FEBRUARY 2025

Protected Areas Conservation Management Framework

2025 – 2034

Aruba Conservation Foundation

Together for *Nature.*

The **Aruba Conservation Foundation (ACF)** is an independent, registered[1], not-for-profit, conservation management organization (CMO), operating on the basis of its Articles of Association and the (inter)national legal framework[2], as well as its Multi Annual Corporate Strategy 2023-2032[3].

At ACF we believe that meaningful work and effective conservation outcomes stem from immense passion and great commitment, high integrity, strong unity, and innovation. ACF works together with the public and private sectors and a diverse community of stakeholders, taking an integrated approach to delivery of the mandate of protecting, preserving, and restoring Aruba's natural heritage, and broader goals of contributing to sustainable development.

ACF protects, preserves, and restores Aruba's valuable natural heritage, seen from an ecological, environmental, geological, social, cultural, archaeological, and historical perspective, with the ultimate aim to secure a measurable improvement in the overall biodiversity, health, and (climate) resilience of Aruba's ecosystems.

As a custodian of the protected areas[4] of Aruba and the biodiversity[5] they harbour, ACF promotes sustainable practices beyond the protected areas, that integrate environmental, social, cultural, and economic objectives, and that address long-term concerns in meaningful ways, to ensure that our natural resources remain relevant for present and future generations. Whenever and wherever necessary, ACF applies the Precautionary Principle (a principle of environmental law) as a strategy to cope with possible risks and potential harm to nature, where scientific understanding is yet incomplete - as is often the case for Aruba.

ACF operates within the national and international legal frameworks and environmental policies, and according to the principles of Biodiversity Conservation and Ecosystem-Based Management (EBM), applying best practices and the Conservation Standards (Theory of Change) to deliver high conservation performance and tangible results.

ACF's Multi Annual Corporate Strategy 2023 – 2032 (ACF MACS 2023 – 2032) articulates a clear ambition and direction for the organisation in its transition from a traditional park management organization to a modern conservation management organization based on a commitment to three core principles that are instrumental in ACF's organizational philosophy: Nature First, Community Partnership, and Organizational Excellence. Having sufficient funding remains a challenge for environmental NGOs, not only in Aruba. Hence, ACF has developed its Cycle of Business (CoB) a framework for value creation and sustained conservation, to keep our focus and management attention firmly on our primary task of nature conservation and consequently on value creation for our nature, our environment, our residents, our communities, our visitors, and our economy, in order to generate their stewardship and support for sustained conservation of our natural assets.

[1] The Aruba Conservation Foundation (ACF) - known formerly as Fundacion Parke Nacional Aruba (FPNA) - is registered at the Chamber of Commerce and Industry Aruba under S679.0.
[2] See Appendix I for ACF's legal and environmental obligations.
[3] See https://cms.acf.aw/wp-content/uploads/2024/04/ACF-MACS-2023-2032.pdf
[4] ACF is mandated by the government of Aruba - the Minister of Nature and the Department of Nature and Environment (DNM), specifically - through a service level agreement (SLA) to manage the legally designated terrestrial and marine protected areas. See Appendix II for an overview of ACF's management areas and Appendix III for the Ramsar areas, which partly overlap with the protected areas.
[5] See Appendix IV for an overview of Aruba's biodiversity and main environmental threats.

This document was developed together with expert consultant, Dr Lawrence Jones-Walters, over the course of one year as a collaborative effort resulting from input provided during internal and external informal conversations, formal meetings, and brainstorming and consultation sessions with ACF's associates, conservation partners, and key stakeholders – both governmental and NGOs.

ACF applies adaptive management as a systematic approach to decision-making and planning in nature conservation, ACF emphasizes flexibility, learning, and continuous improvement. This involves monitoring the outcomes of conservation actions, assessing their effectiveness, and adjusting management strategies based on new information and changing circumstances. This entails that priorities and actions set out in this document may be revised annually, as indicated by version numbers.

Contents

1. Introduction

> "Our reciprocal relationship with nature is that we care for our natural resources and in return nature will care for us.
>
> In this symbiotic relationship, as people dedicate respect, time, and resources to the conservation of nature, our island, its community, and its visitors will thrive."

The Caribbean islands, which includes Aruba, are in the top six of the world's 36 biodiversity hotspots, and as tropical islands they are increasingly impacted by biodiversity loss, climate change, and pollution – the three main interlinked, environmental crisis that we are currently facing at a global level. Not only will the natural world be increasingly impacted and challenged in its survival by this crisis, so too will the Caribbean people – as nature is the very foundation of our islands' societies and our islands' economies.

Aruba, like many islands in the Caribbean, has unique biotic and abiotic factors and geological characteristics that contribute to its landscape and environmental conditions. Its semi-arid climate and its profound geological history has brought forth rugged volcanic, limestone and sandstone landscapes, and a diversity of native and rare endemic species that makes our island unique and forms an inherent part of our cultural heritage, which is worth protecting – not only from an economic standpoint but especially from a socio-cultural perspective. Aruba's nature is part of our national identity, and it is the basis of our wellbeing: our livelihoods, our health, and our quality of life.

A thriving biodiversity of species of flora and fauna, and healthy ecosystems, are fundamental to human well-being, a healthy planet, and economic prosperity for all people, including for living well in balance and in harmony with Nature. We depend on it for food, medicine, energy, clean air and water, security from natural disasters as well as recreation and cultural inspiration, and it supports all systems of life on Earth.

Aruba's nature provides numerous ecosystem services that contribute to the local community and visitors' wellbeing. To be able to sustain these services and the prosperity that nature contributes, it is important to continue protecting, preserving, and restoring Aruba's ecosystems and biodiversity for a sustainable future.

However, Aruba currently faces several drivers and threats that are impacting its resilience such as: overpopulation, overdevelopment, loss of biodiversity, climate change (including sea level rise, extreme weather events, water scarcity, drought and desertification, temperature extremes), pollution, over-exploitation, and tourism vulnerability[6]. Aruba's economy relies predominantly on tourism, with a significant portion of its GDP and employment derived from this sector. This reliance makes the economy vulnerable to fluctuations in global travel trends, economic downturns, and crises such as pandemics and climate change. Moreover, the cost of the current unsustainable tourism economic model comes at a very high price in terms of severe ecological consequences: environmental degradation, impairment of ecosystem services, and loss of biodiversity.

Addressing the drivers and threats to nature requires a comprehensive approach, and collaboration and commitment from government, industry, civil society, and local communities.

In order to prosper as an island-nation for generations to come, we must urgently change our course to one that focusses on both nature's wellbeing and human wellbeing, supported by a diverse, healthy

[6] See Appendix IV for an overview of Aruba's main environmental threats.

and resilient natural environment, and a purpose-driven, regenerative economy, in which our tourism model is transitioned from high impact to low impact, restorative and creating high value. Moreover, we cannot meet '30 by 30' protection targets and 'no extinctions' commitments without a seismic shift in nature investment and the national 'environment' budget, which is typically low in comparison with other national budgets.

Within this paradigm shift we must develop our social, legal, and economic systems to become nature-inclusive and nature-positive, thereby safeguard our natural values in compliance with the human right to a clean, healthy, and sustainable environment. One way to do this is by applying nature-based solutions (NbS) to address and tackle the major environmental and societal challenges, while simultaneously enhancing human wellbeing and providing biodiversity benefits.

The Aruba Conservation Foundation (ACF) embarked on a new direction as a conservation management organization (CMO) with the introduction of its Multi Annual Corporate Strategy 2023 – 2032. This aligned Protected Areas Conservation Management Framework for 2025 – 2034 is a crucial step for ACF to lay a strong foundation for stability and growth of biodiversity and ecosystem-based conservation and ecological sustainability within a broader context of the sustainable development goals and biodiversity conservation priorities for the protected areas, as indicated in the MACS 2023 – 2032.

The conservation of Aruba's nature is not only dependent on the conservation efforts of ACF, but it requires the whole of government, other nature NGO's, and the whole of society to value it and participate in halting and reversing biodiversity loss and ecosystem degradation, and to put nature on a path to recovery for the benefit of people and the planet[7].

For ACF, it is important for our local community and our island's visitors to connect and engage with nature sustainably, and to collaborate in meaningful ways for its conservation, Together for Nature. Only when we can witness the uniqueness of Aruba's natural environment will we value and protect it.

> "For a sustainable development of Aruba, balancing the diverse and interconnected needs of society and the natural environment is vital. ACF thereby applies the Precautionary Principle:
>
> In case of a conflict between conservation - protection, preservation, and restoration - of biodiversity health and the resilience of the ecosystems as a whole and their exploitation, nature and its conservation should always be predominant, as our quality of life will ultimately depend on ecological sustainability, the integrity of our biosphere, and the ecological processes occurring within it."

[7] See Appendix III for an overview of Aruba's biodiversity, ecosystem services, and main threats to Aruba's nature and environment.

2. Purpose of this document

ACF's Protected Areas Conservation Management Framework 2025 - 2034 recognizes the urgent need for a more holistic, integrated, and inclusive approach for the conservation management of nature in Aruba, especially of the protected areas, based on enhanced value creation and a broadening of conservation support, collaboration, and participation. With this approach, ACF wants to ensure the highest levels of ecologically and environmentally sustainable, socially relevant, and economically viable outcomes for the protected areas, along the long-term financial sustainability through ACF's Cycle of Business for value creation and sustained conservation by: conserving Aruba's natural and cultural assets to facilitate long-term ecological integrity and delivery of ecosystem services; creating more value for nature itself through its conservation, and for stakeholders and visitors through sustainable nature-based propositions and experiences that facilitate commitment for Nature of Aruba; and proactively broadening and facilitating understanding of the value of nature and support for sustained conservation on all levels (citizens, communities, visitors, NGO's, government, philanthropists, and corporations) – local, regional, and international.

ACF's MACS 2023 - 2032 provides an aspirational vision for the stability as well as growth and development of ACF over the coming 10 years, including contributing to the strategic pillar of "Leadership in Nature Conservation". In terms of the implementation of the MACS 2023 – 2032: "Conservation Excellence: optimize conservation operations (current) and develop management framework (new)" is one of the key aspirations. A key component for achieving this is to design a Protected Areas Conservation Management Framework for ACF, defining the conservation management philosophy and strategies, and the conservation priorities for the coming 10 years, to be developed and implemented in accordance with national laws and policies, and relevant international obligations, from the basis of a whole-of-government and whole-of-society approach:

> "Nature conservation success depends heavily on political will, recognition at the highest level of government and relies on action and cooperation by all levels of government, and by all actors of society, to tackle the direct and indirect drivers impacting nature."

ACF's Protected Areas Conservation Management Framework 2025 – 2034 stems from and supplements the ACF's Multi Annual Corporate Strategy (MACS) 2023-2032 Conservation Management Philosophy and 8 Conservation Guiding Principles, which together set the standards for ACF's conservation work: Biodiversity Conservation, Ecosystem-based Management (EBM), Conservation Standards (Theory of Change), Strategic Conservation Management, Adaptive Management, Evidence-based Conservation, Precautionary Principle, and applying an Integrated Approach.

ACF's Protected Areas Conservation Management Framework 2025 – 2034 responds to the twin goals of conserving biodiversity and ecosystems while reducing anthropogenic threats to Aruba's nature, especially in the protected areas, and is intended as an informative document for our partners, our stakeholders and our funders, and as a priority-based, daily guide for ACF specialists for developing frameworks and guidelines, protected area management and biodiversity (species) conservation plans, and implementing action plans[8] – with measurable objectives, results, and outcomes - for the terrestrial, coastal and marine protected areas, ecosystems and habitats of Aruba, as well as for affiliated species within and beyond the protected areas.

This framework takes into account the critical issues set out in the MACS, for example: inclusive nature conservation; nature conservation intelligence and research programmes; positioning ACF as a

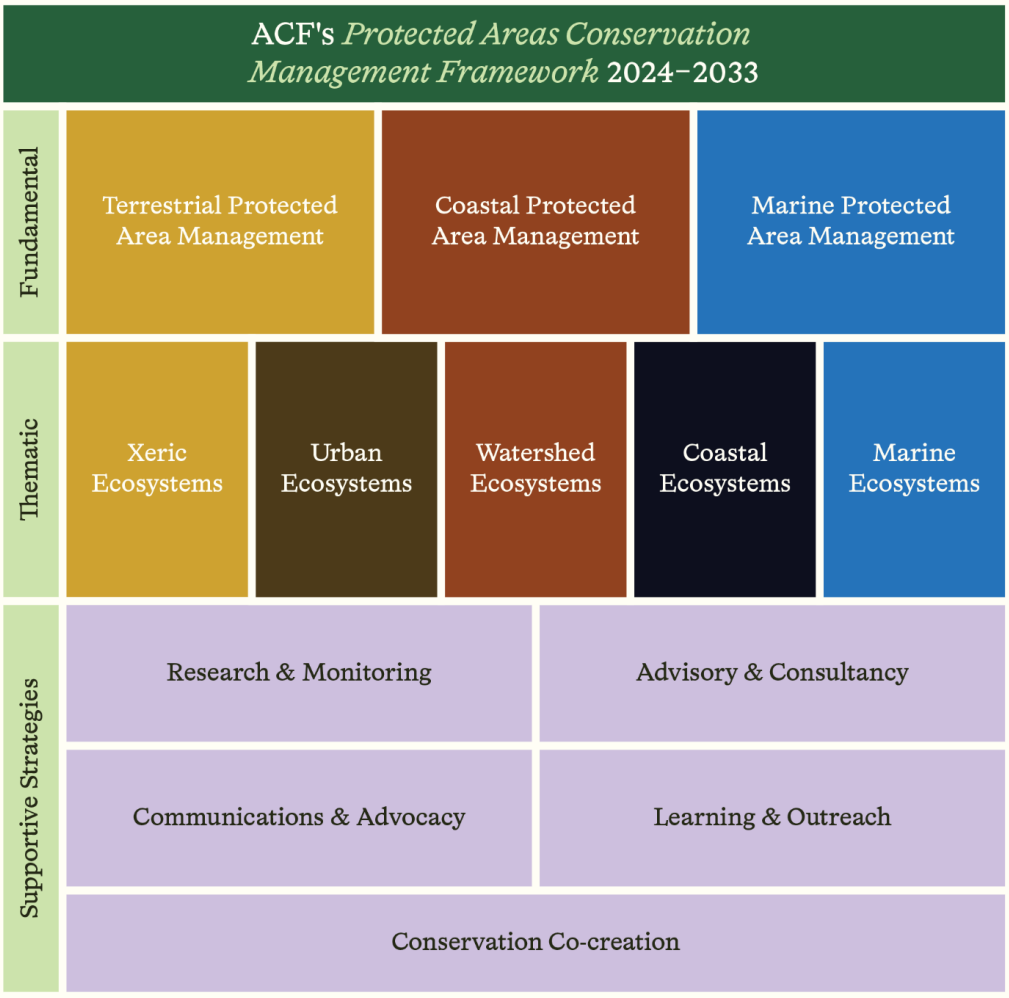
[8] Ditto plans, programs and projects will be supported by operational plans securing the necessary funding and human resources (manpower capacity and skills) for successful execution.

'conservation authority'[9]; improvement of protected area management; digital transformation and innovation in support of conservation; and advocating for a paradigm shift in the aim of transitioning to an eco-centric worldview in which the "Rights of Nature"[10] are a guiding principle.
The focus of ACF's Protected Areas Conservation Management Framework is twofold:

i) 'Fundamental Conservation' – ACF's core roles and responsibilities in relation to protected area and ecosystem-based management.

ii) 'Thematic Conservation' clusters which represent critical areas for development in relation to the conservation of specific species, habitats, and ecosystems (biodiversity), and where relevant, on an island-wide scale - thereby seizing opportunities for structured research.

The Protected Areas Conservation Management Framework for 2025-2034, and the supportive strategies, are set out in the next chapters.



