of both impacts and dependencies on nature (instead of just looking at impacts → given that ecosystem services that businesses rely on can be disrupted, considering dependencies on nature is relevant for risk management
- Refinement of the projected sector-level results and materiality check in the context of Dubai and Zürich
- Location-specific considerations and assessment of local conditions (biogeography, stakeholders, conservation concerns)

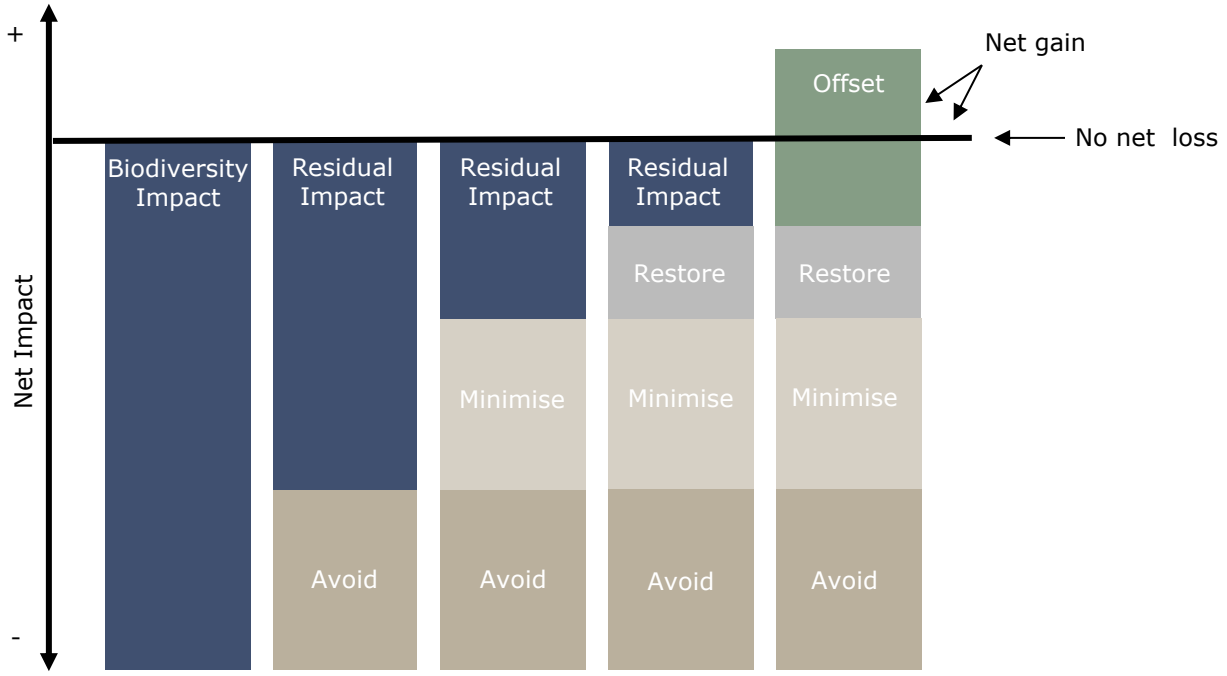
The mitigation hierarchy is a widely applied impact management tool

CHARACTERISTICS

The mitigation hierarchy is a widely-applied framework for managing negative impacts on nature and ecosystem services. It is often being applied as part of an infrastructure feasibility study and it defines measures for achieving so-called no net loss (NNL) or net gain (NG) – a desired positive impact on nature. The hierarchy identifies four steps to turn negative impacts into net gain for nature:

1. **Avoiding** impacts through intelligent sourcing of materials and spatial planning
2. **Minimising** impacts, usually achieved through improvements in design efficiency and sourcing
3. **Restore** temporary biodiversity impacts around a project site or during operations
4. **Offset** any biodiversity impacts that cannot be remediated through any of the previous steps[1]

THE HIERARCHY



[1]IFC – Guidance Note 1 Assessment and Management of Environmental and Social Risks and Impacts (2021)

Proximity to protected areas and Key Biodiversity Areas indicates potential biodiversity risks… and opportunities for eco-tourism

PROTECTED AREAS AND KEY BIODIVERSITY AREAS[1]

Protected areas are designated zones that have been established to achieve a certain conservation goal. The protection status of these reserves varies and ranges from areas still allowing human land use to strict conservation reserves, where only selected people have access (see the table on the left).

Key Biodiversity Areas define spaces with an extraordinarily high ecological value for one or several species. They do not necessarily have to be part of a protected area but follow an independent classification scheme.

Both protected areas and Key Biodiversity Areas can be of relevance for businesses looking into nature tourism. If access and usage could be managed sustainably, new business opportunities can be created. However, the risk of hazardous tourism pressure on these areas needs to be weighed in.

IUCN PROTECTED AREA CATEGORIES[2]

Category		Description
Ia	**Strict Nature Reserve**	Strictly protected areas set aside to protect biodiversity and also possibly geological/geomorphologic features. Human visitation, use and impacts are strictly controlled and limited.
Ib	**Wilderness Area**	Similar to a strict nature reserve, but generally larger and protected in a slightly less stringent manner.
II	**National Park**	Main objective is protecting functioning ecosystems but are managed in a way that may contribute to local economies through promoting educational and recreational tourism.
III	**Natural Monument or Feature**	Can be natural in the fullest sense or include elements that have been influenced or introduced by humans. They are generally quite small protected areas and often have high visitor value.
IV	**Habitat/Species Management Area**	Particular species or habitats are protected, while their management reflects this priority. May exist as a fraction of a wider ecosystem or protected area and may require varying levels of active protection.
V	**Protected Landscape or Seascape**	Interaction of people and nature over time has produced an area of distinct character with significant, ecological, biological, cultural and scenic value. Safeguarding the integrity of this interaction is vital to protecting and sustaining the area.
VI	**Protected Area with Sustainable Use of Natural Resources**	Generally large, with most of the area in a natural condition, where a proportion is under sustainable natural resource management. Combining conservation with low-level non-industrial use of natural resources is seen as one of the main aims.

[1]IBAT, [2]Locke & Dearden – Rethinking protected area categories and the new paradigm (2005)

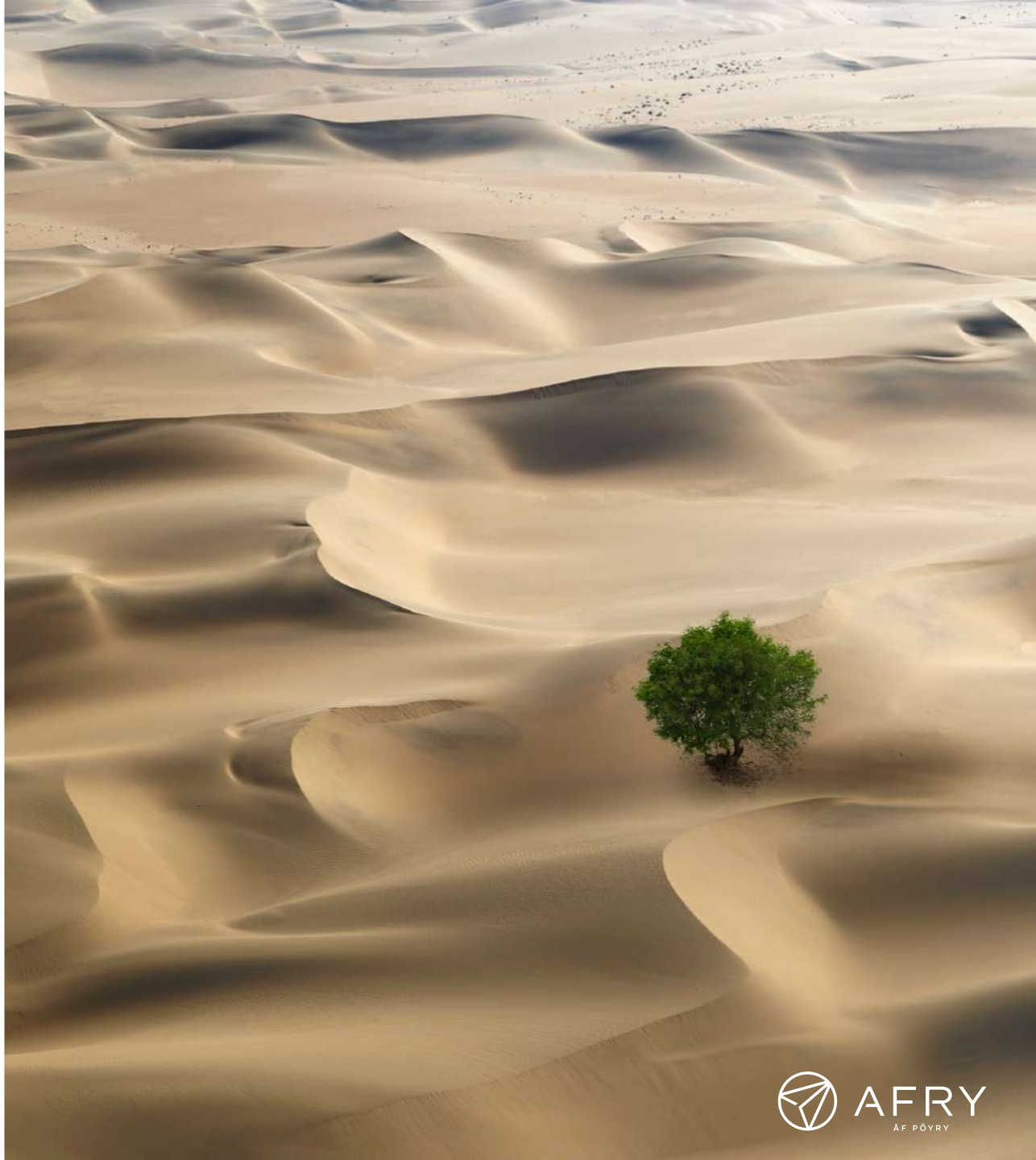
UAE'S BIODIVERSITY CHALLENGES

Biodiversity in the UAE faces strong development pressures

Ongoing infrastructure development pressures are driving a considerable decline in native fauna and flora. This process has led to around 50% of native mammal and bird species being listed as endangered on the UAE National Red List. Main pressures include:

- Land transformation, fragmentation and degradation: Driven by rapid urban development and human land use changes
- Invasive species: entering the region as a result of increased commercial activities and illicit wildlife trade
- Overfishing: Depleting fishstock and threatening mammal populations through by-catch
- High water stress: Caused by population increase and rapid tourism development
- Waste generation, air and land pollution: Caused by population increase and rapid tourism development
- Climate change risks: Including rising sea level, sandstorms, heat waves and desertification[1]