[9] In the sense of complimenting and supporting national governance, with ACF being: i) a custodian of nature, ii) a conservation policy and regulation advisor, iii) an enforcer of nature protection laws, and iv) a body of conservation intelligence.
[10] Recognizing the Rights of Nature in Aruba's Constitution would entail a significant shift in environmental policy and legal frameworks, fundamentally changing how ecosystems and natural entities are perceived and protected, promoting a holistic approach to managing ecosystems, recognizing the interconnectedness of all life forms. This can lead to more sustainable and integrated environmental policies that consider the long-term health of entire ecosystems.

3. ACF's Fundamental & Thematic Conservation

ACF defines conservation as a broad approach to preserving what is already there, giving due care and attention to protecting it for the future, and where needed, restoring it to a viable natural state.

ACF's conservation efforts can be categorized as Fundamental Conservation and Thematic Conservation, supplemented by additional, supportive strategies: Research & Monitoring, Communications & Advocacy, Learning & Outreach, Conservation Advisory & Consultancy, and Conservation Co-Creation as indicated in ACF's Article of Association – which will be elaborated on in the following pages. By employing a combination of these strategies and engaging a diversity of stakeholders at various levels, ACF can work towards achieving integral and effective conservation management and contribute to the sustainable development goals for Aruba.

The numerous terrestrial, coastal and marine protected areas managed by ACF include extra 'management layers' dictated by internationally recognized designations and treaties such as Key Biodiversity Area (IUCN), Important Bird and Biodiversity Area (Birdlife International), and Ramsar Wetlands of International Importance (UNESCO). Such official recognitions imply that specific management layers, frameworks and guidelines need to be adapted and incorporated at a local level, not only in ACF's Fundamental Conservation efforts but also in ACF's Thematic Conservation initiatives and supporting strategies. ACF is currently working towards ratification of the Specially Protected Areas and Wildlife (SPAW) protocol, which too will be incorporated into the protected area management plans.

Moreover, Aruba is currently in the process of implementing its National Biodiversity Strategy and Action Plan (NBSAP) as a key instrument for implementing the objectives of the Convention on Biological Diversity (CBD). The NBSAP is a comprehensive national plan developed by the government to conserve and sustainably manage the island's biodiversity, promote the sustainable use of its components, and ensure equitable sharing of benefits derived from natural resources. The NBSAP serves as a roadmap for integrating biodiversity conservation into national policies, strategies, and development plans across various sectors, and hence, ACF's Protected Areas Conservation Management Framework 2025 – 2034 will evidently be aligned with the NBSAP and other (inter)national environmental-related policies such as those mentioned above and in Appendix 1.

Fundamental Conservation

Managing terrestrial, coastal, and marine protected areas involves specific strategic planning, implementation, and monitoring of activities aimed at conserving and sustainably managing biodiversity, ecosystems, and cultural heritage[11] within designated protected areas. Protected areas, such as national parks, nature reserves, wildlife sanctuaries, and marine protected areas, play a crucial role in safeguarding natural and cultural resources, promoting biodiversity conservation, supporting ecosystem services, and providing recreational and educational opportunities for visitors.

ACF's concept of 'Fundamental Conservation' encapsulates the central roles and responsibilities in relation to protected area and ecosystem-based biodiversity conservation management. From

[11] Cultural heritage conservation within protected areas involves the preservation and management of historical, archaeological, and cultural sites within the designated terrestrial and marine protected areas, requiring a multidisciplinary approach that considers the interplay between natural and cultural values, engages local communities, and applies effective management strategies to ensure the long-term preservation of these invaluable assets. ACF will develop a strategic document for cultural heritage conservation and restoration within the protected areas.

delineating spatial boundaries and planning effective management strategies to enforcing regulations, mitigating threats, and engaging in conservation education, these fundamental roles and responsibilities represent the strategic pillars that guide ACF's on-the-ground efforts and contribute to the sustainability of biodiversity and associated habitats on land and in the marine environment, primarily in the protected areas around the island.

These following critical areas collectively form the framework through which ACF fulfils its core or fundamental roles and responsibilities in the conservation management of protected areas and their biodiversity through activities involving the following on-the-ground efforts within the designated protected areas under ACF management:

Ecosystem-based Protected Area Management, Planning and Policy Development

ACF's initial and primary focus is on ecosystem-based protected area management[12], emphasizing ecological rather than spatial planning boundaries, and hence the importance of continual monitoring of anthropogenic activities and potential threats beyond the boundaries of the protected areas that may impact the natural integrity of the protected areas and their species biodiversity. This is done in alignment with the legal framework and the general rules and regulations of Aruba's terrestrially focussed Land Use Plan (LUP) or Spatial Plan as stipulated in the *Ruimtelijke Ontwikkelings Plan met Voorschriften* ROPV 2021 (*Bestemming 'Natuurgebied' and 'Marienegebied'*). Once a counterpart national Coastal and Marine Spatial Plan (CMSP) has been developed by the government of Aruba, ACF will seek alignment for the management of the coastal and marine protected areas as well. ACF will continue advocating for consistent landscape-level conservation (ROPV 2021 *bestemming 'Natuur en landschap'*, *'Landelijk gebied', 'Strand' and 'Marienezones'*[13]) beyond the protected areas boundaries, as well as for management planning which incorporates the presence and participation of communities, the government, and industries, to manage and mitigate key threats and drivers, and implement conservation management that benefits both people and nature.

Evidence-based, adaptive management planning is at the heart of ACF's Fundamental Conservation. This entails the development and implementation of plans that outline the goals, objectives, and actions necessary for the sustainable management of specific protected areas (or parts of protected areas) and specific species and their habitats. Management planning involves assessing ecological conditions, setting conservation priorities, and establishing adaptive strategies to address emerging challenges. It serves as a roadmap for the ACF, guiding daily operations, resource allocation and long-term conservation initiatives.

The process of managing protected areas typically begins with the identification, designation, and establishment of the area's legal and institutional framework. This involves assessing the ecological, biological, cultural, and socio-economic values of the area in conjunction with its ecological carrying capacity, determining its boundaries, and zoning, establishing management objectives, goals, and guidelines, and developing policies, regulations, and guidelines to govern the use, management, and conservation of natural and cultural resources within the protected area. This may include zoning regulations, visitor use policies, habitat protection measures, wildlife management strategies, and enforcement mechanisms to ensure compliance with conservation objectives and regulations.

[12] Ecosystem-based management (EBM) represents a paradigm shift in natural resource management, emphasizing the importance of maintaining healthy ecosystems for sustainable development. It is an integrated approach to managing natural resources that considers the entire ecosystem, including humans, to achieve sustainable environmental, economic, and social goals. Unlike traditional management strategies that focus on individual species or specific resources, EBM recognizes the interconnectedness of ecosystems and aims to maintain their health, productivity, and resilience. Implementing EBM requires collaboration, adaptive strategies, and a commitment to balancing ecological integrity with human needs.

[13] See AB-2021-No.-123-Aruba-ROPV-Voorschriften.pdf (dip.aw) (in Dutch).

ACF is required by law and through its service level agreement with the government of Aruba to develop and execute protected areas conservation management plans (PACMPs) for the designated terrestrial, coastal, and marine protected areas under ACF management. In accordance with current best practices and guidelines, and in conjunction with national and international policies and agreements, all protected areas will be managed on the basis of ACF's Fundamental Conservation, incorporating ecosystem-based and adaptive management. Stakeholder consultation and engagement are essential components of the planning process to ensure inclusivity, transparency, and support from local communities and relevant stakeholders.

Borders and zoning

Protected area management plans typically include boundary demarcation, spatial planning, and zoning components to guide land and water use and resource allocation within the borders of the protected area.

Within the framework of Fundamental Conservation, establishing and maintaining clear boundaries and zoning for protected areas is foundational. This involves delineating the spatial extent of conservation zones, designating areas with distinct ecological characteristics, and demarcating the interfaces between different land uses, including the creation of buffer zones around protected areas. Responsible boundary and zoning practices enable effective management by providing a spatial framework for targeted conservation efforts, ensuring that the unique needs of each area are addressed appropriately.

Protected areas often have designated zones with varying levels of protection and permitted activities. For example, some areas may have strict no-entry zones to protect sensitive habitats, while others allow limited recreational activities such as hiking or birdwatching and may involve designating different zones or management units with specific regulations and management objectives, such as core conservation areas, buffer zones, recreational areas, and sustainable use zones. Additionally, permits may be required for certain activities within protected areas, such as scientific research, commercial filming, or special events (including sports). Permitting systems help regulate and manage human activities to ensure they are compatible with conservation objectives.

Rules & Regulations

Fundamental Conservation requires the formulation and communication of clear rules and regulations governing the use of and conduct within protected areas. These regulations may address activities such as dog-walking, horse riding, (off-road) driving, biking, hiking, jet skis, kite surfing, and other human interactions with the environment. Developing and enforcing rules will ensure that human activities are harmonized with conservation objectives, minimizing negative impacts on biodiversity and ecosystem health.

Visitors to terrestrial, coastal, and marine protected areas are required to follow specific codes of conduct to minimize their impact on nature and the environment. This may include staying on designated trails, properly disposing of waste, and respecting wildlife by maintaining a safe distance. Certain activities that could harm nature, the environment or wildlife are typically prohibited within protected areas. These may include hunting, fishing, logging/felling, mining, drone flying, and the collection of plants or animals without permits, but also regulations in relation to fire management such as restrictions on campfires, smoking, and prescribed burning practices, especially in areas sensitive to wildfires.

Managing pressures and threats mitigation

To effectively conserve nature at a national level, it is essential to address both the threats (i.e. habitat loss, climate change, pollution, invasive species, overexploitation) and the drivers (i.e. consumption patterns, economic activities, national policy and governance, technological advancements) that contribute to environmental degradation in Aruba. A proactive approach to identifying, assessing, and

mitigating pressures and (emerging) threats to the terrestrial, coastal, and marine protected areas and biodiversity is an essential component of ACF's approach. This involves continuous monitoring of human activities, natural processes and external factors that may pose risks to biodiversity and the integrity of protected areas.

Managing pressures and threats in the terrestrial, coastal, and marine protected areas is essential to ensuring the long-term conservation of biodiversity, ecosystems, and cultural heritage within these designated areas. Protected areas face a range of anthropogenic and natural threats, including habitat loss, poaching, invasive species, climate change, pollution, and unsustainable resource use. Effective management strategies aim to identify, mitigate, and address these threats while promoting the sustainable use and enjoyment of protected area resources.

As part of threat mitigation, ACF will need to conduct comprehensive risk assessments to identify and prioritize the most significant threats facing each protected area. This involves assessing the likelihood and potential impact of different threats on biodiversity, ecosystems, and cultural values within the protected area. Prioritization helps focus limited resources and efforts on addressing the most urgent and high-risk threats.

Managing pressures and threats requires the implementation of responsive strategies and interventions to maintain the resilience and ecological integrity of the conservation areas. In this context, there can be an active exploration of the potential for and execution of Nature-based Solutions (NbS) - addressing societal challenges[14] effectively and adaptively, simultaneously benefiting people and nature – as part of ACF's conservation strategies, including for climate change adaptation.

Nature protection and the enforcement of protection measures

Enforcing rules and regulations within protected areas is a critical responsibility. This involves the implementation of measures to deter and address activities that may threaten biodiversity or compromise the integrity of the conservation zones. Enforcement efforts will aim to uphold established legal protocols (and other rules, regulations, and guidelines), protect vulnerable species and habitats, and maintain the ecological balance within the protected areas.

Regular patrolling and monitoring of the terrestrial, coastal, and marine protected areas is necessary to assess their condition and identify (emerging) threats. Enforcement of regulations and collaboration with law enforcement agencies help deter vandalism, looting, and unauthorized development within protected areas. Strengthening law enforcement and implementing anti-poaching measures are critical for combatting illegal activities such as wildlife poaching, trafficking, and habitat destruction within protected areas. This includes increasing ACF's conservation rangers' patrol efforts, deploying surveillance technologies, and collaborating with law enforcement authorities to deter and prosecute offenders. Penalties for violating regulations may include fines, confiscation of equipment, or even criminal charges in severe cases. Regular offenders may be blacklisted.

Environmental and biodiversity monitoring and evaluation

Regular monitoring and evaluation are also essential for assessing the effectiveness of management actions, tracking changes in biodiversity and ecosystem health, and identifying emerging threats and challenges. Monitoring programs may include biodiversity surveys, habitat assessments, water quality monitoring, visitor use monitoring, and socio-economic assessments. Evaluation of management effectiveness helps inform adaptive management strategies and guide decision-making to improve conservation outcomes over time.

[14] According to the International Union for Conservation of Nature (IUCN), NbS addresses 7 major societal challenges: 1. Climate change mitigation and adaption, 2. Disaster risk reduction, 3. Economic and social development, 4. Human health, 5. Food security, 6. Water security, and 8. Environmental degradation and biodiversity loss.

Sustainable Natural Resource Management (SNRM)

The terrestrial, coastal, and marine protected areas often face threats from human activities, such as habitat destruction, overexploitation of natural resources, pollution, and climate change. Effective protected area management involves promoting sustainable resource use practices – not only within the protected areas but also beyond the protected areas, at a national level - that balance conservation objectives with socio-economic needs. As such, ACF will actively advance sustainable tourism development, water resource management, pollution and waste management, sustainable fisheries management, sustainable agriculture and forestry practices, and sustainable alternative livelihood opportunities for local communities in collaboration with government departments and NGO's.

Climate Change Adaptation

Protected area management plays a crucial role in climate change adaptation efforts by providing refuges for biodiversity, preserving ecosystem services, and enhancing resilience to environmental changes. Climate change poses new challenges for protected area management, including altered weather patterns, shifting species distributions, and increased frequency and intensity of extreme events. Adaptation strategies may include enhancing ecosystem resilience through habitat restoration and connectivity, facilitating species migration corridors, implementing fire management plans, and promoting sustainable land use practices that reduce greenhouse gas emissions and enhance carbon sequestration and other forms of Nature-based solutions (NbS). Integrating climate change adaptation considerations into protected area management is essential for safeguarding biodiversity, ecosystem services, and human well-being in the face of ongoing environmental changes. By prioritizing conservation and resilience-building efforts, protected areas can continue to fulfil their vital role in a changing climate.

These tasks form the nucleus of ACF's commitment to the fundamental aspects of nature conservation on the island and ensuing conservation activities are designed to maintain the fundamental ecological balance and sustainability of protected areas and ecosystems for present and future generations.

Sustainable Visitor Recreation Management

Considering that Aruba has long exceeded its ecological carrying capacity and that all threats to nature and the environment are directly or indirectly of anthropogenic origin, the management of unsustainable human activities remains a high priority, both in designated nature areas (terrestrial, coastal and marine) and for Aruba at large, to protect the island's natural values, and sustain biodiversity and ecosystems functioning - for nature, for Aruba's peoples, and for visitors.
Managed access and responsible recreation are essential components of protected area management. Visitor management strategies aim to minimize negative impacts on natural and cultural resources while providing opportunities for public enjoyment and education. This may involve developing visitor facilities and infrastructure, establishing visitor use regulations and codes of conduct, providing interpretive programs and guided tours, and monitoring visitor dispersal, behaviour, and impacts. It is additionally crucial to manage the number of visitors to (specific locations within) protected areas to prevent overcrowding, preserve the quality of the visitor experience and minimize environmental impacts. This may involve implementing reservation systems, timed entry permits, or daily visitor quotas for popular attractions.

Sustainable visitor recreation management is crucial for several reasons:

- *Conservation of Natural Resources*: Protecting biodiversity and ecosystems from disturbance and degradation due to human activities is essential. Sustainable management ensures that natural habitats, wildlife, and plant species are preserved for future generations.

- *Maintaining Ecological Balance*: Overcrowding and overuse can disrupt the natural balance of ecosystems. Sustainable practices help maintain this balance, preventing issues like soil erosion, water pollution, and habitat destruction.

- *Cultural and Historical Preservation*: Many protected areas in Aruba also have cultural and historical significance. Sustainable management helps preserve these values by preventing damage to archaeological sites, traditional lands, and cultural landscapes.

- *Enhancing Visitor Experience*: Well-managed areas provide better recreational experiences. Sustainable practices ensure that visitors can enjoy natural beauty without encountering overcrowded, degraded environments.