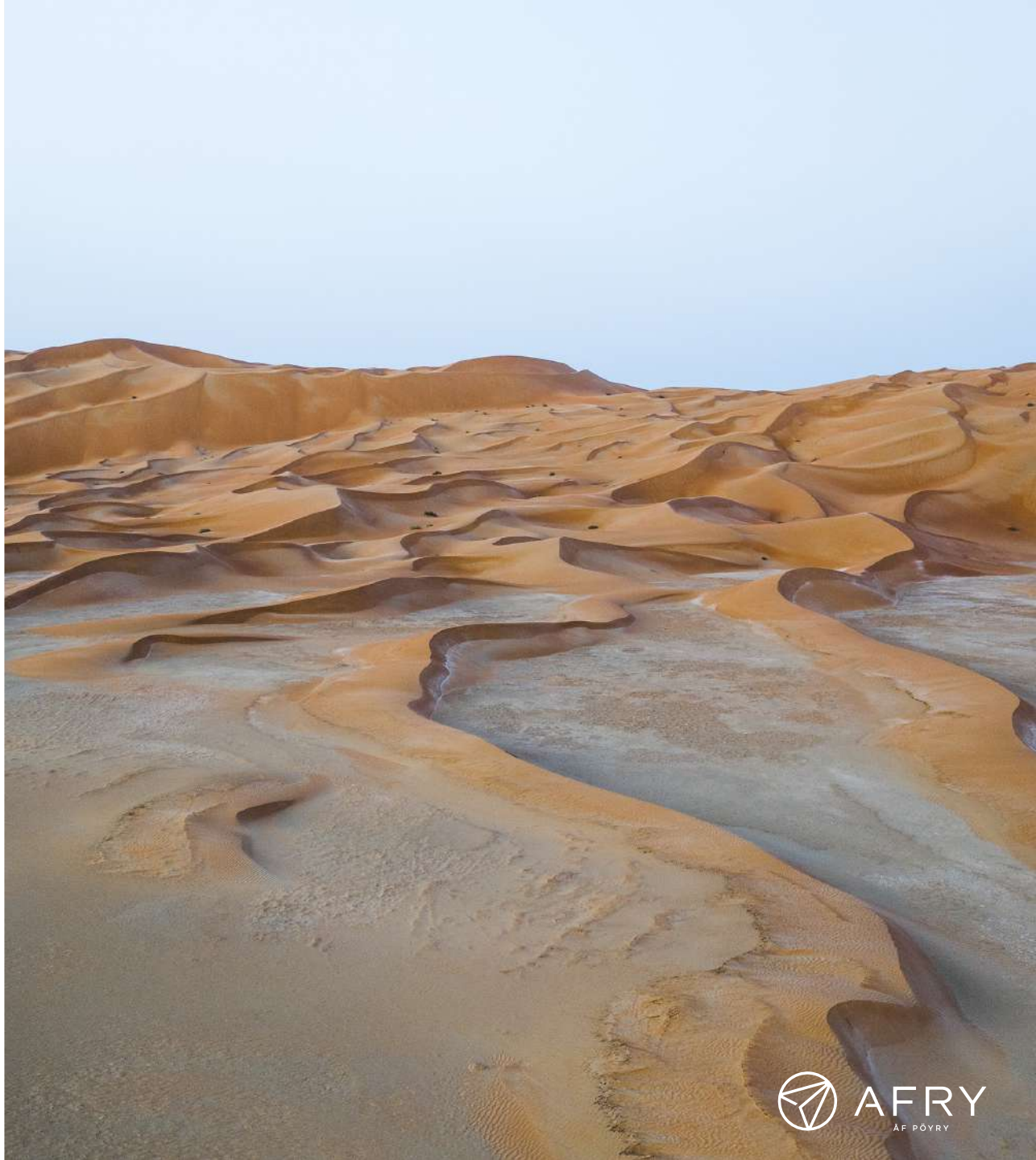
[1]UAE Governmental Portal – Environmental Challenges (2022)



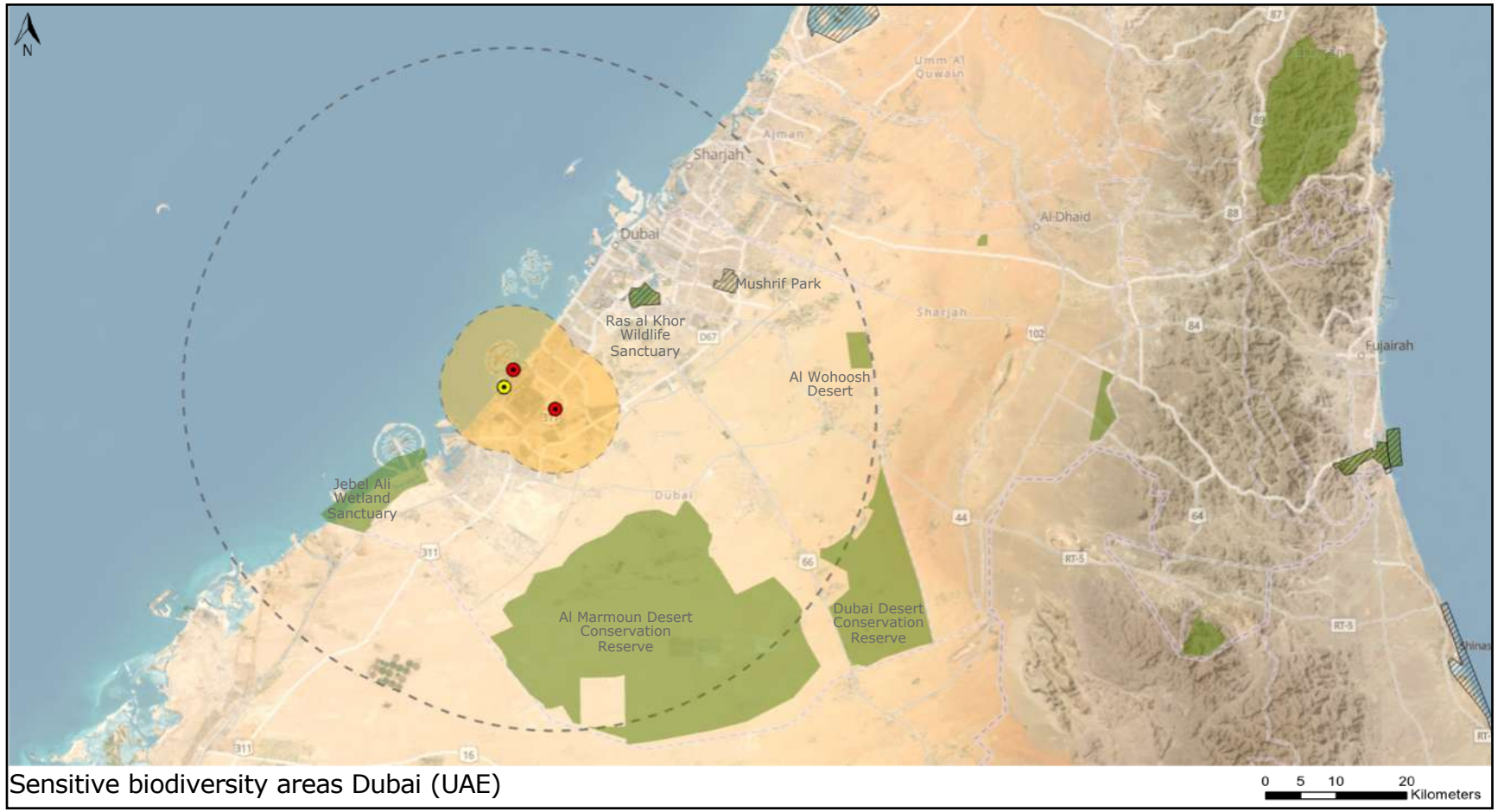
BIODIVERSITY STAKEHOLDERS IN UAE

There are several biodiversity knowledge partners in the UAE

- **UAE Ministry of Climate Change and Environment:** Enacting legislation and monitoring its implementation, establishing and expanding protected areas, protecting breeding species and reintroducing endangered species into their natural habitats
- **Emirates Nature-WWF:** Combats illegal wildlife trade and advocates reduction in home-grown demand for CITES-listed pets
- **General Secretariat for the Conservation of the Arabian Oryx:** Manages oryx reintroduction projects with public support and participation
- **Saudi & Middle East Green Initiatives:** Reducing carbon emissions through offset programme, intends to plant 50 billion trees across the Middle East and to restore an area equivalent to 200 million hectares of degraded land
- **Royal Commission of AlUla (Saudi Arabia):** The organization has become internationally recognized for their conservation and rewilding efforts on the Arabian Peninsula



FIVE's hotels in Dubai are within 50km proximity of 5 protected areas and two key biodiversity areas



Sensitive biodiversity areas Dubai (UAE)

AFRY analysis

Biodiversity screening

Distribution of PAs and KBAs near hotels

Data sources:

protected planet

KBA KEY BIODIVERSITY AREAS

Content:

- FIVE Holdings Hotel
- FIVE Holdings Hotel (under construction)
- Buffer zone (10km)
- Buffer zone (50km)
- Protected areas
- Key biodiversity areas

AFRY ÅF PÖYRY

Examples of characteristic native fauna and flora of the coastal and desert regions in the vicinity of FIVE's hotels in the UAE*

FAUNA

- **Mammals:** Arabian oryx (*Oryx leucoryx*), Arabian gazelle *(Gazella arabica),* sand gazelle (*Gazella marica*), Arabian red fox (*Vulpes vulpes arabica),* sand fox (*Vulpes rueppelli*), Arabian hare *(Lepus capensis*), Arabian wildcat (*Felis lybica lybica*), bats (Chiroptera), desert hedgehog (*Paraechinus aethiopicus)*

- **Birds:** Greater flamingo *(Phoenicopterus roseus),* sand partridge *(Ammoperdix heyi),* chestnut-bellied sandgrouse *(Pterocles exustus),* Macqueen's bustard *(Chlamydotis macqueenii),* Egyptian nightjar *(Caprimulgus aegyptius),* spotted crake *(Porzana porzana),* black-winged stilt *(Himantopus himantopus),* Eurasian oystercatcher *(Haematopus ostralegus),* lesser sand-plover *(Charadrius mongolus),* Eurasian spoonbill (*Platalea leucorodia),* great cormorant *(Phalacrocorax carbo),* white stork *(Ciconia ciconia),* greater spotted eagle *(Clanga clanga),* Arabian green bee-eater *(Merops cyanophrys),* Eurasian hoopoe *(Upupa epops),* lanner falcon *(Falco biarmicus),* greater hoopoe-lark *(Alaemon alaudipes)*

- **Reptiles:** Arabian sand boa (*Eryx jayakari),* Arabian horned viper *(Cerastes gasperettii),* Schokari sand racer (*Psammophis schokari schokari),* desert monitor *(Varanus griseus),* sand lizards *(Acanthodactylus spp.),* Leptiens spiny-tailed lizard *(Uromastyx aegyptia leptieni),* Arabian sand skink (*Scincus mitranus*), house geckos (*Hemidactylus spp.*), sand geckos (*Stenodactylus spp.*), blue-headed agama (*Trapelus flavimaculatus)*

- **Insects:** Striped mantis (*Blepharopsis mendica Fabricius*), desert locust (*Schistocerca gregaria*), Polkadot antlion (*Palpares dispar*), cyclops termite (*Psammotermes hybostoma*), desert runner *(Cataglyphis niger),* golden ant *(Ginonotus sericeus),* zebra bee *(Pseudapsis nilotica),* carpenter bee *(Xylocopa koptortosoma aestuans),* silver-striped hawk moth *(Hyles livornica esper),* Jujube lappet *(Streblote siva),* Acacia looper moth *(Istugia disputaria*), salmon Arab *(Colotis fausta),* blue pansy *(Junonia orithya here),* African monarch *(Danaus chrysippus)*