Thematic Conservation

While Fundamental Conservation priorities address the immediate and direct needs of protected areas, the Thematic Conservation Priorities provide a strategic framework for holistic and sustainable conservation practices, promoting resilience and adaptability in the face of evolving environmental dynamics on the island.

The identified cluster of 'Thematic Conservation' represents broader focal areas that complement and enhance the impact of Fundamental Conservation efforts for ecosystems, species, and their habitats with the aim of maintaining and restoring the health of ecosystems, preserving biodiversity, and ensuring the survival of individual species and their habitats within the protected areas, but may include specific projects and programs beyond the protected areas.

While ACF's focus is initially on protected area management, nature does not limit itself to these anthropogenic boundaries, and hence, ACF also looks beyond the boundaries of the protected areas, in advancement of connectivity, and optimizing ecosystem health and thriving biodiversity, also in relation to climate change and climate adaptation, as nature is connected beyond protected area boundaries. ACF's work beyond the protected areas focusses especially on learning and outreach, communication and advocacy, and advisory and consultancy. Moreover, ACF is already executing certain species recovery programs which entail being active beyond protected areas, such as for the Shoco (*Athene cunicularia arubensis*), the Lora (*Amazona barbadensis*) and the Prikichi (*Eupsittula pertinax arubensis*). Similarly, ACF has for the past decade already been actively contributing to the island-wide mitigation of the locally invasive *Boa constrictor*.

Species and Habitat Conservation

Biodiversity conservation entails protecting, preserving, and restoring populations of vulnerable and threatened species of flora and fauna and the habitats they depend on. Species are conserved through a combination of legal and regulatory, scientific, and community-based efforts. Effective species conservation often requires a combination of these strategies tailored to the specific needs and challenges faced by each species and its habitat in Aruba. Collaboration with and between governments, NGOs, local communities and individuals, and international expert organizations, is key to ensuring the long-term survival of Aruba's native and endemic biodiversity.

Common strategies and approaches that will be applied by ACF for species conservation, besides ecosystem and habitat protection, preservation, and restoration, include:

Habitat preservation, rehabilitation, and restoration

A habitat is the natural environment or ecological setting where a particular species of organism lives and thrives. It encompasses the physical and biological conditions necessary for the survival, growth,

and reproduction of that species. Habitats can vary widely in size, ranging from small microhabitats, such as the underside of a rock, to vast ecosystems like a tropical rainforest, a coral reef or even an interconnected network of ecosystems. Key components of a habitat include the availability of food, water, shelter, and suitable environmental conditions such as temperature, humidity, and soil type. Habitats can be terrestrial (land-based), aquatic (water-based), or a combination of both, and they play a critical role in supporting biodiversity and maintaining ecological balance.

Rehabilitating (to its previous functioning state) and restoring (to the original state) habitats help to maintain or enhance the diversity of plant and animal species in an ecosystem. By rehabilitating or restoring habitats, we can provide suitable conditions for various species to thrive, thus promoting biodiversity. Hence, any species recovery program, such as ACF's Lora Reintroduction and Conservation Program, will not only pay due attention to mitigating the threats and drivers that impact that specific species but will by definition also contain the element of habitat protection and restoration. To this effect, the Lora program also includes habitat restoration with the replanting of native (food source) trees.

Modern habitat restoration methods commonly involve a holistic and adaptive approach to rehabilitate and recover ecosystems to their natural state or to a state that supports both biodiversity and human needs – a process that may take years or even decades to achieve and can be costly. Moreover, it is possible that the original state may never be achieved entailing a possible degree of loss of biodiversity and ecosystem services. Hence, preventing negative impacts and biodiversity loss is key, together with preservation (maintaining the natural integrity) and remediation (repairing damage to a site).

Current and innovative approaches to assist natural recovery of habitats through rehabilitation (improving ecological value) and restoration (bringing a back to the original state) such as (Urban) Rewilding, Nature-based Solutions (NBS) and ecological engineering, integrate advanced technologies, interdisciplinary methodologies, and community-based strategies to enhance the effectiveness and sustainability of restoration efforts. These innovative approaches reflect a shift towards more adaptive, inclusive, and technology-driven strategies in habitat restoration, aiming to create resilient ecosystems that can withstand the challenges of climate change and human impact.

In the coming decade, ACF's conservation efforts will also include such approaches for restoring key habitats, amongst other wetlands, mangroves and coral reefs, and continue developing restorative initiatives in alignment with the National Biodiversity Strategy and Action Plan (NBSAP).

Species recovery programs

As is the case for conservation efforts based on protected area conservation management plans, similarly, species conservation also needs to be guided by species action plans, specifically for species that are considered (near) threatened, vulnerable, endangered, or otherwise in need of management and protection.

Species recovery programs – both in-situ and ex-situ - play a crucial role in coordinating and prioritizing conservation efforts, mobilizing resources, and ensuring that conservation actions are based on (scientific) evidence and best practices. By providing a roadmap for conservation action, species action plans help to enhance the effectiveness of conservation efforts and increase the likelihood of success in protecting and restoring threatened species and their habitats.

Species may become a focus of conservation efforts or management strategies due to the status of these species in ecosystems. Conservation programs often aim to protect, restore, or manage targeted species to ensure their survival and the health of their ecosystems.

In the coming decade, ACF will concentrate its species conservation efforts categorized as follows (with one species possibly falling under several categories):

- *Near Threatened, Vulnerable, or (Critically) Endangered Native or Endemic Species:* native and endemic species decreasing in numbers, becoming increasingly rare, and at a (high) risk of becoming extinct in the near future. This can be due to factors such as habitat loss, over-exploitation, pollution, disease, or climate change. Endangered species receive special conservation attention to prevent their extinction.

- *Keystone Species:* a species that has a disproportionately large impact on its ecosystem relative to its abundance. The removal of a keystone species can significantly alter the structure and function of the ecosystem. Keystone species play a crucial role in maintaining and restoring biodiversity and ecological balance.

- *Footprint-Impacted Species:* species that are directly affected by human activities, particularly those that result in habitat degradation, fragmentation, or destruction. Conservation efforts for these species often involve mitigating the negative impacts of human activities.

- *Health and Livelihood Species:* species that are critical for the health, livelihoods, and economic security of local communities.

- *Culturally Significant Species:* species that are an important part of the Aruban cultural identity and/or are significant as national emblems and global icons.

Breeding Programs and Captive Management

Ex-situ conservation helps increase the population of endangered species of fauna, providing a buffer population (either in Aruba or in another country/region) that helps prevent extinction. Reintroduction into the wild may follow successful breeding efforts but needs to be based on strict protocols and following (inter)national regulations. As such, ACF is the officially appointed management organization for confiscated specimens of Aruba's two species of native parrot - Lora (*Amazona barbadensis*) and Prikichi (*Eupsittula pertinax arubensis*) - which also allows for captive breeding and reintroduction, either by ACF or through collaboration with partner organizations.

Similarly for native plants, ACF contributes to in-situ flora biodiversity through its greenhouse propagation program and native plant nursery, supplemented by botanic collections of native species and enhanced through the reintroduction and out-planting in the natural habitats in protected nature areas of native flora species propagated in dedicated native plant nursery.

Wildlife rehabilitation is a special form of captive management: the process of providing care to injured, orphaned, or sick wild native animals with the goal of releasing them back into their natural habitats. It involves a combination of medical treatment, physical therapy, feeding, and proper housing to ensure the animals can survive independently in the wild once they are released.

For ACF, wildlife rehabilitation is a critical component of wildlife conservation efforts, providing essential care to animals in need and fostering a greater understanding and respect for the natural world. ACF provides support for (injured) wildlife recovery and reintroduction through its Wildlife Hotline, providing the necessary care together with local vets, avian experts, and volunteers.

Invasive species management and mitigation

This is a special category targeting non-native organisms that, when introduced to a new environment, can cause harm to the local biodiversity, ecosystems, economy, or human health. They often outcompete or prey upon native species, leading to ecological imbalances. Examples in Aruba include the invasive boa constrictor, rubber vine, Halophila seagrass and lionfish.

Invasive species management and mitigation involve strategies and actions aimed at preventing, controlling, reducing, or eradicating non-native species that have been introduced to an ecosystem where they cause harm to native species, habitats, or human activities.

ACF has for almost a decade already responded to citizens' calls for removal of the invasive *Boa constrictor* on private properties and is currently developing methods for the eradication of rubber vine, water hyacinth, and slider terrapins from protected areas. Lionfish eradication from the marine protected areas is ongoing through volunteer groups such as the Caribbean Lionfish Alliance (CLA). Further collaboration with the relevant government departments - such as DNM, DLVVM, and CITES - on the control and eradication of specific invasives at a national level is urgent for numerous other species, as well as developing a national policy for prevention, early detection, and rapid response. As such, ACF will play a supportive role to the government agencies but remains responsible for invasive species management and mitigation within the protected areas managed by the Foundation.

Some key approaches to invasive species management and mitigation promoted and supported by ACF are:

- *Prevention:* this is often the most effective strategy for managing invasive species and involves implementing measures to prevent the introduction and spread of invasive species, such as regulating the trade and movement of potentially invasive species, implementing biosecurity measures at ports and borders, and raising public awareness about the risks of introducing invasive species.

- *Early detection and rapid response:* early detection of invasive species is crucial for preventing their establishment and spread. Monitoring programs can help detect new invasive species before they become established populations. Rapid response efforts involve quickly containing and eradicating newly introduced invasive species to prevent them from spreading further.

- *Control and eradication:* once invasive species become established, various control methods may be employed to manage their populations and minimize their impacts. Control methods can include mechanical removal, chemical control using herbicides or pesticides, biological control using natural predators or pathogens, and physical barriers to prevent the spread of invasive species. Control and eradication measures are considered carefully to ensure they only target the invasive species and do not have an adverse impact on native biodiversity or ecosystems in the process.

- *Restoration and rehabilitation:* in some cases, habitat restoration and rehabilitation may be necessary to recover ecosystems affected by invasive species. This can involve restoring native vegetation, reintroducing native species, and implementing other ecological restoration techniques to improve habitat quality and resilience.

- *Research and monitoring:* continued research and monitoring are essential for understanding the dynamics, ecology and behavior of invasive species, assessing their impacts on native ecosystems, and evaluating the effectiveness of management strategies. Research and monitoring can help identify new invasive species, develop more effective control methods, and improve management practices over time.

Ultimately, successful invasive species management and mitigation requires government policy development and execution, and collaboration among government agencies, researchers, land managers, community organizations, and other stakeholders to implement coordinated and adaptive management strategies.

4. Supportive strategies

Supportive strategies to both Fundamental and Thematic Conservation are briefly described below. Each strategy has its own allocated team of experts within ACF responsible for the development and execution thereof. This document focusses specifically on our primary processes of fundamental and thematic conservation, from an evidence-based approach (including research & monitoring) and hence, the supportive strategies will be only briefly discussed below as to how they support fundamental and thematic conservation. For each supportive strategy, a respective strategic document will be developed in alignment with this framework and ACF's core purpose of nature conservation. The actions of these supportive strategies are aligned with ACF's MACS 2023 – 2032, and its Article of Association.

Conservation Research & Monitoring

The implementation of the fundamental and thematic conservation priorities should be based on (scientific) evidence and traditional knowledge and practices, recognizing the role of science, technology, and innovation. A commitment to applied scientific research and monitoring is indispensable in implementing an evidence-based approach to inform decision making and subsequent actions. Conducting scientific research on species' behavior, ecology, and genetics helps inform conservation strategies. Monitoring ecosystems, species' populations and their habitats helps in assessing the success of conservation efforts and identifying potential threats.

Programs will be developed – ideally in collaboration with the University of Aruba (UA) to support local capacity building - for systematic data collection, analysis, and interpretation to understand the dynamics of ecosystems, species populations and the impact of conservation interventions. An evidence-based approach ensures informed decision-making, adaptive management, and the ability to track the effectiveness of conservation measures over time. The delivery of a research strategy and action plan is a critical element in supporting the gaps in knowledge and understanding that will assist in delivering effective management and management planning, also in relation to dealing with pressures and threats. Section 7 of this document provides an overview of the critical areas for research and monitoring and focussing a research action plan.

Conservation Advisory & Consultancy

Conservation consultancy involves providing expert advice, support, and services to organizations, governments, businesses, and other local and regional stakeholders involved in biodiversity conservation, natural resource management, and environmental sustainability.

Resulting from increasing internal and external demand over the past five years, ACF will develop a research and consultancy department within the coming decade to provide professional services through our specialized expertise and advice to its associates and third parties on matters related to environmental conservation such as biodiversity protection, sustainable resource management, and habitat restoration, thereby playing a crucial role in helping organizations and government balance economic development with environmental protection and contribute to the conservation of biodiversity and natural resources for future generations.

Future services provided by ACF will include environmental quick scans, biodiversity assessments and surveys, habitat mapping and ecological monitoring, threats assessments and risk analyses, impact assessments and environmental impact studies, conservation planning and strategy development,

monitoring and evaluation of conservation projects, sustainable land use practices and planning, policy analysis and advocacy, as well as contributing to capacity building, learning and outreach.

Overall, conservation advisory and consultancy plays a vital role in supporting conservation efforts around the world by providing technical expertise, strategic guidance, and capacity-building support to help – in ACF's case both internal and external - clients achieve their conservation goals and contribute to the long-term sustainability of biodiversity and ecosystems.

Conservation Communications & Advocacy

Nature conservation communications involve effectively conveying information and raising awareness about the importance of protecting and preserving Aruba's natural environments and biodiversity fostering a deeper understanding and appreciation for nature. At ACF, conservation communications and advocacy are often blended as strategies with activities and efforts aimed at influencing public policy, public attitudes, and behaviours, to protect and preserve Aruba's natural values. This form of advocacy seeks to influence public opinion, bring about legislative, regulatory, and behavioural changes that supports ACF's conservation goals. Together, communications and advocacy are a powerful tool for effecting change and addressing threats and drivers.

In Aruba, nature goals are poorly considered throughout public and private sector policy and decision-making processes and should be reflected beyond the nature sector in highlighting the contribution of nature to other sectoral goals and to leverage the co-benefits that bridge social and economic interests. It is therefore imperative that ACF aims to actively influence national policy through its communications and by providing advice, input, and facilitation in evidence-based decision-making with respect to defining direction, raising awareness, initiating policies, addressing policy implications, supporting with the updating and development of laws and regulations regarding the natural heritage conservation, and mobilizing support for the protection and sustainable use of natural resources.

ACF identifies the following key aspects of the role of communications and advocacy in nature conservation:

- *Increasing Protected Areas and their Connectivity:* advocating for the management of and the increase in the designation of specific areas of natural value such as national parks and nature reserves[15] helps protect habitats and restricts human activities that could harm species. ACF subscribes to the global 30x30 movement to conserve at least 30 percent of lands and waters by 2030 and restore biodiversity, expand access to nature, and mitigate and build resilience to climate change in alignment with the National Biodiversity Strategy and Action Plan (NBSAP), and through potential designations such as UNESCO Global Geoparks[16] and UNESCO Man & Biosphere[17] Reserves.

Moreover, ACF strongly supports the development of a nation-wide ecological network: an interconnected system of protected areas with ecological corridors as functional zones of passage for species mobility, dispersal, and migration.

[15] Including, but not limited to: the entire salt spray area including 'Tera Cora' (Sero Hudishibana – Banki di Hatabara), Alto Vista, Area Sero Cristal, Mativiri, and Costa Sero Colorado; Ayo, Casibari, Hooiberg and surroundings; Sero and/or Rooi Canashito, Prikichi, Master, Koochi, Bosal and Mahuma; expansion of the protected area near Tierra del Sol to include Sero Pela – Warirui; and the entire marine Exclusive Economic Zone (EEZ). See also Appendix V for areas of natural value as indicated in the ROP 2021.

[16] UNESCO Global Geoparks (UGGp) are single, unified geographical areas where sites and landscapes of international geological significance are managed with a holistic concept of protection, education, and community-inclusive sustainable development.

[17] Biosphere reserves are areas comprising terrestrial, coastal and marine ecosystems, promoting solutions for reconciling the conservation of biodiversity with its sustainable use.