FLORA

- **Trees**: Arabian gum tree (*Acacia nilotica*), umbrella thorn (*Acacia tortilis*), Samur tree (*Acacia ehrenbergiana*), Ghaf tree (*Prosopis cineraria*), date palm (*Phoenix dactylifera*), Christs thorn (*Ziziphus spina-Christi*), Athle tree (*Tamarix aphylla*), toothbrush tree *(Salvadora persica),* grey mangrove *(Avicennia marina)*

- **Shrubs:** Isbaq *(Euphorbia larica),* Arta *(Calligonum comosum),* desert hyacinth *(Cistanche tubulosa),* Safrawi *(Dipterygium glaucum*), broom bush *(Leptadenia pyrotechnica),* Sodoms apple *(Calotropis procera),* Shuntop *(Pentatropis nivalis),* Arfraj *(Rhanterium epapposum),* Turnsole *(Heliotropium kotschyi),* Kary *(Heliotropium digynum),* Neela *(Indigofera colutea),* Nzah *(Crotalaria aegyptiaca),* desert thorn *(Lycium shawii),*Rimth *(Haloxylon salicornicum),* Had (*Cornulaca monacantha*), bean caper (*Zygophyllum hamiense*), strings of bead *(Halopeplis perfoliate),* salt cedar *(Tamarix spp.)*

- **Herbs:** Arabian primrose *(Arnebia hispidissima),* Raghaili *(Convolvulus cephalopodus),* desert squash *(Citrullus colocynthis),* Herbeth *(Lotononis platycarpa),* Shersir *(Tribulus pentandrus)*

- **Grasses:** Dune grass *(Cyperus conglomeratus),* foxtail grass *(Cenchrus ciliaris),* Turgid panic grass *(Panicum turgidum),* bristle grass *(Pennisetum divisum)*

*Most animal and plant species are found in natural environments, such as protected areas. In some cases, they can also be found in urban environments. Introduced species are not included.
Source: UAE MOCCAE National Red List, Dubai Desert Conservation Reserve, Dubai Municipality

FIVE Palm Jumeirah and FIVE Jumeirah Village – geographic observations

- The natural coastline of the Persian Gulf is characterized by scattered mangrove forests in intertidal zones. Due to fast coastal development and land reclamation, aquaculture, coastal pollution and many other anthropogenic impacts, these biodiversity-, as well as carbon-rich ecosystems are globally threatened. Despite this fact, the area of mangrove forests has generally increased in the UAE over the last 40 years[1].
- Satellite data indicates that the area around the FIVE Palm Jumeirah is tightly developed with limited parks or unsealed spaces available. However, large roof areas of the hotel appear to be currently unutilized.
- Without natural protection FIVE's Palm Jumeirah's heavily used coastal area could become subject to erosion.
- Both hotels can be considered greenfield project that have consumed natural habitat alongside the development of the city.
- When compared to the Palm, satellite imagery of Jumeirah Village shows more “breathing space” - while urban development has impacted nature and biodiversity heavily, the area appears less “packed”, with more parks and open spaces for nature to thrive.
- Due to rapid development of Dubai, the connection between guests, traditional culture and the nature of the UAE appears to go unutilized. (Re-) Establishing this connection would be possible and could potentially support biodiversity efforts, but it would depend on how this idea might integrate with the desired narratives and themes of the FIVE properties.
- Due to the distance, the hotels do not have any direct negative impacts on regional nature reserves and key biodiversity areas. However, indirect effect may occur through hotel guests unintentionally entering and disturbing these areas.

[1]AGEDI – Abu Dhabi Blue Carbon Demonstration Project (2014)

COMPANY LEVEL REFINEMENT

FIVE Palm Jumeirah – Risk Matrix

Impact/ Dependency on nature		Materiality	Business Risk	Assessment
Waste generation (solid waste and liquid waste)	I	🟠	🟢	EMS and other measures to reduce waste production and to promote recycling are already in place. Continued research and testing of alternative methods for the reduction of waste may further support risk management.
Disturbances (light, noise pollution, guests disturbing protected areas)	I	🟠	🟢	Light and noise can disrupt the natural feeding and breeding patterns, particularly of nocturnal species. Palm Jumeirah has a large open event space that is being used until late hours, which has an accumulative effects with adjacent properties. Native wildlife on the palm is likely depleted and tourists may introduce indirect effects by disturbing protected areas.
Carbon emissions	I	🟠	🟠	Decarbonization strategy in place. Carbon emissions pose an overall business risk due to potential climate action failure and tightening legislation.
Land use	I	🟠	🟢	High land use - the entire development of Dubai needs to be considered as a greenfield project. Can be managed for future hotels through sustainable property development following mitigation hierarchy.
Flood & storm protection	D	🔴	🔴	Palm Jumeirah appears to lack natural flood protection through mangroves and reefs. Flooding and rising sea levels pose a significant risk to FIVE Palm Jumeirah. Missing natural protection may be substituted through technical solutions but requires investment.
Erosion control	D	🟠	🟠	Heavy land use, lack of vegetation cover and dune stabilization by native plants can lead to sand and soil erosion. This can potentially damage or compromise the property and built assets.
Climate regulation	D	🔴	🟠	Dubai's extreme temperatures are likely to increase under climate change scenarios. Microclimates created with native vegetation can mitigate associated risks. It can also reduce resource use and costs for shading and cooling.
Water provision	D	🔴	🔴	Water saving measures and water repurposing are already in place. The scarcity of freshwater and the continuous decline of ground water levels are a major challenge for Dubai. However, infrastructure measures such as the use of desalination plants can reduce the risk of scarcity. Further consideration should be given to the continued research and testing of novel water saving technologies.
Unknown supplier biodiversity risk	D	🔴	🔴	A supply chain biodiversity due diligence is recommended to identify any biodiversity risks that may disrupt the production processes of suppliers. The risk of supply disruption is currently unknown.

AFRY analysis. Direct operations only. The sector-level ENCORE materiality analysis received a **company-specific refinement and enhancement**, based on expert assessment

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COMPANY LEVEL REFINEMENT

FIVE Jumeirah Village – Risk Matrix

Impact/ Dependency on nature		Materiality	Business Risk	Assessment
Waste generation (solid waste and liquid waste)	I	●	●	EMS and other measures to reduce waste production and to promote recycling are already in place. Continued research and testing of alternative methods for the reduction of waste may further support risk management.
Disturbances (light, noise pollution, guests disturbing protected areas)	I	●	●	Light and noise can disrupt the natural feeding and breeding patterns particularly of nocturnal species. Outdoor event space appears smaller than at Palm Jumeirah, which limits negative effects but still has an accumulative effect with adjacent properties. Tourists may introduce indirect effects by disturbing local protected areas.
Carbon emissions	I	●	●	Decarbonization strategy in place. Carbon emissions pose an overall business risk due to potential climate action failure and tightening legislation.
Land use	I	●	●	High land use - the entire development of Dubai needs to be considered as a greenfield project. Can be managed for future hotels through sustainable property development following mitigation hierarchy.
Flood & storm protection	D	●	●	Off-coast location limits the risks of flooding. Missing natural protection may be substituted through technical solutions but requires investment.
Erosion control	D	●	●	Heavy land use, lack of vegetation cover and dune stabilization by native plants can lead to sand and soil erosion. This can potentially damage or compromise the property and built assets.
Climate regulation	D	●	●	Dubai's extreme temperatures are likely increasing under climate change scenarios. Microclimate created with native vegetation can mitigate associated risks and lower costs for climate control. Jumeirah Village's surroundings appear to have more green spaces when compared to the Palm Jumeirah location.
Water provision	D	●	●	Water saving measures and water repurposing are already in place. The scarcity of fresh water and the continuous decline of ground water levels are a major challenge for Dubai. However, infrastructure measures such as the use of desalination plants can reduce the risk of scarcity. Further consideration should be given to the continued research and testing of novel water saving technologies.
Unknown supplier biodiversity risk	D	●	●	A supply chain biodiversity due diligence is recommended to identify any biodiversity risks that may disrupt the production processes of suppliers. The risk of supply disruption is currently unknown.

AFRY analysis. Direct operations only. The sector-level ENCORE materiality analysis received a **company-specific refinement and enhancement**, based on expert assessment

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SWITZERLAND’S BIODIVERSITY CHALLENGES

Climate change as a main threat to Switzerland’s biodiversity

Switzerland faces the effects of climate change in the form of rising temperatures and heavy precipitation. Its main environmental problems are related to pollution and soil degradation, while many parts of its natural landscapes have been converted for agricultural use, urban areas and infrastructure continuing to expand. As a result, more than a third of Switzerland's native animal, plant, fungus and lichen species are threatened, as reflected in the IUCN Red List, while 95% of dry meadows and pastures have been lost since the 1900’s.[1]

Nevertheless, the City of Zurich is committed to environmental and climate protection through several initiatives:

1. Becoming a climate neutral city
2. Creating a healthy urban environment
3. Establishing a connected landscape
4. Intelligent use of resources[2]

→ These commitments can provide access points for a biodiversity narrative suitable for FIVE Zurich

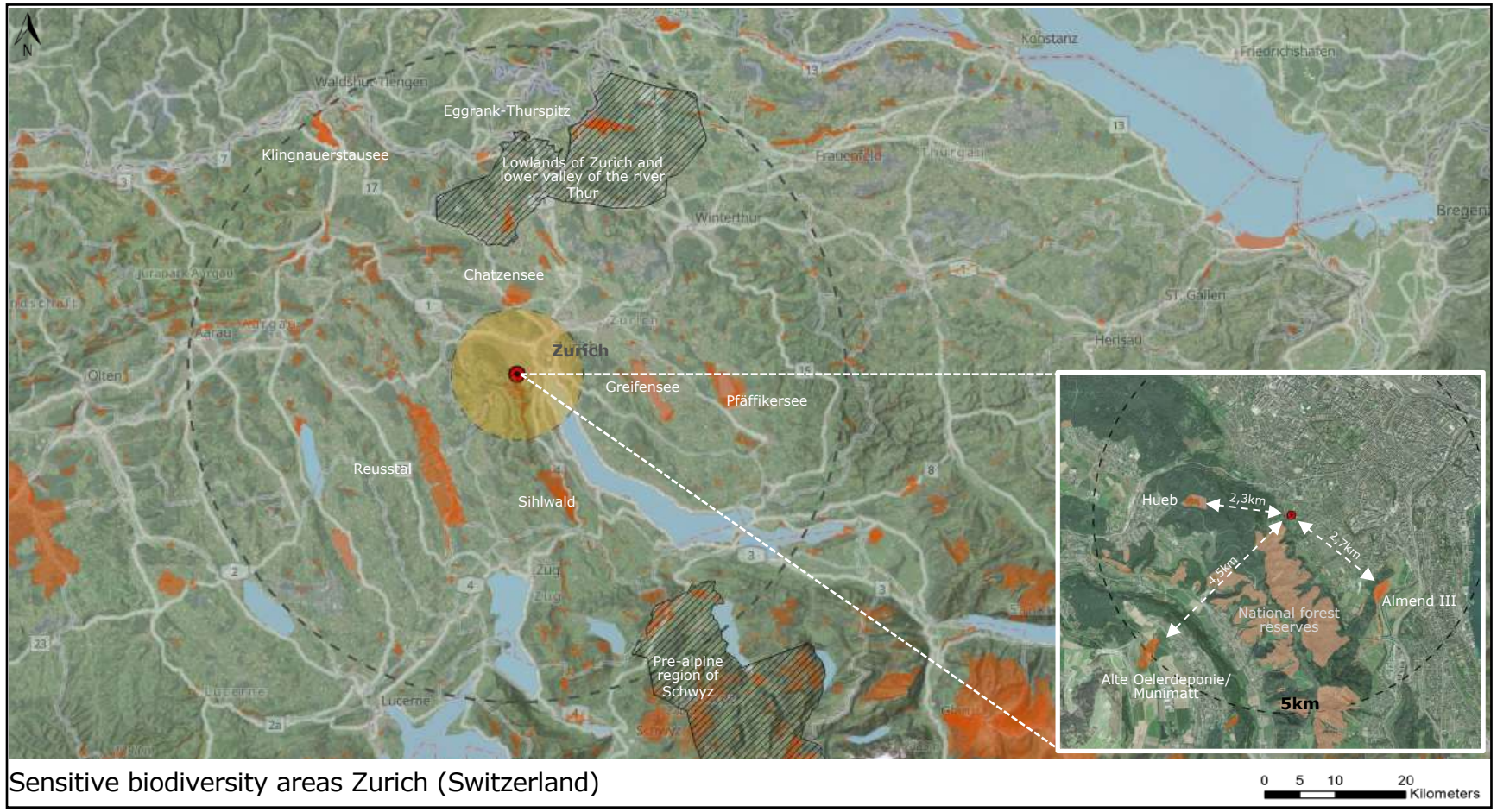
[1]Pro Natura – Biodiversität in der Schweiz (2023), [2]Stadt Zürich – Umwelt und Energie (2023)