- *Raising Awareness:* ACF's communications and advocacy efforts help to inform the public about the importance of biodiversity, ecosystems, and species, and the impact of human activities on the environment. Increasing awareness on sustainable behaviours fosters a sense of responsibility and encourages individuals to take actions that contribute to conservation. As such, ACF communications and advocacy will also be aimed at threats and impacts to biodiversity such as but not limited to: (the many forms of) pollution, and wildlife disturbance and feeding.

- *Policy Influence:* ACF aims to influence government policies and regulations related to environmental and nature protection and promote the development and implementation of laws and policies that safeguard ecosystems, biodiversity, species, natural resources, and their long-term integrity. ACF may lobby for the modernization of Aruba's environmental laws (including the Rights of Nature and a national Nature Restoration Law), climate adaptation, the creation of additional protected areas, sustainable tourism, sustainable resource management practices, policies and regulations that curb activities harmful to nature and the environment.

- *Community Engagement:* Engaging local communities in conservation efforts is crucial. ACF fosters community involvement and empowerment in conservation efforts. This includes education, awareness programs, and providing incentives for communities to participate in sustainable practices and engage volunteers in actively supporting conservation efforts, e.g. through citizen science, habitat restoration efforts, and species and habitat monitoring.

Engaging local communities in decision-making processes and educating them about sustainable practices can lead to more effective conservation initiatives. ACF actively works to build partnerships between communities, NGOs, and governments to ensure a collaborative and inclusive approach to conservation.

- *Corporate Responsibility:* ACF can target businesses and industries to adopt environmentally and nature friendly practices. By influencing corporate policies, through advocacy ACF can encourage companies to minimize their ecological footprint, adopt sustainable supply chain practices, and invest in environmentally responsible technologies, ideally benefiting both people and nature.

- *International Cooperation:* Nature conservation often requires regional, international, and even global cooperation, as environmental issues transcend national borders. Advocacy at the international level involves influencing policies and agreements that address regional and global environmental challenges, such as climate change, deforestation, and biodiversity loss.

- *Funding and Support:* ACF's advocacy efforts can attract financial support for conservation initiatives. By showcasing the ecological and economic benefits of conservation, communications and advocacy may help secure funding from governments, foundations, and private donors to implement and sustain conservation projects.

In summary, communications and advocacy serve as a catalyst for positive change in nature conservation by promoting awareness, influencing policies, engaging communities, fostering international cooperation, and mobilizing resources to increase protection, preservation, and restoration of Aruba's unique nature.

Conservation Learning & Outreach

ACF reaches a diverse audience with its concept of 'Conservation Education': the process of influencing people's attitudes, emotions, knowledge, and behaviours about nature and the environment. It goes beyond simply communicating biological or environmental facts and focuses on: Awareness, Issues, Critical thinking, Problem solving, Decision making, Leadership, Collaboration, and Thinking-Behaving-

Acting Responsibly and Sustainably. Conservation Education initiatives aim to foster awareness, instil a sense of stewardship, and promote responsible behaviours within our community and our visitors.

ACF has a responsibility to reach out to and offer engaging learning opportunities to a diversity of audiences about the value of protected areas and the importance of Aruba's ecosystems and biodiversity. By cultivating an informed and environmentally conscious society, ACF contributes to the long-term sustainability of its conservation efforts. ACF aims to deliver conservation education outcomes through lifelong learning, with programs for formal education, informal education, and corporate education through the ACF Sustainability & Conservation Academy.

Learning and outreach are essential components of nature conservation, playing a vital role in building awareness, understanding, and support for conservation efforts. Key aspects of the roles of learning and outreach in support of ACF's nature conservation goals are:

- *Awareness:* ACF's learning initiatives will be aimed at increasing public awareness about the importance of Aruba's biodiversity, ecosystems, and the impact of human activities on the environment, helping our society to understand the value of nature, the services it provides, and the consequences of its degradation.

- *Environmental Literacy***:** Promoting environmental literacy is the key goal of ACF's learning and outreach efforts and involves providing individuals with the knowledge and skills to understand environmental issues, make informed decisions, and participate in conservation actions. Environmental education programs in primary and secondary schools, higher education, universities, and informal settings play a crucial role in achieving this goal.

- *Behavioral Change***:** ACF's outreach efforts aim to inspire behavioral change by providing information on sustainable practices. Learning about environmentally friendly behaviors, such as reducing waste, using renewable resources, and adopting eco-friendly lifestyles and responsible outdoor recreation, can contribute to the conservation of natural resources.

- *Community Engagement***:** ACF's learning and outreach activities facilitate engagement with our community. Empowering our community with knowledge about our local ecosystems and biodiversity and involving them in conservation decision-making processes helps build a shared sense of ownership and responsibility for the environment.

- *Capacity Building*: ACF's learning programs contribute to capacity building among various stakeholders involved in conservation, including fellow associates and conservation practitioners, policymakers, and educators. Strengthening the knowledge and skills of these individuals enhances their ability to contribute effectively to conservation efforts at a national scale.

- *Citizen Science***:** ACF's learning initiatives will also involve citizen science programs where the public can actively participate in data collection, monitoring, and research. This not only provides valuable information for ACF's conservation programs but also fosters a sense of connection between individuals and the natural world.

- *Cultural Appreciation***:** Learning about the cultural and spiritual significance of nature can foster a deeper appreciation for biodiversity and ecosystems. ACF will develop outreach programs that incorporate cultural perspectives and help bridge the gap between traditional knowledge and modern conservation practices.

- *Long-Term Sustainability***:** Learning and outreach contribute to the long-term sustainability of ACF's conservation efforts by building a knowledgeable and engaged community. Sustainable conservation practices are more likely to be embraced and maintained when supported by an informed and empowered public.

Place-based Learning (PBL)

As part of its strategy to foster environmental stewardship and with the understanding that “onbekend maakt onbemind”, ACF does not only foster classroom learning but also outdoor, place-based learning in protected areas.

Place-based learning can be an effective strategy for nature conservation by fostering a deep connection between individuals and their local environments. This educational approach through field trips to and first-hand experience with protected areas and their biodiversity, and the use of outdoor classrooms and outdoor labs (the latter two which can also be developed on-campus), can inspire active participation in conservation efforts, promote sustainable practices, and enhance community resilience.

ACF can apply PBL strategically to support nature conservation, for example, by:

- Integrating the local body of conservation intelligence, including historical and traditional ecological knowledge and practices from local experts and communities, into the national curriculum and engaging students in biodiversity studies and ecological monitoring

- Increasing community involvement and partnerships through collaborative conservation projects, citizen science, and student service projects such as habitat restoration, native garden planting and sustainable maintenance, developing school and community native species gardens, urban green initiatives, clean-up campaigns, etc.

Through such initiatives, students develop a deeper understanding of their local environment and the importance of conservation, leading to increased awareness and advocacy. Engaging students in real-world conservation projects empowers them to take action and become active participants in protecting their local environment. Students additionally gain hands-on experience and practical skills in conservation techniques, which can be applied in their communities and future careers. By promoting sustainable practices within the community, place-based learning helps to reduce environmental impact and promote long-term ecological health. Moreover, fostering a sense of place and connection to the local environment helps to build a lifelong conservation ethic among students and community members.

Hence, place-based learning is a powerful strategy for advancing nature conservation by connecting education with local environmental issues and involving students in hands-on, meaningful projects. By fostering a deep sense of place and responsibility, place-based learning helps to cultivate the next generation of conservationists and sustainable communities.

In summary, learning and outreach is integral to the success of ACF’s nature conservation efforts by raising awareness, developing knowledge and skills, fostering behavioral change, engaging our community, building capacity, and promoting a deeper connection between people and nature.

Conservation Co-Creation

The complexity and interconnectedness of environmental issues in Aruba often requires coordinated actions and the pooling of resources from numerous stakeholders for effective and successful nature conservation outcomes. Conservation co-creation involves the collective efforts of multiple stakeholders—such as governments, non-governmental organizations (NGOs), local communities, businesses, and academic institutions—to jointly develop and implement for example: conservation, scientific, education, cultural, and sustainable tourism-related initiatives. This approach recognizes

that effective conservation often requires the integration of diverse perspectives, resources, and expertise.

Conservation co-creation partnerships and collaboration harness the collective power of diverse stakeholders to achieve more effective, inclusive, and sustainable conservation outcomes. By fostering trust, facilitating dialogue, sharing knowledge and resources, building capacity, and engaging in joint planning and decision-making, collaborative approaches can address complex environmental challenges and ensure the long-term preservation of Aruba's natural resources and biodiversity.

The following are key aspects of the role of co-creation partnerships and collaboration in ACF's nature conservation ambitions:

- *Holistic Approaches:* ACF's nature conservation efforts often involve addressing multifaceted challenges that span ecological, social, and economic dimensions. Collaborative initiatives enable a more holistic approach, considering diverse perspectives and finding integrated solutions that balance environmental, social, and economic goals.

- *Shared Resources and Expertise:* ACF's collaborative efforts stimulate organizations, government departments, the community, and individuals to combine their resources, expertise, and knowledge. This pooling of resources can lead to more effective and comprehensive conservation strategies.

- *Bridging Gaps in Capacity:* Different stakeholders bring unique skills, experiences, and capacities to the table. ACF's collaborative efforts help bridge gaps in capacity by leveraging the strengths of each partner. For example, local communities may possess valuable traditional knowledge, while scientific institutions can provide technical expertise.

- *Capacity Building***:** Collaborative projects often include capacity-building components, providing training and skills development for ACF's associates, fellow organizations and local individuals involved in conservation specifically. This contributes to the sustainability and long-term success of both ACF's and collective conservation efforts.

- *Research and Monitoring:* Scientific research is fundamental to understanding biodiversity and ecosystem health and monitoring changes over time and is the basis for informing ACF in decision-making and management actions. Collaboration between research institutions, fellow conservation organizations, and government agencies enhances the quality and quantity of data available for evidence-based decision-making and conservation.

- *Community Engagement:* Partnerships with local communities are essential for successful conservation initiatives. Fostering collaborative approaches that involve communities in decision-making processes, respect local knowledge, and consider cultural practices are more likely to gain community support and result in sustainable outcomes.

- *Private Sector Engagement:* Collaboration with the private sector is increasingly important in conservation and is therefore specifically mentioned. Partnerships with businesses can lead to higher integrity sustainable practices that prevent greenwashing, and support responsible resource management, and the development of eco-friendly technologies. This engagement may also involve corporate sponsorship for ACF's conservation programs through corporate social responsibility (CSR), which will include sustainable recreation training (i.e. through the ACF Sustainability & Conservation Academy), certification and licensing for visiting protected areas.

- *Policy Influence:* Collaborations between NGOs, the government, and international organizations can amplify the impact of conservation advocacy efforts. Partnerships allow for a unified voice when influencing policies, regulations, and international agreements related to environmental conservation.

- *Cross-Border Cooperation:* Many environmental challenges, such as climate change, pollution, and species migration, transcend national borders. Collaborative efforts between countries and international organizations such as the Dutch Caribbean Nature Alliance (DCNA) are crucial for addressing these global issues effectively.

International collaboration and cooperation among islands, countries, institutions, and centers of expertise is crucial for increasing conservation success and ensuring local capacity building. For migratory species, collaboration with international agreements and organizations and developing joint efforts is crucial for reaching global conservation targets.

- *Conflict Resolution*: Collaborative approaches can help address conflicts arising from competing land uses or resource extraction. By bringing together different stakeholders, including local communities, policymakers, and industry representatives, ACF seeks through collaborative efforts to find solutions that balance ACF's conservation priorities with other interests.

- *Financial Support*: Partnerships can attract funding from a variety of sources, including governments, philanthropic organizations, and private donors. By combining financial resources, conservation initiatives can achieve greater scale and impact.

In summary, co-creation partnerships and collaboration are essential for addressing the multifaceted challenges of nature conservation in Aruba. It is especially by increasingly fostering cooperation with and among diverse stakeholders, that ACF's conservation initiatives can achieve greater impact, sustainability, and success in protecting, preserving, and restoring Aruba's natural values.

5. ACF's Fundamental Conservation Priorities for 2024-2033

Having a resilient and diverse network of terrestrial, coastal, and marine protected areas is fundamental to preserving Aruba's biodiversity, ensuring ecosystem services, supporting sustainable economies, enhancing human health, and providing cultural and educational opportunities.

ACF manages the terrestrial, coastal, and marine protected areas of Aruba, which include 5 Key Biodiversity Areas (KBA) and 4 Important Bird and biodiversity Areas (IBA)[18], on the basis of the national legal framework and policies, and international guidelines (i.e. CMS, CBD, IUCN, Birdlife International, UNESCO, Ramsar, SPAW). Many of these areas are also Ramsar Areas[19], wetlands of international importance.

Protected Areas Conservation Management Plans (PACMPs)

Effective management of protected areas is essential to achieve conservation goals and ensure the sustainability of these vital areas. ACF's top priority is to develop according to modern standards and best practices a Protected Areas Conservation Management Plan (PACMP) per cluster of protected areas, their ecosystems and associated biodiversity:

i) Terrestrial (xeric scrublands, dry forests, hills, cliffs, caves, rooi, dam, tanki)

ii) Coastal (saliña, baranca, mangroves, beaches, dunes, reef islands)

iii) Marine (seagrass meadows, coral reefs, inland bays, lagoons, open sea)

Each PACMP is a comprehensive document that outlines the strategies and actions necessary to conserve and manage the cluster of protected areas and ecosystems effectively, including:

- borders and zoning
- rules and regulations
- managing pressures and threats mitigation
- nature protection and enforcement
- natural resource management
- climate change adaptation
- sustainable visitor recreation management

Each PACMP serves as a blueprint for ensuring the long-term protection of biodiversity, ecosystem services, as well as cultural and economic values.

The three integral PACMPs to be developed by ACF through a multi-stakeholder process and delivered in 2024-2025 are briefly discussed below.

Terrestrial Protected Areas Conservation Management Plan

Aruba's terrestrial protected areas consist primarily of xeric (dry) dominated ecosystems, and geological features such as hills, limestone cliffs and volcanic rock formations, which are characteristic of our semi-arid island, and includes many sensitive areas harboring cultural heritage and 'typical Aruban' species that are well-adapted to the form part of the island's ecological as well

[18] Saliña Druif (KBA/IBA), Saliña Bubali (KBA/IBA), Oranjestad Reef Islands (KBA/IBA), Parke Nacional Arikok (KBA), and San Nicolas Reef Islands (KBA/IBA).
[19] See Appendix III.

as cultural landscape. Certain of the island's natural features, such as caves with petroglyphs and pictographs, reflect the cultural heritage of Aruba's indigenous people, adding an extra layer of significance to its natural landscape.

Aruba's xeric landscape and unique, associated biodiversity face numerous challenges, primarily resulting from human activities such as pollution, invasive species, and climate change. Moreover, certain protected areas contain private and long lease properties already present before designation, and for which a solution must be found.

The terrestrial protected areas included in this plan are:

Sero Grandi, Muskita & Tres Cabes	The highest hill in this area is Sero Grandi (50 m), giving a good view of the undulating rugged, windswept salt spray landscape leading up to the coast. This area is frequented by reptiles (snakes, lizards), numerous species of birds (including birds of prey such as the Caracara Cheriway), and the elusive Aruban cottontail. This area is directly connected to Saliña Druif (see coastal protected areas).
Ser'i Teishi	This hilly area with a diversity of vegetation types and protected indigenous plant species has historically been a habitat for populations of breeding ospreys and bats, among others. The area is strategically located relative to the adjacent and nutrient-rich wetland Spaans Lagoen.
KBA Parke Nacional Arikok	This first protected area of Aruba was officially ratified by the government in 1997 and is since 2003 under the management of ACF. The Arikok National Park covers approximately 18 percent of the island, with 34 km² of natural xeric area, located in the northeastern part of Aruba. It contains unique and characteristic elements for Aruba, such as the island's highest rugged hills formed by volcanic solidified lava, batholithic quartz diorite, and tonalite rocks, as well as limestone rocks formed by petrified coral. There are also various bays (boca's) along the rugged north coast and several dune areas. Furthermore, there is a large diversity of drought-resistant cacti, trees, and plants, as well as Amerindian drawings, gold mines, and ruins from the Gold Rush period, old plantation buildings, and a typical rural adobe house. The park is a refuge for various birds, reptiles, and mammals, such as the endemic Aruba burrowing owl (Shoco), Brown-throated parakeet (Prikichi), Aruba whiptail lizard (Cododo), Aruba-island rattlesnake (Cascabel), and the Hummelinck's vesper mouse.
Rooi Lamunchi	Rooi Lamunchi functions as an ecological corridor or connecting zone between Arikok and Spaans Lagoen, including the mangrove area at Isla de Oro and Santo Largo. This is an important area for migrating land crabs to complete their reproductive cycle.
Rooi Bringamosa	Both Rooi Bringamosa and Rooi Taki, as well as Rooi Frances, lead to the salt flats of Spaans Lagoen. Rooi Bringamosa and Rooi Taki are connected to Arikok Park. Rooi contain fertile soil with shallow groundwater, making it an ideal habitat for various fruit-bearing trees. Sheltered parts of the rooi can retain water for extended periods, attracting various animal species, including dragonflies, bees, and frogs. The Aruba cottontail (Conew) typically inhabits the Rooi.