BIODIVERSITY STAKEHOLDERS IN SWITZERLAND

There are several biodiversity knowledge partners in Switzerland

- **WWF Switzerland**: Their main objective is the conservation of species-rich habitats, mediation of human-wildlife conflicts and political engagement
- **The Swiss Parks**: Committed to preserving and maintaining cultural and natural landscapes while promoting a sustainable regional economy and education for sustainable development. The organizations raises awareness both among local communities and visitors
- **Pro Natura**: An environmental advocacy group raising awareness on environmental issues in politics and society
- **IUCN Conservation Centre**: The IUCN is the world's largest conservation organization. Its headquarters are in Gland, Switzerland
- **Federal Office for the Environment**: Responsible for the development of the Swiss Biodiversity Strategy, species conservation, management of invasive species, regulation and use of water habitats
- **BirdLife Zurich:** Association of over 100 nature and bird conservation organization with a special focus on the protection of native birds in the Canton of Zurich

FIVE's resort in Zurich is located within 50km proximity of several small protected areas and biotopes, as well as to two key biodiversity areas



Sensitive biodiversity areas Zurich (Switzerland)

Biodiversity screening

Distribution of PAs and KBAs near hotels

Data sources:

protected planet

KBA
KEY BIODIVERSITY AREAS

Content:

- FIVE Holdings Hotel
- Buffer zone (10km)
- Buffer zone (50km)
- Protected areas
- Key biodiversity areas

Source: IBAT, Key Biodiversity Areas, World Database on Protected Areas, AFRY Analysis

AFRY
ÅF PÖYRY

Examples of characteristic native fauna and flora in the vicinity of FIVE's resort in Switzerland*

FAUNA

- **Mammals:** Eurasian beaver (*Castor fiber*), red fox (*Vulpes vulpes*), European badger (*Meles meles*), wild boar (*Sus scrofa*), roe deer (*Capreolus capreolus*), red deer (*Cervus elaphus*), bats (Chiroptera), beech marten (*Martes foina*), red squirrel (*Sciurus vulgaris*)
- **Birds:** Chaffinch *(Fringilla coelebs),* common blackbird *(Turdus merula),* coal tit *(Periparus ater),* European robin *(Erithacus rubecula),* common buzzard *(Buteo buteo), barn owl (Tyto alba),* tawny owl *(Strix aluco),* great spotted woodpecker *(Dendrocopos major),* barn swallow *(Hirundo rustica),* Eurasian blackcap *(Sylvia atricapilla),* common chiffchaff *(Phylloscopus collybita),* Eurasian jay *(Garrulus glandarius),* peregrine falcon *(Falco peregrinus),* alpine swift *(Tachymarptis melba),* western jackdaw *(Coloeus monedula),* common kestrel *(Falco tinnunculus),* northern goshawk (*Accipiter gentilis*)
- **Reptiles:** Viviparous lizard (*Zootoca vivipara),* slow worm (*Anguis fragilis*), sand lizard (*Lacerta agilis),* barred grass snake (*Natrix helvetica*)
- **Amphibians:** Grass frog (*Rana temporaria*), alpine newt (*Ichthyosaura alpestris*), yellow-bellied toad (*Bombina variegata*), common midwife toad (*Alytes obstetricans*), fire salamander (*Salamandra salamandra*)
- **Insects:** Common carder bee (*Bombus pascuorum*), hairy-footed flower bee (*Anthophora plumipes*), red mason bee (*Osmia bicornis*), early-nesting bumblebee (*Bombus pratorum*), cabbage butterfly (*Pieris brassicae*), small blue (*Cupido minimus*), common brimstone (*Gonepteryx rhamni*), small tortoiseshell (*Aglais urticae*), red admiral (*Vanessa atalanta*), hummingbird hawk-moth (*Macroglossum stellatarum*), Roman snail (*Helix pomatia),* lemon snail (*Cepaea nemoralis*)

FLORA

- **Trees**: European spruce (*Picea abies), European silver fir (Abies alba), European beech (Fagus sylvatica), common yew* (*Taxus baccata*), sycamore maple (*Acer pseudoplatanus*), European ash (*Fraxinus excelsior*)
- **Shrubs:** Rowan (*Sorbus aucuparia),* wild cherry (*Prunus avium*), *bird cherry (Prunus padus), mountain rose (Rosa penduline), gueder rose (Viburnum opulus), blackthorn (*Prunus spinosa), hawthorn (Crataegus monogyna), hazel (Corylus avellana), black elder (Sambucus nigra), common juniper (*Juniperus communis),* bracken *(Pteridium aquilinum)*
- **Herbs:** Dandelions (*Taraxacum officinale),* ground-ivy *(Glechoma hederaceae), nettle (Urtica dioica),* ribwort plantain *(Plantago lanceolata),* hedge bedstraw *(Galium mollugo),* garlic mustard *(Alliaria petiolate),* cuckoo flower *(Cardamine pratensis),* daisy *(Bellis perennis),* wild garlic *(Allium ursinum)*
- **Grasses:** Perennial ryegrass (*Lolium perenne*), quaking grass (*Briza media*), cock's-foot orchard grass (*Dactylis glomerata*), tufted grass (*Holcus lanatus*), bulbous oat grass (*Arrhenatherum elatius*), barren brome (*Bromus sterilis*), annual meadow grass (*Poa annua*), red fescue (*Festuca rubra*)

*Most animal and plant species are found in natural environments, such as protected areas. In some cases, they can also be found in urban environments. Introduced species are not included.
Source: National forest inventory, Stadtwild Tiere, Kanton Zürich, Landolt (2001), BirdLife Zurich, Stadt Zürich

FIVE Zurich – geographic observations

- The premise is located on the western outskirts of the city of Zurich. To the east side, the hotel borders the settlement areas of the city, while the western part is characterized by an adjacent forest at the foothills of Uetliberg.
- Uetliberg is a small mountain with forests, protected biotopes and creeks. It is a popular recreational area and offers opportunities for outdoor activities such as hiking, mountain biking and an educational planet trail, as well as viewpoints overlooking the city, Lake Zurich and the Alps.[1]
- Satellite data indicates a mosaic landscape of green spaces within 200 m radius of the hotel, in addition to linear structures such as rows of trees and shrubs. The pastures appear to be used for livestock grazing by a neighboring farm.
- The building has a green roof with soil covering, surrounded by lawn gardens with fruit trees planted on the property.
- While situated in a suburban, almost rural landscape, the hotel does not have any direct impacts on regional nature reserves and key biodiversity areas. However, indirect effects may occur through hotel guests visiting and unintentionally disturbing the areas.

[1]Stadt Zürich – Uetliberg (2023)

COMPANY LEVEL REFINEMENT

FIVE Zurich – Risk Matrix

Impact/ Dependency on nature		Materiality	Business Risk	Assessment
Waste generation (solid waste and liquid waste)	I	🟡	🟢	EMS and other measures to reduce waste production and to promote recycling are already in place. Continued research and testing of alternative methods for the reduction of waste may further support risk management.
Disturbances (light, noise pollution, guests disturbing protected areas)	I	🔴	🟢	Light and noise can disrupt the natural feeding and breeding patterns particularly of nocturnal species. The effects in suburban/rural areas may be more severe when compared to a more urban hotel location. Tourists may introduce indirect effects by disturbing local protected areas.
Carbon emissions	I	🟡	🟡	Decarbonization strategy in place. Carbon emissions pose an overall business risk due to potential climate action failure and tightening legislation.
Land use	I	🟢	🟢	Very low materiality and impact – the location has been taken over from a previous owner and been fully renovated. Land loss impacts are addressed through green roofs, including 'insect and pollinator hotels', which provide habitat and stopover structures. Although not a greenfield project, building efficiency has likely increased significantly due to LEED design choices.
Flood & storm protection	D	🟡	🟡	Overall risk of stormwater damage and flooding due to severe weather events in Central Europe.
Erosion control	D	🔴	🟡	High materiality of ecosystem service due to proximity to hill slope. Soil stability and health in closer and wider landscape around hotel should be ensured, and potential related climate risks considered.
Climate regulation	D	🟡	🟡	Overall risk of stormwater damage and flooding due to severe weather events in Central Europe.
Water provision	D	🟢	🟢	Water saving measures and water repurposing are already in place. Low water stress in the Zurich area significantly reduces materiality and business risk.
Unknown supplier biodiversity risk	D	🔴	🔴	A supply chain biodiversity due diligence is recommended to identify any biodiversity risks that may disrupt the production processes of suppliers. The risk of supply disruption is currently unknown.