Rooi Taki	See above.
Rooi Manonchi	Rooi Manonchi functions as an ecological corridor and "oasis" in the middle of the capital city and adjacent areas, providing shelter and habitats for protected native flora and fauna.

Coastal Protected Areas Conservation Management Plan

Conserving coastal areas presents a unique set of challenges for Aruba, not only due to their unique and dynamic nature and the variety of ecosystems they encompass, but also due to the high anthropogenic activity in Aruba's coastal areas.

The coastal area is also a high activity area with a diversity of socio-economic pressures impacting nature. The primary challenges for coastal conservation in Aruba include habitat loss and degradation, pollution, tourism and recreation, erosion and sedimentation, and climate change.

ACF will apply Integrated Coastal Zone Management (ICZM) - a comprehensive approach to managing coastal areas in a sustainable way. It aims to balance environmental, socio-economic, and cultural objectives to ensure the long-term health and productivity of coastal zones, and recognizes the interconnectedness of land and sea, involving the coordination of various stakeholders and sectors to reduce the impact on Aruba's coastal areas, while integrating Nature-based Solutions (NbS) to provide long-term environmental, societal and economic benefits.

The coastal protected areas included in this plan are:

Duinen Sasarawichi & Arashi	Vulnerable dune area with characteristic vegetation due to the calcareous soil. The area also includes the beaches at Arashi. Protected fauna found there include 4 species of sea turtles, various birds of prey (including falcons), the Shoco, terns, Patrishi, Cododo, and the native vesper mouse *Calomys hummelincki*. Protected flora include: Banana di rif, Breba, Cadushi, Bushi, and Tuna.
Saliña Druif	The saliña (2 hectares) is surrounded by a golf course. It comprises an area of open water body which flows naturally to the sea, bordered by desert scrub habitat with salt and drought tolerant vegetation. The salina dries out periodically naturally but will be developed as Aruba's second permanent water body as an overflow from the Bubali Wetlands. This area is significant for the Near Threatened Caribbean Coot *Fulica caribaea* and supports a wide range of waterbirds including large populations of White-cheeked Pintail *Anas bahamensis*, nesting and roosting herons and egrets, and roosting terns. Hundreds of shorebirds visit the site during migration. Birds of prey include the Aruba burrowing owl, American kestrel, Osprey and Caracara. The surrounding shrubland is important for a number of species, including Bare-eyed Pigeon *Patagioenas corensis*.
Saliña Malmok	Extensive salt flat with mangrove forests, migratory birds, waterfowl, and birds of prey, including the Osprey (Gabilan piscado). The area is used as a resting, nesting, and foraging site. The area also contains archaeological findings from the pre-Columbian period.
Saliña Cerca	See above.

Saliña Palm Beach	This area is also located in a wetland or salt flat and is rich in mangrove forests, with a diversity of flora and fauna. Essentially, the salt flats of Malmok, Cerca, Palm Beach, and Bubali form one large continuous salt flat, which has been divided over the decades by infrastructural development.
Saliña Bubali	Bubali wetlands (53 hectares) serves not only as a catchment area for rainwater but also as a runoff area for water from the sewage treatment plant. Bubali contains a permanent water reservoir (approx. 5 hectares), surrounded by a border of mixed scrub vegetation. Saliñna Bubali functions as a reserve for bird wildlife, especially migratory (water and shore) birds, and is an area that is rich in crustaceans and insects as well. This IBA is significant for the Near Threatened Caribbean Coot *Fulica caribaea* and also for the Neotropic Cormorant *Phalacrocorax brasilianus.* The shrublands are important for a number of species, including White-tailed Nightjar *Caprimulgus cayennensis*, and Bare-eyed Pigeon *Patagioenas corensis.*
Parke Nacional Arikok *Baranca, beach & dunes – including Daimari, Moro, Dos Playa, and Boca Prins – and a natural pool* **Spaans Lagoen** *Saliña and mangroves*	The Parke Nacional Arikok, which covers nearly 20% of Aruba's land area, is renowned for its diverse landscapes, including rocky coasts, pristine beaches, and dynamic sand dunes. One of the most notable features along the rocky coast is the "Conchi" or Natural Pool. Formed by rock encircling a small depression, this pool is a popular spot for swimming and snorkeling, offering a unique experience of the rugged coastline. Annexed to Parke Nacional Arikok, Spaans Lagoen is a high biodiversity area containing mangroves bordering a large inland lagoon, which give way to an extensive saliña, home to four species of mangrove, as well as thousands of fiddler crabs and birds.
Mangel Halto *Baranca, mangroves, beach*	Mangel Halto is a picturesque, unique and ecologically rich area that showcases the natural beauty and biodiversity of coastal Aruba. Its mangrove forests, clear waters, coral reefs, and abundant wildlife make it a must-visit location for anyone interested in experiencing the island's natural environment. Hence, this area has become increasingly popular and in need of sustainable management.
Area di Mangel *Coast & reef islands*	Mangroves in Aruba are historically significant and continue to be ecologically vital despite their great reduction due to unregulated and unsustainable coastal development. Spaans Lagoen, Mangel Halto and the Isla di Oro areas harbor the remaining significant mangrove forests supporting a diversity of terrestrial, coastal, and marine wildlife and support fisheries. Mangrove protection and restoration should be top priority, in tandem with seagrass meadows and corals – who together provide habits for the entire life cycles of numerous species of high ecological importance and for livelihoods.
Area di Cay *From San Nicolas to the Oranjestad Reef islands*	The development of coastal areas for tourism, housing, and infrastructure can lead to the destruction of mangroves, seagrasses, and other critical habitats that support marine life and protect shorelines. Aruba's cays and reef islands are special due to their unique ecological features, rich marine biodiversity, and the various

	recreational activities they offer, but are at the same time highly impacted by human activity, illegal construction, and climate change.
Costa Sero Colorado *Coastal strip from Bachelor's Beach to Boca Grandi*	Various species of tern breed annually in this coastal area. Protected birds of prey also inhabit the area. Additionally, the area is valuable from a cultural-historical and archaeological perspective as a site of pre-Columbian artifacts and because of the phosphate mines, cannons, and a historic tunnel for collecting rainwater.

Marine Protected Areas Conservation Management Plan

Aruba's nature-based economy of tourism is built upon the natural values of the island's beautiful white sandy beaches and crystal-clear waters with abundant marine life. Marine-based recreation is on the increase and when unregulated poses numerous threats to marine biodiversity and ecosystem health and resilience.

The four marine protected areas designated in 2018 are noted for their exceptional marine biodiversity but also the three with increasing human activity – MPA Sero Colorado, MPA Mangel Halto, and MPA Oranjestad - are in need of higher protection and regulatory efforts and restoration in conjunction with increasing anthropogenic activities and impacts.

The marine protected areas included in this plan are:

MPA Arikok	Located on the eastern coast and runs along an 8 km coastal stretch of the national park, Parke Nacional Arikok (PNA). The border starts at Daimari beach and runs south to Vaderpiet. The MPA extends 2 km seawards and covers a total area of approximately 16.5 km2. MPA Arikok encompasses different zones varying from intertidal Sawah banks to pelagic areas. This MPA is connected to sea turtle nesting beaches and shore birds nesting grounds, encompasses coral reefs and is a dolphin nursery and marine mammal corridor.
MPA Sero Colorado	Located on the eastern tip of the island and covers a coastal stretch of approximately 9.4 km from Bachelor's Beach to the Refinery of Aruba. The MPA extends 2 km seawards and covers a total area of approximately 18.7 km2. This MPA is connected to sea turtle nesting beaches and shore birds nesting grounds, and includes sea turtle foraging and resting areas, conch habitat, shark nursery, and marine mammal corridor. Key ecosystems of reef islets, coral, seagrass, and historically red mangroves are characteristic of this MPA. In the coming years, with the opening of numerous hotels in this formerly 'quiet' MPA, ACF will need to invest much effort and resources to counter-balance the increase of human impacts.
MPA Mangel Halto *including the water body of Spaans Lagoen*	Located on the southwest coast and covers a coastal stretch of approximately 8 km from Santo Largo to Spaans Lagoen. The MPA

	extends 2 km seawards and covers a total area of approximately 16 km2. This MPA is adjacent to the Aruba's mangrove forests, and this ecosystem is complemented to form the power of three with seagrass and coral ecosystems. Sheltered by reef islands, this MPA has a coastal lagoon area that is a refuge for many species in fragile life stages or rough weather conditions and an inland lagoon (Spaans Lagoen). The MPA is known to be a conch habitat, crustacean nursery, fish and shark nursery, dolphin nursery and refuge.
MPA Oranjestad	The smallest of the MPA and located on the southwest coast next to the Oranjestad harbor area. The MPA border circles around the Oranjestad reef islands and extends 2 km seawards, covering a total area of approximately 9 km2 This MPA includes reef islets, coral and seagrass ecosystems, historically also mangroves on the reef islets. It is an important habitat for conch and octopus and a marine mammal corridor. The MPA is connected to sea turtle nesting beaches and the seagrass beds are sea turtle foraging grounds.

To be able to increase the effectiveness of both coastal and marine protected area management and the conservation of the related natural values, a Marine Conservation Center (MCC) will be developed to include the headquarters for these management zones. The MCC will have additional facilities to cater to co-creation and collaboration and support thematic conservation initiatives which include a Coral Rescue Facility and Marine Wildlife Rehabilitation Facility.

Research & Monitoring

As monitoring is a key adaptive management tool, each PACMP will be supplemented by a Research & Monitoring Plan (see also Chapter 7) as well as an Operational Plan (funding requirements, human capacity and skills and other non-financial resources required, risk assessment and mitigation, estimates of projects' lifespans and exit strategies), and include detailing of the relevant supportive strategies (research & monitoring, communications & advocacy, advisory & consultancy, learning & outreach, co-creation & collaboration), for which specific plans also need to be developed by the dedicated ACF departments and their specialists.

Communications & Advocacy for Fundamental Conservation:

Communications for fundamental conservation will concentrate on ecosystem and biodiversity topics, as well as informing about and promoting sustainable (recreation) behaviours – both within the protected management areas and beyond.

Advocacy will include lobbying for expansion of terrestrial protected areas (including those stipulated in Aruba's spatial plan 2010/2021 - see Appendix V) to be able to more comprehensively and holistically protect both Aruba's ecosystems and their services, and biodiversity, and advocate for government compliance with the global initiative to designate 30% of Aruba's land and sea area. ACF will also lobby for the expansion of Marine Protected Areas (MPAs) for an island-round marine park to effectively manage anthropogenic factors, protect critical habitats and biodiversity and further enhance connectivity, and to include a marine megafauna reserve as part of a wider Caribbean marine reserve: the Yarari Sanctuary.

Moreover, and as part of its conservation strategies, ACF will not only be implementing sustainable resource management within the protected areas but will also advocate for sustainable water(shed) resource management, pollution and waste management, sustainable fisheries, sustainable agriculture, and sustainable 'landscape' management *('groenbeheer; landschapsbeheer'*), and sustainable recreation on an island scale.

Learning & Outreach for Fundamental Conservation:

Through the development of ACF's Conservation & Sustainability Academy, due attention will be paid to human capacity building for further developing terrestrial, coastal, and marine conservation knowledge and skills. This is, after all, where the conservation works starts, and it is the quality of our (local) human capital that determines the quality of the work delivered.

Furthermore, comprehensive fundamental conservation learning and outreach materials and programs will be developed through ACF's Conservation & Sustainability Academy for all formal education levels, as well as for informal groups on the basis of life-long learning.

Partnerships & Collaboration

A part of ACF's staff and team of rangers will need to be appointed and trained as official nature 'Toezichthouders' or nature 'Supervisors': by Aruban legislation, an official responsible for the management, oversight, and enforcement of nature areas and conservation laws. The duties of a 'nature supervisor' can vary but typically include supervision and enforcement: ensuring that laws and regulations related to nature and environmental protection are followed. This may involve conducting inspections and issuing fines or warnings for violations. Hence, a close and strong collaboration with relevant government authorities (i.e. DNM, BCI, DLVVM, DIP, DOW, KPA, Kustwacht) is essential for effective protection and conservation and sustainability of Aruba's ecosystems and biodiversity. Current threats and unregulated activities such as illegal littering and dumping of garbage and other forms of pollution in protected areas, illegal land clearing and creation of passageways in mangroves, building illegal piers and building structures on the coast and on reef islands, need to be tackled through an integral approach. In such, ACF will need to develop policies for regulations and compliance, which will include a fining and black-listing system. Policies will also need to be developed for recreational activities (i.e. driving and biking) and events taking place in protected areas to align with and support the transition from high impact to low-impact recreation.

6. ACF's Thematic Conservation Management Priorities for 2024-2033

In this section, we focus on specific areas crucial for development, opportunity utilization, and structured research within the context of the protected areas, and when necessary, beyond the borders. Each of these thematic areas plays a vital role in enhancing the understanding and management of Aruba's natural environment, in guiding ACF's initiatives, ensuring the integrity of ecosystems and fostering a harmonious coexistence between human activities and the unique biodiversity found on the island. The strategic priorities encapsulated within these key themes - and the yet to be developed action plans in alignment and agreement with the Government of Aruba – are aimed mainly at the protected areas managed by ACF (and where beyond the protected areas, ACF's role will be of advocacy) and will contribute to enhancing the resilience and vitality of Aruba's natural heritage.

ACF's Thematic Conservation Management Priorities for 2024-2033 have been targeted for 5 ecosystem 'clusters' identified as top priority within the protected areas for the coming 10 years; 5 'programs or avenues' of opportunities for preservation and especially restoration within the protected areas, supported by structured research and monitoring:

- *Xeric Ecosystems:* the quintessential Aruban 'outback' is characterized by aridity and dry conditions for significant portions of the year. These ecosystems have sparse vegetation and include semi-deserts, dry grasslands, and scrublands, but also hills, limestone cliffs, and caves. Organisms in xeric ecosystems, including plants, animals, and microorganisms, have evolved various adaptations to cope with the heat and water scarcity. The Aruban xeric landscape harbours native as well as endemic species found nowhere else on Earth.

- *Terrestrial Water Management*: increasing watershed (rooi, dam, tanki) protection and restoration and adopting an integrated approach to managing water resources that considers the interconnectedness of surface water and groundwater, as well as the interactions between water, land, ecosystems, society, and the economy is needed to conserve biodiversity and the integrity of the protected areas,

- *Urban/Metropolitan Ecosystems*: urban and metropolitan ecosystems present unique challenges and opportunities for conservation efforts due to their complex socio-economic dynamics, dense human populations, and built environment. This thematic program encompasses applying especially ACF's supporting strategies for advocating for the development of green spaces and green infrastructure in both public and private spaces, urban forests, and an ecological network of biodiversity corridors connecting protected areas to facilitate migration of species through the areas and thus maintaining genetic diversity.