Source: AFRY analysis. Direct operations only. The sector-level ENCORE materiality analysis received a **company-specific refinement and enhancement**, based on expert assessment

AFRY ÅF PÖYRY

HOTELS OFFERING NATURE EXPERIENCES IN DUBAI

Nature-related offerings in Dubai are not always biodiversity-friendly

Hotel	Nature/outdoor activities	Ecotourism or sustainability strategy	Specific biodiversity measures/activities	Flag	Afry Assessment*
Al Maha Desert Resort & Spa	- Nature walks - Horse riding & camelback trekking - Desert safaris - Archery - Falconry displays	- No sustainability concept on website - A full-time team of researchers (assisted by universities) constantly monitor the Dubai Desert Reserve around Al Maha Desert Spa & Resort, establishing conservation and scientific projects that ensure the future of many of the indigenous species of Arabia	- Field Guides advise and educate guests on local fauna and flora by travelling on foot, by 4x4 vehicle, on camel or horseback	🟢	- If the rules of the reserve are followed, activities can have a positive effect on raising awareness and global interest, as well as enhancing traditional values
Jumeirah Al Naseem	- Yacht tours - Water sports	- Removal of plastic bottles and straws, - Supporting local farmers, waste management (recycling and composting) - Reduction of energy consumption - Offers placements in hospitality for females from developing nations, enforcement of diversity and equal opportunity	- Dubai Turtle Rehabilitation Project: centre is part of the resort (environmental education programmes for children, public awareness, fundraising)	🟠	- Having the turtle centre within the resort is an advantage, although this is not ecotourism
Sofitel Dubai The Palm Resort & Spa	- Boat tours - Eco golf - Kayaking - Snorkeling - Water sports	- Follow best practices across operations with an effective sustainability management plan	- Raising employee awareness - Promoting garden, lawn and farmland management practices that limit the use of chemicals - Partnering with specialized associations	🟠	- The nature activities are potentially hazardous to nature and biodiversity - This is not ecotourism
Bab Al Shams	- Nature guided walks - Hot-air balloon rides - Horse and camelback riding - Falconry - Nomadic nature tours - Electric fatbike safari	- No sustainability concept on website - Educational component embedded in guided activities	- Field Guides advise and educate guests on local fauna and flora	🟢	- If the rules of the reserve are followed, activities can have a positive effect on raising awareness and global interest, as well as enhancing traditional values
Atlantis Dubai	- Aquaventure waterpark - Atlas village (including interactions with Indo-Pacific bottlenose dolphins and South African fur seals) - Aquarium - Watersports	- Atlantis Atlas Project is the company's commitment to do business in ways that are good for both people and planet. They do this by focusing on Responsible Operations, Conservation and Animal Welfare, Education and Awareness, and Corporate Social Responsibility	- The Atlas Project facilitate breeding, exchange and release programmes of fish species - Partners with Zayed University on the Dubai Dolphin Survey, led by the UAW Dolphin Project - Species Survival Plans and studbooks - Stranding response and rehabilitation - Youth education programmes - Sourcing sustainable items for their menus	🟠	- Although they have a strong interest in conservation, education and research, this is mainly to compensate for the negative impact on the captive animals - Advertising and offering interactions with wildlife has become a very controversial global issue - This is not ecotourism
FIVE Palm Jumeirah & Jumeirah Village	- n/a	- Follow best practices across operations with an effective sustainability management plan (certified LEED Platinum status, only SPIRE Smart Building Rated hotels) - Energy and resource saving - Recycling and composting systems	- Company supports reforestation projects in Kenya	🟠	- Reforestation projects as compensation measure but no local initiatives in place - This is not ecotourism

Source: AFRY analysis (comparison of website content) *The assessment is based on the content identified as ecotourism (with special focus on biodiversity)

AFRY ÅF PÖYRY

HOTELS OFFERING NATURE EXPERIENCES IN ZURICH

Hotel operators in Zürich offer only limited nature-related experiences

Hotel	Nature/outdoor activities	Ecotourism or sustainability strategy	Specific biodiversity measures/activities	Flag	Afry Assessment*
Hotel Alex Lake Zürich	- n/a	- Farm-to-table concept - Home-made farm products from Switzerland - Water from Lake Zurich used to cool and heat premises - Food waste biotransformation for green energy - Support project: Clean drinking water for schools and households in Uganda	- n/a		- Few or no opportunities/activities offered by the hotel to experience nature
Hotel City Zürich	- E-biking	- Paper-free - Door code instead of plastic key - CO2 compensation through MyClimate - Air-water-heat pump to maximise energy efficiency - Seasonal cuisine - Partnership with organisations, donations	- n/a		- Few or no opportunities/activities offered by the hotel to experience nature
Widder Hotel	- n/a	- Farm-to-table concept - Reduction of daily food wastage - Involvement in the local community - Donations to charitable foundations	- n/a		- Few or no opportunities/activities offered by the hotel to experience nature
The Dolder Grand	- n/a	- Geothermal technology and Swiss hydropower as energy suppliers - Support of climate protection and sustainability in Swiss tourism	- n/a		- Few or no opportunities/activities offered by the hotel to experience nature
Castello del Sole Beach Resort & Spa (Ascona)	- Biking	- Farm-to-table concept: regional and seasonal products, nose-to-tail principle - Used soaps sent to SapoCycle organisation which uses them to manufacture hygiene products for people living in poverty - Plastic-free daily routine	- Bird conservation area as part of the Castello del Sole's park, classified as water and migratory bird conservation area of national importance – off-limits to guests		- Although guests can't visit the conservation area, the property plays an important role of the local conservation effort
Valsana Hotel Arosa (Arosa)	- Hiking - Biking - Snow sport	- Carbon-neutral facility - Paper-free - Free charging stations for electric vehicles - Regional ingredients	- Hotel supports an upland moor renaturating project and a mountain gorilla project in Rwanda - Hotel guests can plant a tree by making a voluntary donation		- Offers restoration activities and compensation opportunities for an important global conservation project
FIVE Zurich	- Outdoor gym: Uetliberg mountain	- Only LEED Platinum hotel in Switzerland - Energy saving guest room management system - Low-energy-consumption building	- Company supports reforestation projects in Kenya		- Few or no opportunities/activities offered by the hotel to experience nature - Reforestation projects as compensation measure but no local initiatives in place - This is not ecotourism

Source: AFRY analysis (comparison of website content) *The assessment is based on the content identified as ecotourism (with special focus on biodiversity)

AFRY ÅF PÖYRY

CONCLUSION

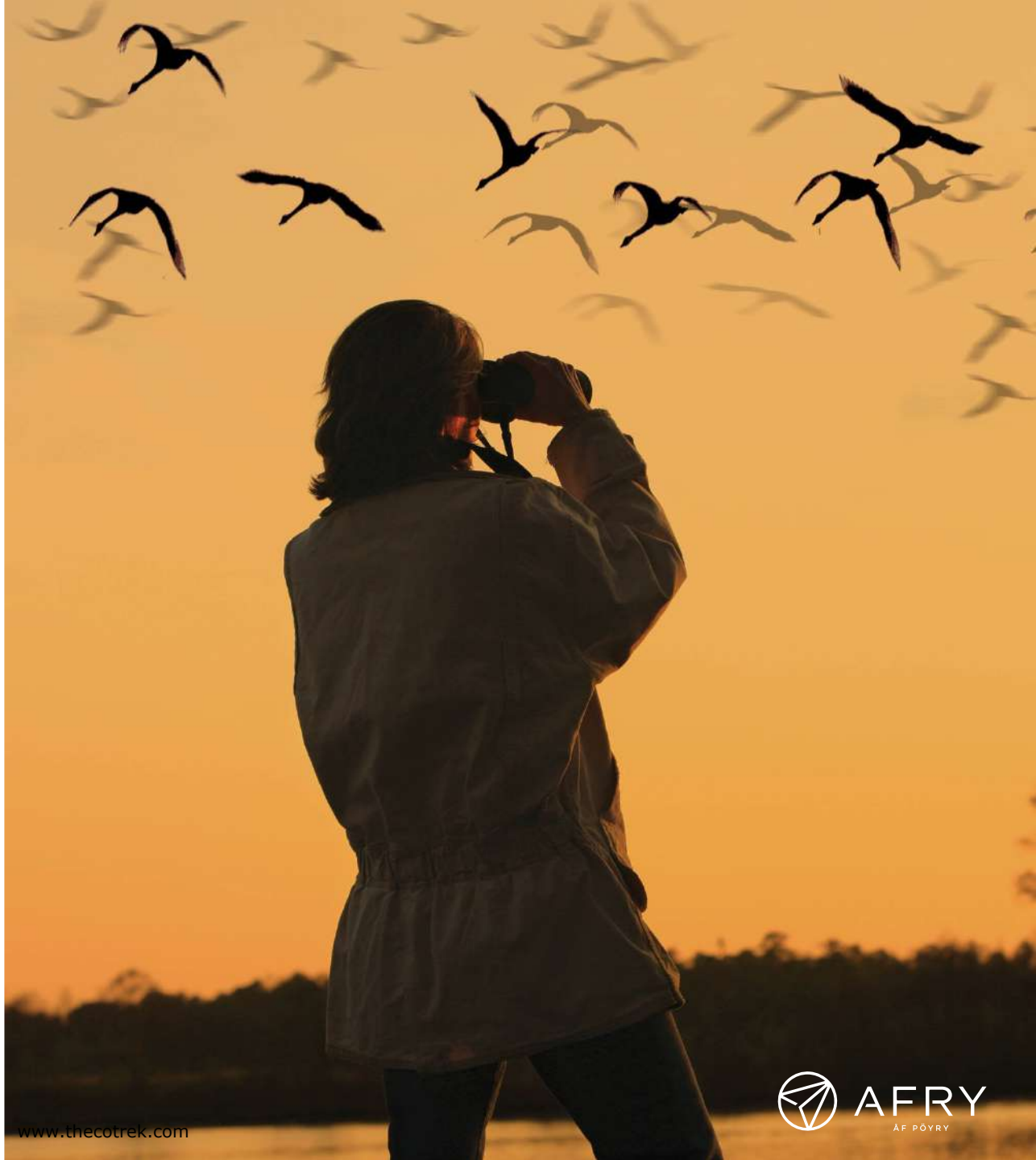
Ecotourism is not well defined

- Hotel operators in Dubai offer a variety of nature-related activities, but the activities are in most cases not biodiversity-friendly
- Biodiversity-friendly tourism appears to be possible in cases where resorts are integrated in protected areas
- In Zurich, hotel operators rarely offer nature activities directly and it is expected that visitors rely on third-party operators for nature experiences
- The investigated hotels highlight, to a varying degree, the relevance of sustainability for their business
- The investigated hotels do not have a dedicated biodiversity strategy in place
- There appears to be an overall **confusion about the term ecotourism**, as several hotels use it to refer to *any* type of nature activity

ECOTOURISM DEFINED

Ecotourism is more than just a nature adventure

"Ecotourism is defined as responsible travel to natural areas that conserves the environment, sustains the well-being of the local people, and involves interpretation and education"



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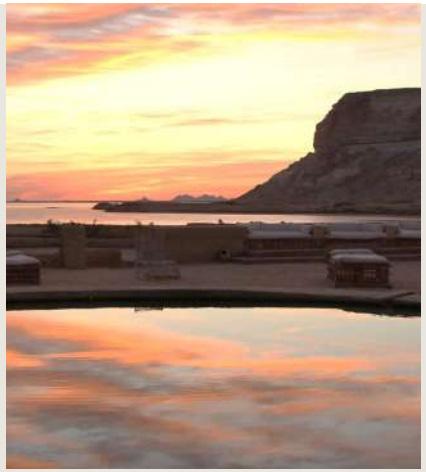
BEST PRACTICE

Tourism companies reflect the definition of ecotourism within their business

Wild Jordan Adventures

The Royal Society for Conservation of Nature creates nature-based tourism businesses that do not exert pressure on the natural resources of the area but co-finance conservation measures and protected area management. To ensure the success of their operations, RSCN heavily relies on the involvement of local communities, which benefits them with alternative forms of income.[1]