- *Coastal Ecosystems:* Aruba's coastal ecosystems are incredibly diverse and play a vital role in the island's ecology, economy, and culture. It encompasses saliña, baranca, beach, dune, mangrove, reef islands and their associated biodiversity. Conserving these coastal ecosystems is essential for maintaining Aruba's biodiversity, supporting its economy through tourism and fisheries, and climate adaptation by protecting against natural disasters like storms and sea-level rise.

- *Marine Ecosystems*: Aruba's marine protected areas include rich and diverse ecosystems, supporting a wide range of marine life, including seagrass meadows, coral reefs, inland bays, lagoons, open sea and their associated biodiversity. Aruba's marine ecosystems supplement the coastal ecosystems and are also invaluable resources that provide ecological, economic, and cultural benefits to the island and its inhabitants. The conservation and long-term sustainability of these highly impacted ecosystems and associated marine species is critical due to their ecological importance, biodiversity, and the ecosystem services they provide.

These thematic priorities encompass interdisciplinary and multi-stakeholder approaches, incorporating socio-economic considerations, community engagement, research, outreach and learning, policy advocacy, and collaboration with conservation partners to address specific challenges and opportunities within the broader conservation landscape.

In forwarding ACF's ambition of nature conservation, intensive and long-term collaboration with government agencies, knowledge institutes, and fellow (specialist) nature NGOs, is crucial for conservation success, and hence these collaborative efforts will eminently be amalgamized and expanded, with ACF fulfilling a supportive role to fellow nature conservation NGOs, as is already the case with the Aruba Birdlife Conservation, Aruba Marine Mammal Foundation, ScubbleBubbles, and Turtugaruba.

Xeric Ecosystems

Aruba's landscape and the majority of the protected areas managed by ACF are predominantly shaped by xeric ecosystems. Effective management and protection of these arid environments are fundamental to preserving the overall integrity of the island's wildlife. These efforts focus on mitigating threats, restoring native habitats, and implementing measures to safeguard the unique biodiversity dependent on these arid landscapes.

Ecological Networks:

The Department of Nature and Environment (*Directie Natuur en Milieu - DNM*) has developed an ecological network map/plan for Aruba, which was introduced in the national spatial plan of 2019. The ecological main structure consists of areas and zones with high ecological, natural, water management, cultural-historical, archaeological, geological, and landscape values (including 'mini-mondi' and biodiversity 'steppingstones'). The zones are important as ecological corridors and connecting these areas. The ecological main structure forms the ecological backbone of the island. No development is desired in the areas of the ecological main structure because this could impair the functioning of the ecological main structure as a whole and thereby affect the individual natural and protected areas. Consequently, no construction is allowed within the areas of the ecological main structure. The adjacent zones are part of the assessment of DNM's 'Build with Nature' policy. In these zones, the emphasis is on realizing or strengthening the ecological corridor function. The map showing the ecological main structure is included as Appendix IV to this document.

The ecological network plan is a significant step in connecting habitats, improving the potential for wildlife to move between them and thereby increasing population viability. Adoption of this plan is crucial, and ACF will play a key role as a partner in advocating for this. The adoption and subsequent execution of the ecological network plan could be integrated into a broader research project, contributing to the long-term sustainability of Aruba's arid ecosystems.

Plants and Vegetation Management & Restoration:

A pivotal step in the preservation of arid ecosystems involves a comprehensive approach to plant and vegetation management. A vegetation map, currently in preparation, will serve as a foundational tool for planning the protection, management, and restoration of threatened and (critically) endangered native plant species and their associated habitats. This initiative will be complemented by a program for growing and planting these species within the protected areas as part of restorative efforts, complete with measures to protect against grazing by animals such as goats. This concerted effort forms part of a broader plant conservation strategy which includes the development of an in-situ greenhouse, and native plants (accredited) botanical gardens, which is integral to an island-wide flora biodiversity action program that includes the other thematic clusters. These actions tie in with the species recovery programs mentioned below and present collaborative opportunities with specialist NGOs like Stimaruba and Ban Lanta y Planta.

Species recovery programs:

For certain highly impacted native and endemic species, species recovery programs have already been developed and are currently being executed based on their status (threatened to critically endangered) in their respective ecosystems. Since 2017 ACF and the Aruba Birdlife Conservation have been executing a Shoco (Aruba burrowing owl) Conservation Program, under guidance of amongst others, Dr David Johnson of the Global Owl Project. This program includes the rehabilitation of injured Shoco, the protection of natural burrows and the placement of in total 400 artificial burrows at different locations all over the island (60 of which have already been realized). A new population study (baseline) still needs to be carried out and a monitoring program needs to be developed.

In 2022, 33 juvenile Yellow-shouldered amazon were illegally trafficked into Aruba, confiscated, and brought under the care of ACF for rehabilitation and reintroduction. The surviving 25 birds were released in January 2024 in Parke Nacional Arikok as the start of the Lora Reintroduction & Conservation Program, under the guidance of the World Parrot Trust (UK/USA) and Vogelpark Avifauna (Netherlands) to establish a viable population once more after a 70-year local extinction. It is estimated that this program takes at least 20 years to complete and will be supplemented with habitat rehabilitation through native plants and vegetation restoration to ensure sufficient food sources. Moreover, Vogelpark Avifauna is exploring the possibilities of developing a European-wide ex-situ breeding program.

A recovery program will additionally be designed for the brown-throated parakeet (Prikichi), whose population has been diminishing due to a combination of threats, including the disappearance of termite nests which it uses to co-nest in. It is essential to gather the necessary data on threats and habitat availability to guide conservation actions. Both the Lora and the Prikichi recovery programs are supported by the World Parrot Trust and Vogelpark Avifauna, amongst other partners.

The Crested bobwhite (Patrishi) is another xeric species that has become rare, together with the Aruba cottontail (Coneu), who share similar habitats and food preferences. As for the ground dwellers, these species are particularly impacted by the disappearance of habitats due to development, unsustainable human activity such as off roading, and invasive and domestic predators such as boa, and feral dogs and cats. For both species population research (baselines) and monitoring data is needed to help guide the design of recovery programs. This also applied to the elusive Hummelinck's vesper mouse.

The Aruba island rattlesnake (Cascabel) is amongst the most endangered snakes in the world and the primary reason for designating Aruba's first protected area, Parke Nacional Arikok (2000). In 2024 the first steps were taken together with Dr. Matt Cross and colleagues from Toledo Zoo (USA), and long-time conservationist Dr. Jeff Goessling for Eckerd College (Florida) to design a Cascabel conservation program to safeguard this species in-situ and re-establish the ex-situ breeding population in the USA, starting with a population and genetics study.

In the past, seven species of bat have been identified in Aruba with numerous studies carried out by experts from Bonaire and Venezuela, supplemented by monitoring carried out by a local volunteer. The aim is to re-establish a monitoring program and implement additional protective actions resulting from the information gathered.

ACF has been carrying out injured wildlife responses, with intensive care carried out by local vets and expert volunteers. ACF covers costs and gives additional support with resources. In 2024 ACF launched its wildlife hotline. The ambition is to develop a Wildlife Conservation & Rehabilitation Center in Parke Nacional Arikok, that aids species recovery programs and allows for in-situ rehabilitation after intensive care.

Invasive Species Control:

Invasive species pose a substantial threat to both terrestrial, coastal, and marine ecosystems on the island. While the issue is acknowledged, effective control and management strategies require commissioned research. This includes advocacy efforts, regulatory measures such as border security, and targeted interventions, particularly in urban areas and certain regions of the protected areas like those affected by neem trees (Azadirachta indica), rubber vine (Cryptostegia grandiflora), and boa constrictor. Identifying and implementing control measures at a national level are essential for mitigating the impact of invasive species on Aruba's delicate ecosystems or

its biodiversity. For ACF, mitigation actions are limited to the protected areas, with early warning towards government and advocacy for prevention considered secondary roles for ACF.

Free Roaming Non-Native Grazers (Goats):

A primary concern within Aruba's arid ecosystems is the presence of free-roaming non-native grazers, particularly goats. The overarching goal is to eliminate their free-roaming status across all protected areas, aligning with the broader initiative of restricting free-roaming practices on the island. Goats are domestic animals that pose a significant threat by damaging ecosystems, leading to the proliferation of non-native thorns that suppress native flora. Addressing this issue is critical to maintaining the balance of Aruba's arid landscapes and preserving the associated fauna. For ACF this entails removing domestic grazers from the protected areas to be able to restore native vegetation for biodiversity recovery.

Feral cats and dogs:

An increasing concern in Aruba is the current proliferation of former pets (cats and dogs) being dumped and left behind to live feral in protected nature areas and beyond. Not only are tourists and local visitors upsettingly confronted with former pets in a deplorable state, dogs and cats are predatory domestic animals that can wreak havoc in nature and highly impact native biodiversity. It is critical to also address this threat to native wildlife and come with long term solutions to this nation-wide issue, for which ACF will take on an advocate role. Removing non-native (domestic/feral) predators from the protected areas will also be a priority.

Communications & Advocacy for Xeric Ecosystems:

Advocacy efforts for Arid Ecosystems in Aruba are essential for raising awareness about the critical importance of these environments and to garner support for conservation initiatives. Advocacy from ACF's end will emphasize the role of arid ecosystems in maintaining biodiversity, highlight the threats posed by free-roaming non-native grazers (particularly goats) and non-native predators, and stress the need for comprehensive plant and vegetation management. Developing collaborative campaigns, engaging both the public and policymakers, are crucial for investigating positive changes in behaviours and policies that contribute to the protection and restoration of Aruba's arid landscapes.

Learning & Outreach:

Educational programs and outreach initiatives are vital to enhance public understanding of arid ecosystems and biodiversity, their ecological significance, and the ongoing conservation efforts. ACF's learning & engagement opportunities will include awareness campaigns, workshops, courses, and educational materials aimed at different - formal and informal - age groups. ACF's outreach efforts will extend to local communities, schools, and businesses, in order to foster a sense of responsibility and engagement in the conservation of arid environments.

Partnerships & Collaboration:

Collaborating with the *Directie Natuur en Milieu* (DNM) on the ecological network map/plan is a primary partnership. Engaging with local and international research institutions, local environmental NGOs for habitat and (flora) species recovery, and community groups is essential for leveraging diverse expertise and resources and fostering a culture of environmental stewardship. Collaboration with government agencies, such as DNM for xeric nature conservation in general, DLVVM for domestic grazer eradication, BCI for feral dogs and cats (and trash/illegal dumping), and the *Dienst Openbare Werken* (DOW – Department of Public Works) for water management and the management of green areas outside of the protected areas, is also important for aligning conservation efforts with legislative and regulatory frameworks. Additionally, partnerships with educational institutions such as *Directie Onderwijs* and the University of Aruba can enhance outreach and learning programs.

Links to Research (Section 7 of this strategic document):

The ecological network plan developed by the DNM presents an opportunity for research integration. ACF's role as a partner in the implementation of the ecological network plan can be linked to broader research projects. Research in this context can focus on assessing the effectiveness of the ecological network in supporting wildlife movement and population viability. Additionally, commissioned research is essential for invasive species control, including studying the impacts of invasive species on arid ecosystems and developing effective management strategies. The ecological network plan and associated research contribute to the evidence-based approach outlined in Section 7 of this document. The knowledge generated from research initiatives informs conservation decisions and will enhance the long-term sustainability of Aruba's arid ecosystems.

Terrestrial Water Management

In the arid landscape of Aruba, water is a critical resource for the terrestrial environment. Numerous of the protected areas managed by ACF contain (parts of Aruba's) watershed systems, including Parke Nacional Arikok. This entails a strategic approach to terrestrial water management, especially in view of climate change, and specifically focussing on its pivotal role in sustaining the island's ecosystems. The overarching focus is on developing systems that retain more water, mitigate extreme weather impacts, and optimise existing water bodies and wetlands for biodiversity, and preventing run off into the ocean, smothering the fringing mangrove forests, seagrass meadows, and coral reefs. Addressing these issues is essential for enhancing water resilience, a key component of Aruba's environmental sustainability. Learning from the experiences and practices of neighbouring islands, such as Curaçao and Bonaire, is crucial in shaping effective water management strategies within the protected areas to increase the integrity of these areas. Drawing inspiration from successful initiatives in similar arid environments can inform the development of tailored approaches suited to Aruba's unique landscape and environmental conditions.

Retaining as Much Water on Land as Possible:

A primary priority in terrestrial water management is the retention of water on land, mitigating its loss from the island. This strategic approach will be incorporated into both the terrestrial and coastal PACMPs and aims to maximize water availability for local ecosystems. ACF will restore dams and tanki and develop systems that encourage water retention for biodiversity conservation in protected areas, and where possible advocate for such beyond the protected areas. By developing an integrated water management, the government of Aruba can enhance its overall water sustainability and ecological resilience.

Managing the Rooi Systems:

The management of water flows by ACF in rooi systems within protected areas is centred on a targeted effort to retain and slow down the movement of water during extreme weather events. Slowing water flows is essential for preventing erosion and facilitating more effective water absorption by the soil. This approach contributes to the overall resilience of terrestrial ecosystems, particularly in areas prone to rapid water runoff, such as in the Arikok National Park. ACF will facilitate research initiatives, followed by field experiments within the protected areas, and will explore traditional methods for ecosystem restoration, including the (re)introduction of 'riparian' zones. This approach aims to enhance the functionality of rooi systems, contributing to improved water management and ecosystem health. This also represents a nature-based solution which could also contribute to the national ecological network, steppingstones and mini-mondi, acting as biodiversity hotspots, while offering wider benefits to the island by delivering a range of regulating ecosystem services. Collaboration with DOW and DNM will be important to advocate for national policy development.

Managing the Saliñas:

Saliñas or salt pans have a unique role in Aruba's terrestrial water dynamics as well as having great cultural, historical, and archaeological significance. ACF currently manages 5 saliñas (Western Wetlands) for which a conservation action plan will be developed in 2025 for a 5-year term. Baseline research into these saliñas is important for understanding their ecological significance and potential contributions to water management, and to inform strategies for their restoration and sustainable use as they also offer nature-based solutions delivering regulating ecosystem services for flooding and water management.

Maintain, Restore, Extend, Create More Dams and Tanki:

The maintenance of existing dams and creation of new tanki, small artificial freshwater bodies, is critical for terrestrial water management. This involves a comprehensive approach to maintaining

existing dams and tanki and restoring those in need within the protected areas. These dams and tanki serve as vital habitats and contribute to the ecological network, acting as 'mini wildlife hotspots'. The strategic creation of new ones should accompany research into the role of dams and tanki in the protected areas but also the potential for the ecological network, thereby building on existing understanding. Such research is necessary to inform future conservation strategy and contribute to the integration of dams and tanki into broader ecological planning.

Multi-Use Management: Nature based Solutions(NbS) / Ecosystem Services:

Emphasizing multi-use management considers the diverse ecosystem services and NbS provided by water bodies. Beyond supporting biodiversity, these water bodies contribute to various services such as recreation, and water supply beyond protected areas. Incorporating these services into national management strategies ensures a holistic and sustainable approach to terrestrial water management for which ACF will be advocating for.

Watershed associated native species conservation:

Baseline studies will provide initial data for species action plans, including protection and habitat restoration - for both the native four-eyed frog (*Dori*) and for the different species of mollies (*Poecilia*) – which are considered increasingly rare. These species action plans will be developed in sync with the water management of dam, rooi, and saliña within the protected areas. The baselines carried out for the Western Wetlands will identify additional species to be monitored, including sentinel species for monitoring water quality and habitat health.

Invasive species management:

Fresh water attracts wildlife, including invasives and hence, invasive species management such as for boa constrictor and cane toad should be incorporated into the conservation actions. Moreover, water bodies are increasingly impacted by the invasive water hyacinth and dumped exotic pets such as red-eared and yellow-eared sliders (terrapins).

Communications & Advocacy for Terrestrial Water Management:

ACF's advocacy efforts for Terrestrial Water Management in Aruba will focus on raising awareness about the critical role of water in sustaining the island's ecosystems. This includes advocating for the implementation of strategic approaches for retaining water on land, managing rooi systems, maintaining saliñas and creating and managing dams and tanki. Advocacy is crucial for promoting the importance of these initiatives for ecological resilience, water sustainability, and overall environmental health. Possibly developing collaborative campaigns involving stakeholders, policymakers, and the public could help build support and understanding of the significance of water management for Aruba's arid landscape.

Learning & Outreach:

ACF's learning and outreach programs will aim to educate the public, communities, and relevant stakeholders about the importance of terrestrial water management. Workshops, educational materials, and community engagement activities will be designed to enhance understanding of water-related initiatives, such as the management of rooi systems, saliñas, dams and tanki. Outreach efforts will also include sharing experiences and lessons learned from neighbouring islands like Curacao and Bonaire, fostering a knowledge exchange that informs Aruba's tailored water management strategies.

Partnerships & Collaboration:

ACF will collaborate with local and international partners for successful terrestrial water management within protected areas. Partnerships with governmental agencies, in particular the *Dienst Openbare Werken* (DOW – Department of Public Works) whose operational activities can be focussed on specific water management related activities, the *Directie Natuur en Milieu* (DNM)

and research institutions are essential for leveraging expertise and resources, but also for aligning strategies within the protected areas with strategies for the watershed systems beyond the protected areas. Such interdisciplinary collaboration could open the door to NbS that can deliver a variety of ecosystem services. Collaborating with neighbouring islands, particularly Curacao and Bonaire, will provide valuable insights into successful water management practices in similar arid environments. Engaging with local communities and businesses is vital for garnering support and participation in water conservation initiatives.

Links to Research (Section 7 of this strategic document):

Research is integral to the success of terrestrial water management initiatives outlined in the strategy. The research on rooi systems, including traditional methods for ecosystem restoration and the (re)introduction of 'riparian' zones, aligns with the strategy's emphasis on evidence-based approaches. Additionally, research into saliñas contributes to understanding their ecological significance and informs strategies for sustainable use and preservation. The creation and management of dam and tanki should be informed by research into their role in the ecological network, building on existing understanding and contributing to broader ecological planning. These research efforts align with the strategy's commitment to an evidence-based conservation approach, ensuring that water management strategies are grounded in scientific knowledge and best practices, and support and restore native biodiversity.

Urban/Metropolitan

Aruba is experiencing increasing urbanization in several ways, driven by tourism growth, population expansion, and infrastructure development. This means that the protected areas and specific populations of native species are increasingly at risk of becoming isolated from each other, which could ultimately impact the health and resilience of both biodiversity and ecosystem functioning – both within the protected areas and beyond, as pockets and ribbons of connective mondi offering corridors for species of native flora and fauna are increasingly cleared to make way for development. There is a growing global movement to integrate nature into urban and suburban areas, often referred to as "urban greening," "nature-based solutions," or "biophilic urbanism." This movement aims to create more sustainable, liveable cities while supporting biodiversity and ecosystem health, with strategies such as: Creating green corridors with native plants to connect urban and wild spaces and protected areas; Designing sponge city elements like rain gardens to manage stormwater; Promoting urban reforestation with native drought-resistant trees; Encouraging community-led greening projects in neighbourhoods; and protecting urban wetlands to support biodiversity.

Integrating nature into urban/metropolitan areas requires a multifaceted approach involving the creation and maintenance of green spaces, sustainable infrastructure, community engagement, and supportive policies. These efforts not only enhance the aesthetic and recreational value of urban environments but also promote native biodiversity, improve public health, decrease the 'heat island' effect, combat flooding, and contribute to the overall sustainability of cities.

With significant and ever-increasing growth in built development Aruba faces the challenges of balancing urban expansion with the preservation of its unique island biodiversity. The pressing issues associated with urban and metropolitan areas, call for the implementation of sustainable practices to maintain ecological integrity amidst rapid development. Critical to this effort is the creation of green and blue infrastructure, fostering native biodiversity and integrating nature positive principles into management approaches for both existing and future urban/metropolitan areas. ACF will collaborate with government agencies and local NGOs and advocate for NbS within the existing urban landscape and the incorporation of these and additional strategies within new designs and development projects as follows:

Creation of Corridors and Biodiversity Hotspots:

Connective features help sustain ecological processes, facilitate wildlife movement, and promote biodiversity within urban areas. Aiming to counteract the fragmentation caused by urban development, the integration and creation of blue and green infrastructure corridors and biodiversity hotspots within urban areas is therefore a key priority. This involves the incorporation of water bodies (including tanki), parks, and green spaces into the urban landscape, promoting biodiversity, providing recreational spaces, and mitigating the impact of urbanization on Aruba's natural environment. Providing habitats such as birdhouses, bat boxes, and insect hotels can support urban wildlife.

Principles to be Integrated by Management Agencies:

Management agencies play a pivotal role in steering the development and maintenance of urban areas. The integration of urban nature conservation principles by these agencies, guiding both the management of existing urban spaces and the design and future management of new build areas, including hotel developments is a key requirement. Sustainable practices are essential for striking a balance between development and environmental preservation.

Native Species Gardens:

Integration of this theme involves the establishment of both public and private native species gardens within urban/metropolitan areas. These serve as educational and advocacy tools,

promoting the importance of preserving native plant species. Partnership with local/specialized NGOs will enhance the outreach and impact of these initiatives, fostering a broader understanding and appreciation for Aruba's unique flora within urban communities. Such native species gardens will additionally support pollinators such as bees, butterflies and (humming)birds, but attention will also be given to the conservation of the four-eyed frog (Dori) and the Aruba cat-eyed snake (Santanero) in urban/metropolitan settings.

Managing invasive and feral domestic species:

ACF will advocate for the management of free roaming non-native predators such as boa constrictor, dogs and cats can be a major threat to nature conservation in urban/metropolitan areas and will need to be managed for impact. Increasingly, flocks of feral chickens are becoming a nuisance and impacting native biodiversity.

Communications & Advocacy for Nature-inclusive Urban Development:

Advocacy efforts for urban/metropolitan nature conservation will focus on promoting the adoption of sustainable practices in green urban planning and development. This includes advocating for the creation of green, blue and sustainable infrastructure, and reducing pollution (including light pollution), the integration of connective features like corridors and biodiversity hotspots, and the implementation of nature-positive principles by management agencies. Developing a clear position statement will reinforce the commitment to balancing urban growth with environmental conservation. This advocacy effort aims to influence policies, promote responsible urban planning, and garner support for sustainable practices within the community and among stakeholders, such as for redesigning and increasing green spaces alongside road systems, walkways and cycle paths (verges), and landscaping op administrative properties and public spaces such as parks to include native plant species that support and recover biodiversity but also present numerous opportunities for NbS that benefit both nature and people.

Learning & Outreach:

Learning and outreach programs should emphasize the importance of green and blue infrastructure in urban areas and the role of connective features in sustaining biodiversity. ACF will develop educational initiatives that will target local communities, schools, and urban planning professionals. Outreach efforts will include ‘restoration events’, workshops, awareness campaigns, citizen science (i.e. for monitoring), and educational materials that highlight the benefits of native species gardens and the integration of urban nature conservation principles. Learning from successful urban conservation practices in other regions can inform Aruba's approach to sustainable urban development.

Partnerships & Collaboration:

Collaboration with local management agencies, urban planners, and governmental bodies is crucial for the successful implementation of urban conservation initiatives. Partnerships with expert NGOs such as Ban Lanta Y Planta and StimAruba will be essential in achieving the outreach and impact of the native species gardens initiative. Collaborating with regional and international organizations that have experience in urban conservation provides will valuable insights and best practices for Aruba's context.

Links to Research (Section 7 of this strategic document):

The development and integration of urban nature conservation principles, including the creation of green infrastructure and biodiversity hotspots, align with the strategy's emphasis on evidence-based approaches. Research into the ecological impact of urbanization, the effectiveness of green infrastructure, and the benefits of connective features and corridor functions can inform urban planning and conservation strategies. The integration of this theme with ACF’s Flora Biodiversity Enhancement Programme for protected areas underscores the importance of research to inform

the establishment of native species gardens and their impact on urban biodiversity. Developing a position statement through advocacy efforts contributes to the overall goal of influencing policies and urban planning decisions based on sound research and conservation principles.

Coastal Ecosystems

Aruba's coastal zone consisting of a rocky (rock-pool laden) windward coastline, saliñas, beaches, dunes, and reef islands, are fringed on the leeward side with diminishing patches of mangroves. This is a high-activity zone and the prime space for tourism and related coastal development and recreation.

Aruba's coastal protected areas face several nature and environmental conservation challenges, exacerbated by both natural processes and human activities, with some of the key challenges being coastal erosion and habitat loss, land-based sources of pollution and marine debris, and climate change impacts, but also lack of effective management and enforcement, with insufficient regulatory frameworks and enforcement mechanisms hindering effective conservation and management of coastal resources.

ACF will undertake habitat restoration projects for saliñas and mangroves and execute beach and dune stabilization actions within the coastal protected areas according to nature-based solutions.

Habitats

Saliña: the five saliñas of the Western Wetlands support a highly specialized set of life adapted to saline conditions. Plants typically are salt-tolerant, while the marshes provide vital food and habitat for insects such as butterflies and dragonflies, reptiles such as lizards and the Aruba cat-eyed snake (Santanero), mammals such as bats, juvenile fish, bivalves such as mussels and clams, and crustaceans such as fiddler crabs and land crabs, as well as offering shelter and nesting sites for resident and migratory species of birds. Two of the five wetlands (known as the Western Wetlands), managed by ACF are internationally recognized as Key Biodiversity Areas (KBAs) and Important Bird and Biodiversity Areas (IBAs), namely: Bubaliplas and Saliña Druif. The five Saliñas of the Western Wetlands provide food and habitat to numerous species of fauna, and Bubali alone is home to over 200 species of birds. These and other natural values have resulted in the Western Wetlands being designated as a Ramsar area in 2023. As part of the Western Wetlands project, ACF aims to restore the watershed, health, and connectivity of these saliñas and in the process support biodiversity. Baseline studies and post-intervention monitoring are essential for effective management. Fiddler crab populations will be protected and monitored, and sentinel species will additionally provide crucial information on ecosystem quality and dynamics. ACF will also advocate for the protection of the 'Tera Cora' saliña area behind the Tierra del Sol resort and residence.

Beaches and Dunes: these incredibly fragile and valuable ecosystems play a crucial role in coastal ecosystems, especially in the Caribbean. Beaches and dunes provide numerous ecosystem services, including shoreline stabilization, storm protection, and erosion control. Healthy dune systems act as natural barriers against storm surges and high tides, protecting coastal communities and infrastructure from damage, especially in the face of climate change. Conserving these natural features is essential for building resilience to the impacts of climate change in the Caribbean.

These coastal habitats support a diverse array of flora and fauna, including nesting sites for endangered sea turtles, migratory birds, and unique plant species. Preservation of these habitats is essential for maintaining Aruba's biodiversity and ensuring the survival of numerous species.

Moreover, beaches and dunes hold cultural significance for many Caribbean communities such as Aruba, serving as gathering places, sources of inspiration, and sites for traditional

activities such as fishing and beachcombing. Protecting these areas helps preserve cultural heritage and traditional practices.

However, Aruba's stunning beaches are a major draw for tourists, contributing significantly to the island's economy. ACFs conservation efforts should help to protect, maintain, and restore the natural beauty and integrity of Aruba's protected beaches and dunes and associated biodiversity, ensuring their appeal to visitors for generations to come.

Coastal Mangroves: Coastal mangroves, vital for mitigating the effects of climate change - including storm surges and sea-level rise - and supporting diverse marine life, require ongoing protection and management, especially in the Aruban context in which they and their associated biodiversity is heavily impacted by unregulated anthropogenic activities. As part of fundamental conservation management, ACF's legislated regulatory and enforcement role is pivotal in safeguarding these areas, ensuring their resilience and continued contribution to Aruba's coastal ecosystems.

Moreover, ACF has partnered with the University of Wageningen in the Netherlands, the University of Aruba, and ScubbleBubbles in a joint (Resembid-funded) project for restoring corals (see next section) and mangroves. For mangrove restoration, the focus in first instance is on restoring the waterflow and quality by adding silt traps to prevent a higher than healthy influx of sediment into the different lagoon and coastal mangrove forests, such as Spaans Lagoen and Isla di Oro. Once proven effective, this method will be applied to the restoration of the mangrove system at Mangel Halto and other identified restoration areas.

Species

Tern habitat conservation (reef islands and the coastal salt spray zone): the rocky salt spray (windward) coast of Aruba, and in particular the San Nicolas bays and islets, are unique within the Caribbean and most probably the world. Every year, 25.000 terns return to the San Nicolas Bay Reef Islands. 10.000 pairs reproduce and secure their offspring on these very vulnerable islets. 16 species of terns are seen in North America every year, and 10 of the 16 species breed on Aruba's reef islands. Aruba is the only place in the world where 10 species of terns gather. While other places around the globe may have four or five species converging, nowhere else has 10 species. In 2009 San Nicolas Bay contained approximately 25% of the world's population of Cayenne terns, over 90% of the Caribbean population of common terns, and 25% of the Caribbean's black noddy. Tern expert Dr Adrian Delnevo has been guiding ACF in tern conservation and habitat protection initiatives, supported by Vogelbescherming Nederland (who also provide resources for the Aruba burrowing owl and Yellow-shouldered amazon conservation).

Communications & Advocacy for Coastal Conservation:

The above stated challenges will need to be addressed through a combination of regulatory, community-based, and scientific approaches, with conflict resolution playing a role in mediation and consensus building through dialogue and negotiation in ensuring the sustainability of coastal ecosystems, their resilience and health, for future generations of locals and tourists.

Mitigation and conservation strategies that Aruba can adopt to address these challenges include:

Integrated Coastal Zone Management Plan: ACF will advocate for the development and implementation of a comprehensive, national coastal zone management plan that integrates conservation, sustainable development, and climate adaptation.

Sustainable Tourism Practices: ACF will promote eco-conscious tourism and eco-friendly tourism practices, advice and help develop guidelines to minimize the environmental footprint of tourism and drive sustainability to an end vision of regenerative tourism, which is the least impactful.

Pollution Control Measures: ACF will advocate for more effective waste management systems, the improvement of sewage treatment facilities, and the implementation of stricter regulations on the use of pesticides, insecticides and herbicides, agricultural runoff (fertilizers) and industrial discharges – all of which impact the integrity of nature, including in protected areas.

Learning & Outreach:

ACF will develop educational materials and programs to engage and involve local communities and tourists in conservation efforts (saliña and mangrove restoration; coastal clean-ups and beach and dune stabilization) and raising awareness about the importance of protecting coastal environments and biodiversity.

By protecting the social and breeding areas of the terns visiting Aruba and educating the public (also on sustainable behaviours), the community will have an increase in knowledge and appreciation of local biodiversity and conservation efforts. This will create a positive and nature-inclusive image of Aruba and serve as an example of sustainability.

The saliña and mangrove areas, and tern populations around Baby Beach, could become an additional attraction for ecotourism, birders, and photographers, if proper mitigation is put in place, such as barriers and signage for staying at a safe distance, and ideally accompanied by ACF rangers and certified tour operators.

Other Partnerships & Collaboration:

Considering the strong link with tourism and development, key conservation partners will include relevant government departments such as DIP and DOW, and especially the Aruba Tourism Authority (ATA), the Aruba Hotel and Tourism Association (AHATA), the Association of Tour Operators Aruba (ATOA), but also the Aruba Airport Authority and the Aruba Ports Authority.

Links to Research (Section 7 of this strategic document):

Support scientific research and establish monitoring programs to track targeted species and environmental changes and assess the effectiveness of conservation measures.

Besides ongoing monitoring for fundamental conservation, sentinel species for saliñas, beaches and dunes, and mangroves, will be identified for developing monitoring programs.

The monitoring and regular maintenance of the San Nicolas Tern Islands (to clear invasive species) and the coastal salt spray zone (to reduce disturbance), both critical breeding grounds for terns, are essential. Sensitivity during breeding times and effective communication practices will ensure the preservation of these seabird colonies in their natural habitats.