Taziry Ecovillages

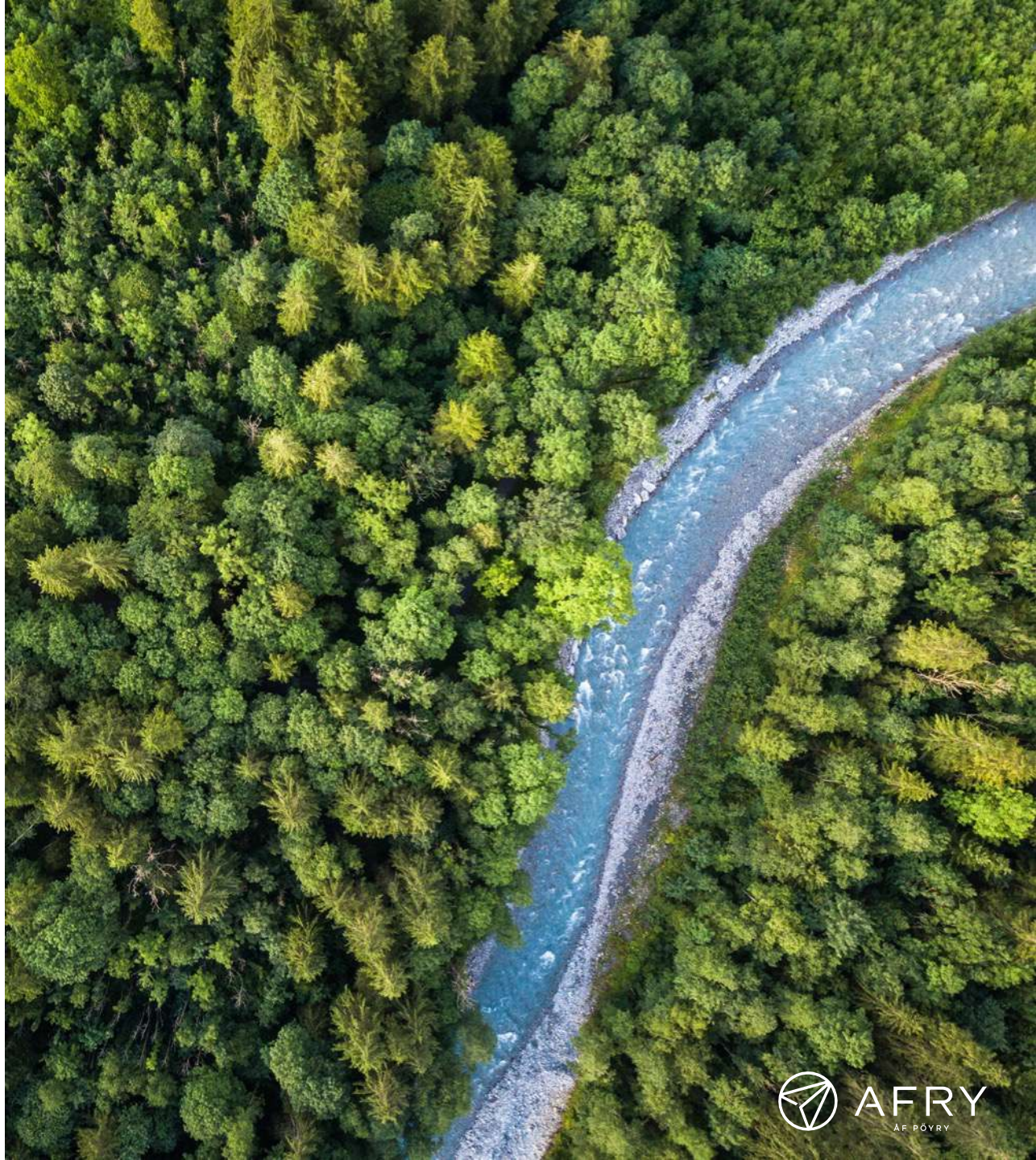
The business creates a narrative in which their operations, as well as the experience to the visitors, is fully embedded into the local socio-cultural and natural environment. Activities include a mix of historical, archeological and wildlife experiences such as desert safaris, visits to historical sites, experiencing local handcrafts and cuisine as well as birdwatching, among others.[2]

Whitepod Switzerland

The self-efficient tents are erected without any infrastructure and leave a very limited environmental footprint. Guests are educated by staff about the local fauna and flora, and a variety of nature and outdoor recreational activities are offered on site. According to the operator, the demand for experiences in and with nature is growing rapidly.[3]

[1]Wild Jordan [2]Taziry Ecovillages [3]Whitepod

Content



FIVE targets as cornerstone for a biodiversity strategy

I. **Optimize input**: Intelligent sourcing of biodiversity-friendly resources for all operations

II. **Optimize output**: Minimize environmental impact through effective waste management and recycling

III. **Biodiversity-friendly property management**: Improve biodiversity through effective landscape management

IV. **Conservation partnerships programme**: Engage with conservation organizations and knowledge partners and develop an ecotourism programme

V. **Low-impact CAPEX programme**: Implement international performance standards and mitigation hierarchy in property development and construction

TARGETS

Actions to optimize input

Hierarchy	Action	Impact		Readiness		Pressures addressed	Overall assessment		Location	Indicators
Minimize	Source certified organic products for bars and restaurants and consider recommendations of the TRAFFIC programme	●	High	◑	Partly in place	Land use changes, pollution, resource exploitation	●	May significantly improve biodiversity effects along the supply chain. Evaluate readiness. **Seafood supplier: MSC certified**	Global	% products tested in terms of their impact on biodiversity
Avoid	Source organic/sustainably produced fertilizers, herbicides and chemicals for cleaning/maintenance	●	High	◑	Will require inventory of existing stock and supplier options	Land use changes, pollution, resource exploitation	●	Can improve biodiversity effects on-site and reduce the risk of water contamination. **Cleaning products with Ecologo in use**	Global	% organic and sustainable products
Restore	Utilize organic gardens (herbs, fruits and vegetables) on own property to supply restaurants/bars	◑	Medium	●	**This measure is already being implemented**	Resource exploitation, land use changes	●	Localized effect, creates improvements for local biodiversity (e.g., pollinators), small positive supply chain impact	Global	% garden products
Minimize	Source natural and cultural products for guest rooms, public areas, gifts and souvenir shop, consider sustainably certified products (i.e., Forest Stewardship Council)	◑	Medium	◔	Will require adjustments or revision of current sourcing strategy	Land use changes, pollution, climate change, resource exploitation	●	Can reduce carbon emissions and the use of hazardous materials. Can also create positive cultural links and support traditional crafts.	Dubai	% products tested in terms of their impact on biodiversity
Minimize	Optimize and limit the use of chemicals (herbicides, fertilizer, cleaning agents and other substances)	◔	Low-medium	●	**This measure is being implemented through EMS**	Pollution, resource exploitation	●	Can reduce emissions of hazardous chemicals on the premises.	Global	% reduction in use against previous year
Avoid/ Minimize	Appoint a person responsible for overseeing and developing local biodiversity initiatives for each property	●	High	◔	Will require hiring or training of staff	Lack of awareness and information on local biodiversity	●	Can positively influence staff and management relations and the perception of the hotel	Global	% employees trained in biodiversity conservation; n° initiatives per property

Source: AFRY analysis

TARGETS

Actions to optimize output

Hierarchy	Action	Impact		Readiness		Pressures addressed	Overall assessment		Location	Indicators
Minimize	Optimize wastewater treatment and greywater usage	●	High	●	**This measure is already being implemented**	Pollution, resource exploitation	●	Strong effect on wastewater output	Global (very high relevance for Dubai)	Optimization level vs. previous year; Litres water treated
Avoid/ minimize	Use of in-house water bottling plants and refillable bottles	●	High	●	**This measure is already being implemented**	Pollution, resource exploitation	●	Reduction of 1 million plastic bottles per hotel each year	Global	% plastic eliminated vs. previous year; n° plants installed
Avoid/ minimize	Recycle cooking oil for biofuel production using government-licensed vendors	◑	Medium	●	**This measure is already being implemented**	Pollution, resource exploitation	●	Limits waste output **Certificate by core green obtained**	Global	Litres of oil recycled per year
Minimize	Offer cleaning services and towel changing on demand instead of every day	◑	Medium	◔	**Extended laundry option in place**	Resource exploitation	●	Reduction of cleaning cycle may save both costs and limit waste output	Global	Litres of water and cleaning products saved per year
Minimize	Installing a composting machine to produce on-site composting for property landscaping or retail	●	High	◑	Currently in process	Pollution, resource exploitation	●	Can significantly reduce waste, while composting material can be used as fertilizer	Global	Kg of waste reduced; Kg of compost produced
Minimize	Adoption of natural material amenities and large-sized amenity bottles	●	High	●	**This measure is already being implemented**	Pollution, resource exploitation	●	Reduction of plastic waste, avoiding ca. 43,000 plastic mini soap bottles and over 83,000 plastic bathroom kits per year	Global	N° of plastic bottles avoided per year

Source: AFRY analysis

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TARGETS

Actions for biodiversity-friendly property management

Hierarchy	Action	Impact	Readiness	Pressures addressed	Overall assessment	Location	Indicators
Restore	Maximize planting of native flora and insect friendly flowering plants in outdoor facilities and gardens. Source species with differing flowering times to support pollinators throughout the year.	High	Will require procurement of adequate species, gardening staff, and may require adjustments to outdoor landscape. **Currently, <10% of FIVE's Palm Jumeirah plants are UAE native.**	Land use changes, climate change	Will result in the creation of new habitats and the conservation of local species. CAPEX may be high.	Global	% native plants % of biodiversity-enhanced area
Restore	Create insect and lizard hotels, bird houses and nests, watering spots within hotel's gardens	High	**FIVE Zurich already has insect and pollinator hotels on its roof.** Will require procurement of adequate materials	Land use changes	Will result in the creation of new habitats and the conservation of small terrestrial and avian species.	Global	N° installations; N° species spotted since
Restore	Introduce awareness and educational concepts to the hotels, using infographics, signs on flora and fauna etc. that can be found on the premises	High	Will require procurement of adequate materials and training of staff.	Indirect effect on all pressures on nature through science communication	Measure could raise interest in ecotourism experiences. Concept may need adjustment to target audience/narrative of each hotel	Global	N° signs installed; N° of topics covered
Avoid/ minimize	Switch to insect-friendly lighting and avoid unnecessary and excessive lighting during night time	High	Will require new light design and installing outdoor lighting with motion sensors	(light-)Pollution, resource exploitation	Will reduce insect mortality as well as that of birds blinded by strong lights during night time. Additionally, energy will be saved	Global	% reduction in energy consumed; % insect-friendly lighting
Avoid/ minimize	Reduce noise emissions from the hotels	High	Will require procurement of hotel activities	(Noise-)Pollution, resource exploitation	Will reduce disturbances to wildlife species (especially during breeding and resting times)	Global	% of noise reduction vs. previous year
Restore	Re-think outdoor concept and explore opportunities for unsealing concrete floors, where feasible, and expanding green spaces	High	**FIVE Zurich already has sufficient green roofs and areas around the hotel.** Will require adjustments to outdoor landscapes at FIVE Dubai	Land use changes, climate change	Could improve microclimates and habitats which can be used for planting	Global	% share of unsealed areas vs. total surface
Restore/Offset	Consider zoning coastal areas to plant mangroves or protect existing forests and creating mini-reefs for biodiversity recovery and ecotourism activities.	Very High	Will require procurement of adequate species and adjustments to a large strip of coastal area	Land use changes, climate change	Highest biodiversity benefit. Offsets significant carbon emissions. Likely unfeasible on the Palm but off-site locations might be considered. High-effort, multi-stakeholder initiative required.[1]	Dubai	Surface of area designated for restoration

Source: AFRY analysis

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TARGETS

Actions for initiating biodiversity partnerships programme

Hierarchy	Action	Impact		Readiness		Pressures addressed	Overall assessment		Location	Indicators
Avoid	Avoid activities that risk negative wildlife interactions and disturbances of nature	●	High	◔	**The Dubai Dolphinarium is presented on the website as a cultural activity[1]**	Overexploitation	●	Taking a stand against maintaining wildlife in captivity and interactions with wildlife will foster the sustainability narrative	Dubai	N° biodiversity-friendly activities
Restore/ Offset	Explore partnerships with local conservation NGOs and support species conservation, habitat restoration and education programmes	●	High	◑	Will require research on and engaging with possible cooperation partners **Already in place at a global level: Botanica certificate: 1,477 trees planted in Kenya**	Land use changes, overexploitation	●	In addition to monetary support to help NGOs achieve their conservation goals, hotels can offer trips to participate and learn about the NGOs work and local flora, fauna and habitats, including increased marketing opportunities	Dubai: Approach Dubai Desert Conservation Reserve Zurich: Approach Pro natura initiative	N° supported conservation projects; surface of area restored; n° trees planted; n° education programmes
Restore/ Offset	Explore collaborations with universities and research organizations	●		◑	Will require research and engaging with possible cooperation partners	Land use changes, overexploitation, pollution and waste, lack of awareness and environmental education	●	In the context of tourism (especially ecotourism), collaborations could be helpful in exploring more sustainable production practices and innovative building technologies/systems to further reduce and optimise resource use, which may well require research	Global	N° collaboration partners/programmes
Restore	Increase opportunities for nature-friendly activities in nearby nature reserves	●	High	◑	Will require research and engaging with possible cooperation partners	Indirect effect on all pressures on nature through science communication	●	New visitor experiences created for the hotel, including increased marketing opportunities	Dubai: Create Ecotourism offer for Dubai Desert Conservation Reserve	N° biodiversity-friendly activities; % staff trained in biodiversity conservation
Minimize	Partner with Clean Up UAE to reduce waste pollution in natural areas	◑	High	●	**This measure is already being implemented**	Pollution and waste	●	Low-cost opportunity to raise awareness and remove hazardous or dangerous materials from the environment	Dubai	Kg of litter collected
Restore	Cooking course with edible wild herbs, educational plant trail or bird watching (bird-call) on site	◑	Medium	◔	Will require research and engaging with possible cooperation partners, or training of staff	Lack of awareness and environmental education	●	Low-cost opportunity to raise awareness and involve guests in biodiversity activities	Global	% staff trained; N° courses offered

Source: AFRY analysis [1]Palm Jumeirah Cultural Offer

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TARGETS

Actions for implementing a low-impact CAPEX programme

Hierarchy	Action	Impact		Readiness		Pressures addressed	Overall assessment		Location	Indicators
Avoid/ Minimize/ Restore/ Offset	Implementing international performance standards	●	High	◑	Will require research and training of staff, procurement of adequate materials, selection of new suppliers	Land use change, pollution, waste, climate change, water use, socio-economic issues	●	Will improve sustainability and biodiversity narrative. Is becoming lender requirement more often	Global	N° projects implemented
Avoid/ Minimize/ Restore/ Offset	Implementing mitigation hierarchy during property development	●	High	◑	Will require research and training of staff, procurement of adequate materials, selection of new suppliers	Land use change, pollution, waste, climate change, water use, socio-economic issues	●	Will improve sustainability and biodiversity narrative. Is becoming lender requirement more often	Global	N° projects implemented

Source: AFRY analysis

BEST PRACTICE

Best practices in biodiversity can already be found within the tourism sector

Sustainable Restaurants at Six Senses Hotels & Resorts

Measures include obtaining products from sustainable sources, banning fish species with low stocks, collaborating with local communities and establishing long-term relationships with local fishermen and farmers. Staff is also trained on the issue, to ensure awareness and understanding on the topic.[1]

Local Conservation Partnership: Bawah Reserve

The resort works in close alignment with the Anambas Foundation, aiming to conserve and expand biodiversity by protecting the coral and fish on the surrounding barrier reef and conducting reforestation, nursery development and agro-tourism development. Providing alternative livelihoods and capacity building to the community is another point of focus of the foundation. Guests can participate by actively assisting with marine conservation activities or by financially supporting the foundation.[3]

Biodiversity-friendly properties: LaPlaya Beach Resort & Club

Artificial reefs have been installed at Vanderbilt Beach to boost biodiversity and clean water. The artificial „mini reefs" from Ocean Habitats can filter over 30,000 gallons of water per day and house over 300 fish and 200 crabs per year, providing wildlife a greater chance at survival and establishing a small local food chain in dead zones. LaPlaya is committed to the long-term rejuvenation of local biodiversity by investing in 23 mini reefs.[2]

Biodiversity-friendly properties: Novotel Limoges

The hotel transformed its gardens by creating a natural flower meadow, rethinking lawn mowing and including climbing plants and hedges with shrubs with flowers or berries that attract butterflies and birds. Information boards explain the project and the company's achievements. The restoration of the land was carried out in partnership wit the French bird protection association (LPO).[4]

[1]Six Senses Sustainability Strategy (2023) [2]Pebblebrook Hotel Trust – ESR Report 2020 [3]Bawah Reserve - Sustainability Practices (2023) [4]IUCN - Biodiversity: My hotel in action (2012)

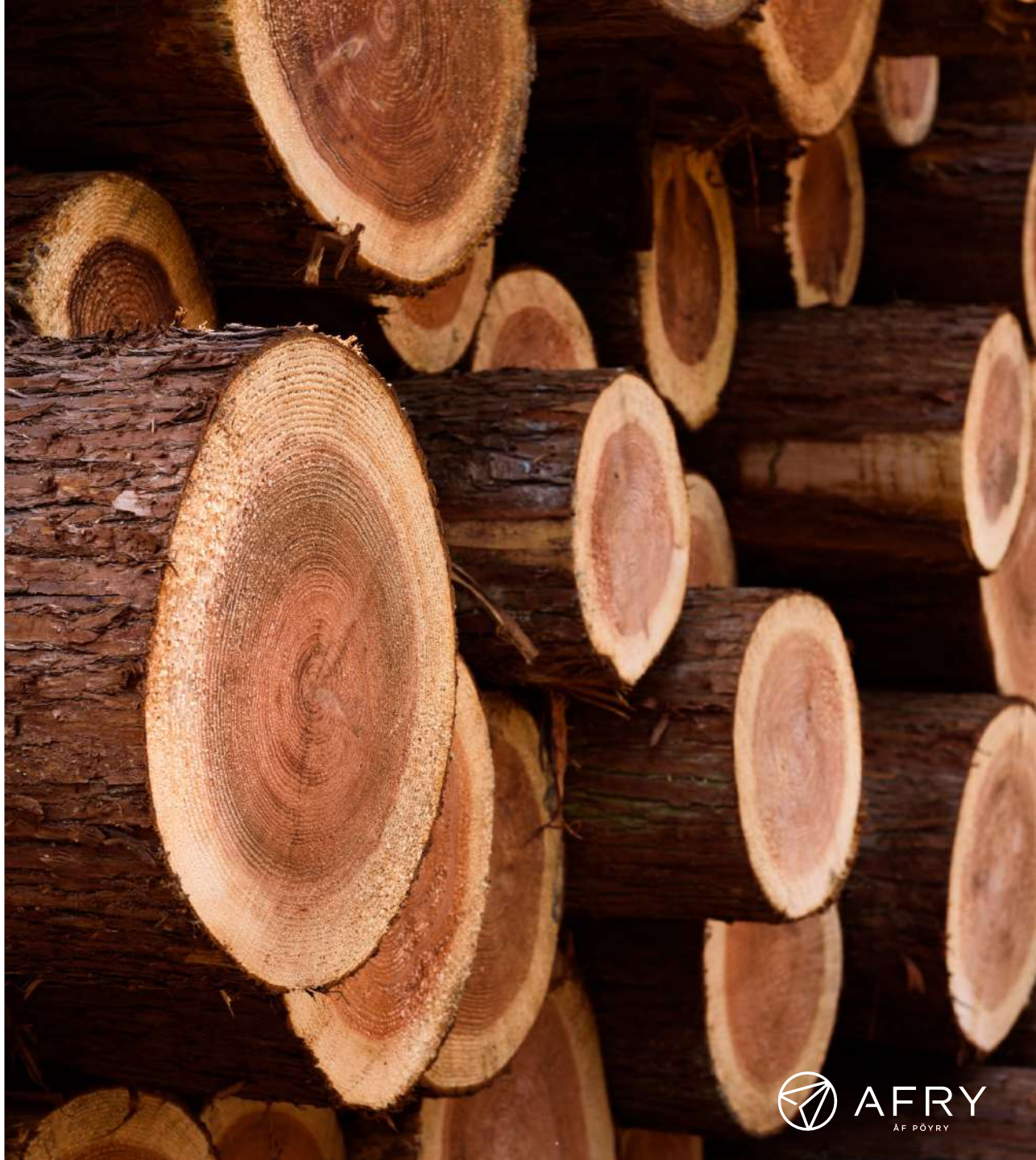
BEST PRACTICE

TRAFFIC – Sustainable use of biological resources

The purchase of wild animals and plant products can have a significant conservation impact. Wildlife trade can also be part of a variety of economic activities, including the purchase of products related to food, fuel, fodder, building materials, clothing and ornaments, sport, healthcare, religion and museum collections.

However, it has been acknowledged that hotel operators are able to manage such risks as part of their supply chain management. In this context, TRAFFIC, a wildlife trade monitoring network, has developed factsheets to guide operators in making sustainable and responsible choices of products and services based on biological resources.

The guides focus on aquatic wildlife, but also include timber and wood products, plants, live animals, wildlife-based souvenirs and activities and excursions[1].



[1]IUCN - Biodiversity: My hotel in action (2012)

Biodiversity frameworks can be used for monitoring and evaluation, although global metrics are still in development

Science Based Targets for Nature (SBTNs):
Measurable, actionable, and time-bound objectives, based on the best available science, that allow actors to align with Earth's limits and societal sustainability goals.

SBTs give companies and cities a clear pathway to resilience by using scientific evidence to identify their role in restoring nature.

1. **Assess:** What and where are your company's biggest impacts and dependencies on nature and the environment?
2. **Prioritize:** Where do you need to focus and take more action? Both in areas where you have direct control and more broadly across your whole "sphere of influence".
3. **Measure:** Collect baseline data for your priority targets and locations and where possible set targets.
4. **Act:** Use our Action Framework and act to avoid future impacts, reduce current impacts, regenerate and restore ecosystems, and transform systems.
5. **Track:** Finally, monitor progress toward targets and report publicly on this progress.

Taskforce on Nature-related Financial Disclosures (TNFD):
Developing and delivering a risk management and disclosure framework for organizations to report and act on evolving nature-related risks.

TNFD's approach aligns with emerging global and national policy target setting frameworks and corporate target-setting approaches such as those being developed by the **Science Based Targets Network (SBTN)**. TNFD will work closely with SBTN to maximize alignment and work towards a joined-up approach to guidance for market participants.

LEAP approach:
1. **Locate** interface with nature
2. **Evaluate** dependencies & impacts
3. **Assess** material risks & opportunities
4. **Prepare** to respond & report

The SBTN and TNFD are still being finalized throughout 2023. They follow a similar strategy as their climate policy counterparts – SBTi and TCFD. It is expected that the frameworks will provide more clarity and guidance on what to measure and how to measure in the second half of 2023, allowing businesses to set more comparable metrics. For the moment, draft indicators are still being set on a case-by-case basis, in tailored to individual corporate objectives, rather than a global biodiversity narrative.

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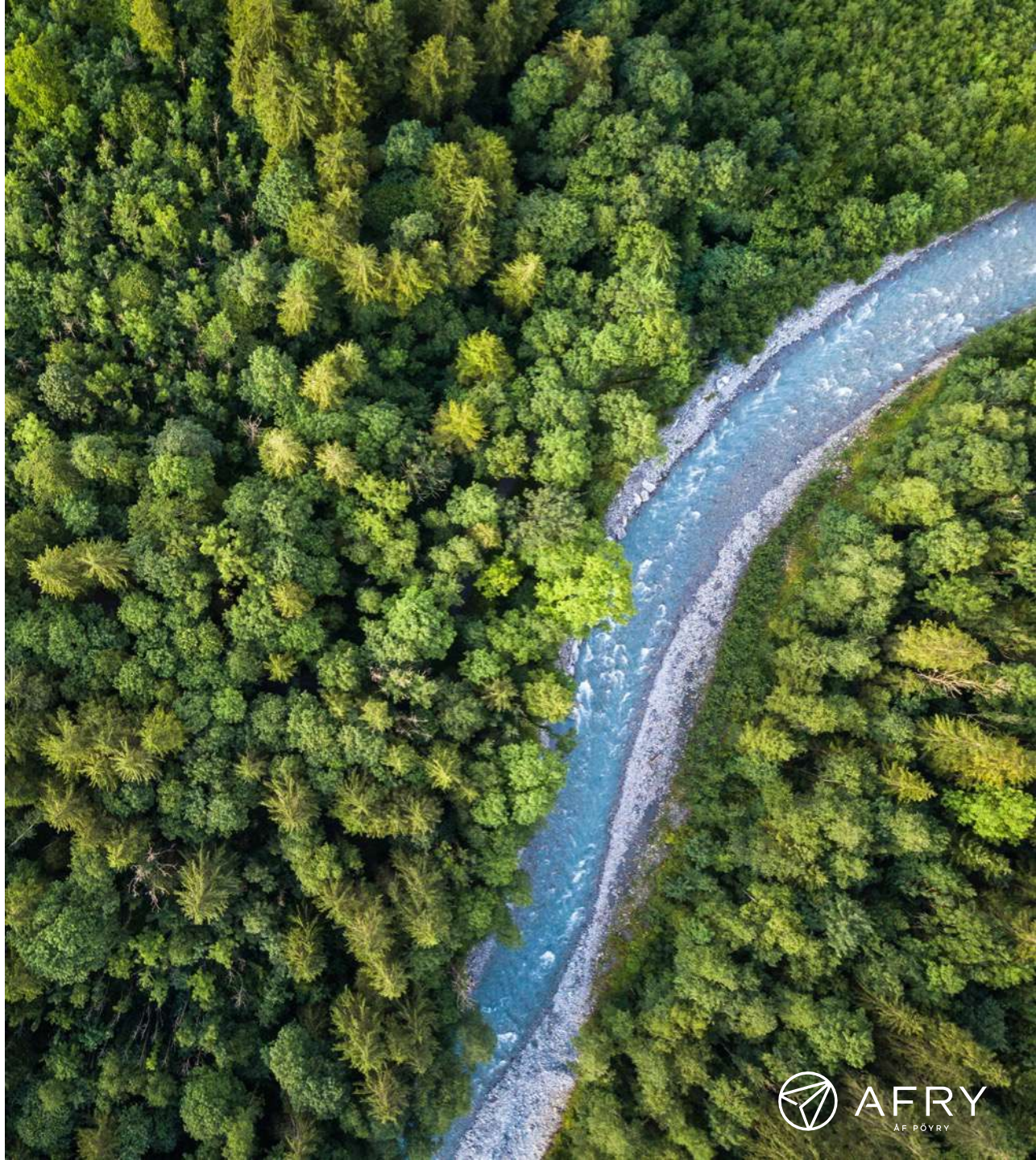

Pressures on nature

Land/Water/Sea Use Change

a. **Terrestrial ecosystem use:** Examples include area of agriculture by type, area of forest plantation by type, area of open cast mine by type, etc.

b. **Freshwater ecosystem use:** Examples include area of wetland, ponds, lakes, streams, rivers or peatland necessary to provide ecosystem services such as water purification, fish spawning, areas of infrastructure necessary to use rivers and lakes such as bridges, dams, and flood barriers, etc.

c. **Marine ecosystem use:** Examples include area of aquaculture by type, area of seabed mining by type, etc.

Resource Exploitation

a. **Water use:** Examples include volume of groundwater consumed, volume of surface water consumed, etc.

Climate Change

a. **GHGs emissions:** Examples include volume of carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), Sulphur hexafluoride (SF6), Hydrofluorocarbons, (HFCs) and perfluorocarbons (PFCs).

Source: ENCORE

Pollution

a. **Non-GHG air pollutants:** Examples include volume of fine particulate matter (PM2.5) and coarse particulate matter (PM10), Volatile Organic Compounds (VOCs), mono-nitrogen oxides (NO and NO2, commonly referred to as NOx), Sulphur dioxide (SO2), Carbon monoxide (CO), etc.

b. **Water pollutants:** Examples include volume discharged to receiving water body of nutrients (e.g., nitrates and phosphates) or other substances (e.g., heavy metals and chemicals).

c. **Soil pollutants:** Examples include volume of waste matter discharged and retained in soil over a given period.

d. **Solid waste:** Examples include volume of waste by classification (i.e., nonhazardous, hazardous, and radioactive), by specific material constituents (e.g., lead, plastic), or by disposal method (e.g., landfill, incineration, recycling, specialist processing).

Invasives and Other

a. **Disturbances:** Examples include decibels and duration of noise, lumens and duration of light, at site of impact.

b. **Other resource use:** Examples include volume of mineral extracted, volume of wild-caught fish by species, number of wild-caught mammals by species, etc.

GLOSSARY

Natural Capital Assets

Atmosphere: The atmosphere is the mass of air surrounding the earth. It's components (such as oxygen) and its processes (such as temperature regulation) support a number of essential ecosystem services.

Habitats: Habitats refer to the conditions of the environment necessary for life to prosper. These conditions vary widely between species but can include elements such as water and food availability, temperature range, or absence of predators. Habitats can be defined very narrowly for one population of a particular species or more widely by type such as forests or coastal habitats that host different species.

Land geomorphology: Land geomorphology describes the structure of the land, such as mountains and valleys. Land geomorphology supports the provision of regulatory services, like erosion control.

Minerals: Minerals are naturally occurring compounds not produced by living beings. They can be metallic or non-metallic and play an important supporting role in the provision of services like soil quality.

Ocean geomorphology: Ocean geomorphology describes the structure of the marine environment such as shelfs and slopes. Ocean geomorphology supports the provision of regulatory services, like dilution by ecosystems.

Soils and sediments: They are layers of the earth's surface that support life and comprise top-soil, sub-soil and ocean sediments to support various regulatory services.

Species: Species includes plants, animals, fungi, algae and genetic resources, which can be wild or domestic/commercial, for example livestock. Like habitats, species underpin a wide range of ecosystem services.

Water: Water includes surface water, ground water, ocean water, fossil water and soil water. Water is essential for a wide range of ecosystem services.

Source: ENCORE

Ecosystem Services (1/2)

Animal-based energy: Physical labour is provided by domesticated or commercial species, including oxen, horses, donkeys, goats and elephants. These can be grouped as draught animals, pack animals and mounts.

Bio-remediation: Bio-remediation is a natural process whereby living organisms such as micro-organisms, plants, algae, and some animals degrade, reduce, and/or detoxify contaminants.

Buffering and attenuation of mass flows: Buffering and attenuation of mass flows allows the transport and storage of sediment by rivers, lakes and seas.

Climate regulation: Global climate regulation is provided by nature through the long-term storage of carbon dioxide in soils, vegetable biomass, and the oceans. At a regional level, the climate is regulated by ocean currents and winds while, at local and micro-levels, vegetation can modify temperatures, humidity, and wind speeds.

Dilution by atmosphere and ecosystems: Water, both fresh and saline, and the atmosphere can dilute the gases, fluids and solid waste produced by human activity.

Disease control: Ecosystems play important roles in regulation of diseases for human populations as well as for wild and domesticated flora and fauna.

Fibres and other materials: Fibres and other materials from plants, algae and animals are directly used or processed for a variety of purposes. This includes wood, timber, and fibres which are not further processed, as well as material for production, such as cellulose, cotton, and dyes, and plant, animal and algal material for fodder and fertiliser use.

Filtration: Filtering, sequestering, storing, and accumulating pollutants is carried out by a range of organisms including, algae, animals, microorganisms and vascular and non-vascular plants.

Flood and storm protection: Flood and storm protection is provided by the sheltering, buffering and attenuating effects of natural and planted vegetation.

Genetic materials: Genetic material is understood to be deoxyribonucleic acid (DNA) and all biota including plants, animals and algae.

Ground water: Groundwater is water stored underground in aquifers made of permeable rocks, soil and sand. The water that contributes to groundwater sources originates from rainfall, snow melts and water flow from natural freshwater resources.

Source: ENCORE

GLOSSARY

Ecosystem Services (2/2)

Maintain nursery habitats: Nurseries are habitats that make a significantly high contribution to the reproduction of individuals from a particular species, where juveniles occur at higher densities, avoid predation more successfully, or grow faster than in other habitats.

Mass stabilization and erosion control: Mass stabilization and erosion control is delivered through vegetation cover protected and stabilizing terrestrial, coastal and marine ecosystems, coastal wetlands and dunes. Vegetation on slopes also prevents avalanches and landslides, and mangroves, sea grass and macroalgae provide erosion protection of coasts and sediments.

Mediation of sensory impacts: Vegetation is the main (natural) barrier used to reduce noise and light pollution, limiting the impact it can have on human health and the environment.

Pest control: Pest control and invasive alien species management is provided through direct introduction and maintenance of populations of the predators of the pest or the invasive species, landscaping areas to encourage habitats for pest reduction, and the manufacture of a family of natural biocides based on natural toxins to pests.

Pollination: Pollination services are provided by three main mechanisms: animals, water and wind. The majority of plants depend to some extent on animals that act as vectors, or pollinators, to perform the transfer of pollen.

Source: ENCORE

Soil quality: Soil quality is provided through weathering processes, which maintain bio-geochemical conditions of soils including fertility and soil structure, and decomposition and fixing processes, which enables nitrogen fixing, nitrification and mineralisation of dead organic material.

Surface water: Surface water is provided through freshwater resources from collected precipitation and water flow from natural sources.

Ventilation: Ventilation provided by natural or planted vegetation is vital for good indoor air quality and without it there are long term health implications for building occupants due to the build-up of volatile organic compounds (VOCs), airborne bacteria and moulds.

Water flow maintenance: The hydrological cycle, also called water cycle or hydrologic cycle, is the system that enables circulation of water through the Earth’s atmosphere, land, and oceans. The hydrological cycle is responsible for recharge of groundwater sources (i.e. aquifers) and maintenance of surface water flows.

Water quality: Water quality is provided by maintaining the chemical condition of freshwaters, including rivers, streams, lakes, and ground water sources, and salt waters to ensure favourable living conditions for biota.


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