Marine Ecosystems

Aruba's marine environments harbour a rich array of habitats, from coral reefs and seagrass beds to lagoons, inland bays, and open ocean – parts of which occur within the marine protected areas (MPAs) managed by ACF. These ecosystems are home to diverse marine life, including crucial breeding grounds for sea turtles, marine mammals, sharks, and rays (and together with the internationally significant seabird colonies they are known as 'marine megafauna'). However, these habitats face escalating threats, including invasive species, sea-level rise, coastal development, coral diseases, and the tourism industry. Here we address the pressing issues impacting the naturally connected marine environment both within and beyond the MPAs, highlighting the need for research, regulatory measures, restoration efforts, and advocacy to ensure the long-term health and resilience of Aruba's marine ecosystems.

Habitats

Seagrass: With a regulatory/enforcement role, ACF is already actively involved in seagrass management. Research is imperative for understanding restoration techniques, monitoring, and addressing invasive species. Collaboration with ongoing efforts on Bonaire will enhance the effectiveness of both in-situ and ex-situ seagrass conservation through ACF's Marine Conservation Center, contributing to the overall health of Aruba's marine environment.

Corals: Ongoing ex-situ propagation of specific coral species is underway, and there is a need to expand nursery facilities in the short to medium term as well as develop an ex-situ coral conservation facility. This expansion aligns with the upscaling of relevant projects and integrates with an island-wide marine park but also addresses the pressing need for urgent action in the face of increasing coral bleaching events and stony coral tissue loss disease (SCTLD) that has recently decimated Aruba's healthy corals. Collaboration with the ScubbleBubbles Foundation and the University of Aruba is crucial for successful implementation.

Through tandem restoration efforts for the mangroves, seagrass meadows, and coral reefs of Aruba, ACF and its conservation partners can make significant contributions to biodiversity and ecosystem restoration, that also as part of Nature-based solutions help Aruba with climate change adaptation through coastal protection.

Species

Several species are important to marine conservation and the details of the relevant research are include in section 7. Of particular importance are:

Long-spined Sea Urchins (*Diadema antillarum*), Queen Conch (*Strombus giganteus*) and other keystone marine invertebrates: which are integral to seagrass and coral ecosystems.

Marine Mammals and Sea Turtles: Several dolphin species breed in Aruban waters and their protection is becoming more complex with the increase in marine-based recreation. Moreover, coastal development is impacting sea turtle nesting habitat. ACF will continue to actively support and collaborate with the Aruba Marine Mammal Foundation and Turtugaruba in their conservation efforts, both within the protected areas and beyond.

Sharks and Rays (Elasmobranchs): Declining reef health, the loss of reef fish and specific fishing practices pose significant threats to sharks and rays in Aruban waters. ACF will support necessary research to learn more about shark and ray populations and how best to conserve them.

Communications & Advocacy for Marine Conservation:

ACF's advocacy efforts for Marine Conservation in Aruba should emphasize the urgent need for research, regulatory measures, restoration efforts, and community engagement to safeguard these vital ecosystems. Advocacy is required to raise awareness about the escalating threats

facing marine and coastal environments, including invasive species, sea-level rise, coastal development and coral diseases. Tourism also impacts heavily on the marine environment and increased awareness is a step in reducing those impacts. Stakeholder engagement, public awareness campaigns and collaboration with policymakers are crucial components of advocacy to garner support for the sustainable management and preservation of Aruba's marine ecosystems.

Learning & Outreach:

ACF's learning and outreach programs will focus on educating the public, local communities, and relevant stakeholders about the importance of marine and coastal conservation. Awareness campaigns, workshops, and educational materials will emphasize the significance of seagrass, corals, coastal mangroves, and breeding grounds like the Tern (reef) Islands and the Salt spray area of the windward coastline. Outreach efforts will also highlight the crucial role of specific species like sea urchins, conch, and sharks in maintaining the health of marine ecosystems. Collaboration with schools, community groups, and businesses is essential to foster a sense of responsibility and engagement in the preservation of Aruba's marine and coastal environments.

Partnerships & Collaboration:

Collaboration with research institutions, NGOs, the tourism industry, and governmental bodies is crucial for the success of ACF's marine and coastal conservation initiatives. DIP, DOW and DNM will play an important role in mangrove management, including on the protected reef islands. Partnerships with organizations involved in mangrove and seagrass conservation on Bonaire and collaborations with the Scubblebubbles organization for coral conservation are essential. Collaborating with the Aruba Marine Mammal Foundation and other marine-focused NGOs strengthens research efforts related to marine mammals and sharks. Engaging with local communities and businesses enhances the impact of outreach and educational programs, fostering a collective commitment to the preservation of Aruba's marine and coastal ecosystems.

Links to Research (Section 7 of this strategic document):

Research is integral to addressing the pressing issues in marine and coastal conservation outlined in the strategy. Research on seagrass restoration, shark conservation, invasive species monitoring, and coral propagation, and ongoing and expanded research into the ecological roles of sea urchins and conch contributes to the sustainable management of seagrass and coral ecosystems. Research collaboration with the Aruba Marine Mammal Foundation on dolphins will enhance understanding and (the collaborative) conservation efforts for these species. Advocacy efforts are strengthened by research findings, providing a scientific basis for raising awareness, influencing policies, and gaining support for the sustainable management of Aruba's marine and coastal environments.

7. ACF's Research and Monitoring Priorities for 2024-2033

The development of a robust Research and Monitoring Action Plan by ACF is paramount for developing nature intelligence and guiding the successful implementation of conservation strategies for the protected areas and native species managed by ACF. This section outlines key research areas and monitoring initiatives critical to understanding and preserving the island's diverse ecosystems. The Protected Areas Conservation Management Plans (PACMPs) and associated action plans will be developed not only to address terrestrial, coastal, and marine related conservation actions but will also help to address knowledge gaps and serve as a collaborative platform, engaging research institutions, partners from Aruba and neighbouring Caribbean islands and other stakeholders. By linking research outcomes to pressing conservation needs, a yet to be developed research and monitoring plan for the protected areas and beyond will inform evidence-based decision-making and foster sustainable practices for the long-term protection of Aruba's biodiversity. Integrating research findings with pressures and threats will provide a holistic understanding of the challenges faced by Aruba's biodiversity. This linkage informs targeted conservation strategies to address specific threats and enhance the overall resilience of ecosystems and their associated biodiversity.

ACF's research and monitoring priorities primarily focus on ecosystems and biodiversity within the protected areas but may go beyond where official permits are granted, as for example would be the case for populations studies or charting the distribution of threats and their influence on the natural integrity of the protected areas and their biodiversity.

Species group studies

Such work will provide data and information to support the broader aims and objectives of this conservation framework, from which species action plans will be developed. It focusses on particularly important groups in the Aruban context.

Corals – State, Diversity and Abundance: Monitoring the health of is coral reefs regularly is essential to understand the ecological functioning as well as the health of individual coral species populations and susceptibility to anthropogenic pressures or disease. Following the Global Coral Reef Monitoring Network (GCRMN) Guidelines for coral monitoring several key sites are monitored every 2 years for the six elements of the coral reef ecosystem – (1) abundance and biomass of key reef fish taxa, (2) relative cover of reef-building organisms (corals, coralline algae) and their dominant competitors, (3) assessment of coral health and (4) recruitment of reef-building corals and recruit habitat, (5) abundance of key macro-invertebrate species, and (6) water quality. These elements provide an overview of the current condition of the coral reef ecosystem as well as an indication of likely future trajectories. Besides this structured monitoring additional research can contribute to restoration strategies, genetic assessments for efficient gene banking as coral reserves, historic presence of coral reefs and coral species to guide restoration efforts. Additionally, research is needed on offshore marine ecosystems, including deep sea corals, as this remains uncharted territory for Aruba.

Seagrass meadows: Monitoring the cover, species composition and health of seagrass and associated species is essential to understand the ecological functioning. The effectiveness of seagrass conservation measures can be monitored and adapted by comparing monitoring results over time. The extent and potential mitigations of the invasive seagrass species *Halophila stipulacea* is to be identified through specific research.

Bird Monitoring – Diversity and Abundance: Monitoring bird diversity and abundance, especially in lava rock formation areas and limestone terraces, is essential for understanding avian ecology. This research aims to provide insights into the distribution of bird species across different ecosystems in protected areas, contributing to the overall biodiversity assessment of Aruba.

Tern Conservation: How to stabilize reef islands' dynamic shorelines and increase the quality of the breeding grounds for the terns breeding on the San Nicolas Reef Islands.

Tern Nest Monitoring: Monitoring nest abundance for all tern species on San Nicolas Reef Islands and along the windward coast will give information as to population dynamics and environmental impacts.

Bats and Caves: Monitoring the seven bat species in numerous caves, some with public access, is crucial. With archaeological remains and island-wide importance, ongoing monitoring evaluates the effects of conservation measures, particularly in managing access. Utilizing existing research outcomes through metanalysis enhances the understanding of bat populations and their ecological significance.

Rare flora species inventory: Mapping of rare flora species inside and outside the protected areas in order to have source material for propagation. It is also important to track in which seasons each flora species of interest produces seeds.

Population and Distribution of Mollies (*Poecilia*): Conducting research on the population size and distribution of native fish species, particularly the freshwater mollies, is crucial amid increasing pressures from tourism, urbanization, and agriculture. Ensuring the survival of these unique native species requires strategic conservation measures based on comprehensive research.

Invertebrate Blitz Survey: The initiation of a blitz survey for invertebrates, engaging a group of experts in the field to intensively sample defined areas and locations for key species groups (dragonflies, butterflies, spiders, bees, and wasps, etc), starting with terrestrial and later expanding to aquatic environments, will provide insights into the diverse array of (largely under-studied) invertebrate species. This research will contribute to understanding the role of invertebrates in diverse ecosystems, their responses to environmental pressures and more particularly their role as indicators of environmental change.

Sharks and Rays (Elasmobranchs): Declining reef health, the loss of reef fish and certain fishing practices pose significant threats to sharks in Aruban waters. Research initiatives, including monitoring habitat use and abundance of certain species of shark through tagging and tracking, are essential for understanding and mitigating these threats. ACF aims to play a crucial role in these efforts and also in research into populations of rays.

Species specific studies

These initiatives all aim to inform individual conservation plans to protect populations of the following species and their specific habitats. Research revolves around assessment of the population size and distribution of species, pressures and threats and conservation measures:

Aruba Island Rattlesnake (*Crotalus unicolor* - Cascabel): Building on previous work to ensure its future survival in its natural habitat.

Dori (*Pleurodema brachyops*): The native Aruban frog species, threatened by invasives and with little knowledge about it.

Aruba Cottontail (*Sylvilagus floridanus nigronuchalis* – Coneu) and Hummelinck's Vesper Mouse (*Calomys hummelincki*): Both species are declining, especially the vesper mouse, and research is

needed to contribute to the overall understanding and their management in protected areas and on the rest of the island.

Crested Bobwhite (*Colinus cristatus* - Patrishi), Scaly Naped Pigeon (*Patagioenas squamosa*) and Rufous Collared Sparrow (*Zonotrichia capensis*): Research can contribute to avian conservation efforts on Aruba for these particular scarce, threatened and likely locally extinct species.

Aruba Burrowing Owl (*Athene cunicularia arubensis* - Shoco): As well as the above aims, this research will specifically evaluate the use of artificial burrows, linked to breeding success and carrying capacity of the burrowing owl on the island.

Yellow-shouldered Amazon Parrot (*Amazona barbadensis* - Lora) and Brown-throated Parakeet (*Eupsittula pertinax arubensis* – Prikichi): population dynamics and survivability. Additionally, assessing the ecosystem carrying capacity for these species is vital for their conservation. This research informs measures to sustain these bird species and their habitats.

Long-spined Sea Urchin (*Diadema antillarum*) and Queen Conch (*Strombus giganteus* - Calco): which are integral to seagrass and coral ecosystems, require dedicated research and breeding programs. Collaborations with NGOs and research institutes are essential to better understand their ecological roles and implement measures to counteract threats, including invasive species, ensuring the sustainability of these vital marine components.

Invasive species – e.g. Cane Toad (*Rhinella marina* - Sapo), Boa Constrictor (*Boa constrictor*), Tilapia (probably *Oreochromis mossambicus*), *Lionfish (Pterois volitans/miles), Halophila stipulacea* seagrass and Buffel Grass (*Cenchrus ciliaris*) – to name but a few: Creating an overview of invasive species for Aruba and carrying out research on emerging and established invasive species and the monitoring thereof (including goats, dogs and cats in protected areas) is vital in order to investigate their impact on native species and ecosystems, to inform strategies for control and management to mitigate the threats posed by these invasives to native biodiversity and ecosystems.

Sentinel Species: Organisms need to be identified and used to monitor the health of an ecosystem, particularly in relation to environmental changes, pollution, or emerging threats. These species are sensitive to changes and can serve as indicators of the overall condition of the environment. Sentinel species in Aruba may include plants, birds, reptiles, and amphibians connected to specific habitats as an early warning indicator, freshwater fish (mollies), corals and reef fishes, and invertebrates such as dragonfly (larvae).

National studies

ACF will advocate and collaborate with relevant parties for the below list of studies, not only within the protected areas but also beyond (at a national level), in so far as such is relevant not only for biodiversity and ecosystems managed by ACF, but where it affects the integrity of the natural values.

Erosion and Runoff (Threats / Meta-analysis): Addressing the threat of erosion and runoff involves a comprehensive meta-analysis to understand the patterns, causes, and potential mitigations. This analytical approach informs targeted interventions and management strategies to minimize the impact of erosion and runoff on both Aruba's terrestrial and marine environments.

Develop a National Soil Map (Meta-analysis): a national soil map provides essential information for designing and implementing effective conservation strategies that protect and restore natural ecosystems, promote sustainable land management practices, and mitigate environmental threats. Soil types directly influence the types of vegetation that can grow in an area, which in

turn affects the habitat suitability for various plant and animal species. By understanding the distribution of different soil types across a country, conservationists can better predict where certain species are likely to thrive and prioritize those areas for protection.

Develop a National Vegetation Map (Terrestrial): The last vegetation study was done in Aruba in late 1990s, by John de Freitas of Carmabi. This vegetation report is in the process of being completed and a new, updated map (which includes the protected areas) is being developed as a collaborative effort between ACF, Wageningen University & Research (WUR) and Carmabi. This vegetation map will be the basis for further studies on the sustainability of species populations and will be able to show the change in vegetation over a +/- 30-year period. The knowledge will be important for national reporting obligations on biodiversity conventions like the CBD, Ramsar and Cartagena. This map will also be important for the development of a vision towards a nature-inclusive economic development of Aruba – a project planned for 2023-2025.

Develop National Ecosystem Map (Terrestrial/Marine): Creating a comprehensive national ecosystem map for both terrestrial and marine environments serve as a foundational tool for conservation planning. This initiative contributes to understanding the spatial distribution of ecosystems and their connectivity.

Develop National Biodiversity Map based on Selected Species (Terrestrial/Marine): Developing a biodiversity map based on selected species, ranging from birds to marine life, facilitates a targeted approach to conservation. This map provides a visual representation of key species and their habitats, informing conservation priorities and initiatives.

State of Nature Report (Meta-analysis):
State of Nature reports play a crucial role in guiding conservation efforts by providing a structured and regular comprehensive and comparative assessment of the island's biodiversity. Such reports serve as valuable tools for informing policy, informing decision-making processes, raising public awareness, and monitoring progress towards conservation goals both within and beyond the protected areas.

Ecological Carrying Capacity (Meta-analysis): for the entire island and for the protected areas specifically, this assessment aims to determine the maximum population size or level of human activity that an ecosystem or particular area can support over the long term without suffering significant degradation or loss of ecological integrity.

Potential of NbS for climate change adaptation: in order to increase resilience to climate change, extensive research is needed on the possibilities of NbS, to improve understanding of their effectiveness, and to develop innovative, local practices, which can also be incorporated into the conservation management of protected areas.

Shifting baselines and local attitudes towards nature (social science/Meta-analysis): ACF will advocate for conducting a study to chart the changes of perception over time towards nature and the environment and what is considered "normal" or "natural". Uncovering, recognizing, and addressing shifting baselines can help make ACF's conservation efforts more effective.

Glossary

Adaptive management: also known as adaptive resource management or adaptive environmental assessment and management, is a structured, iterative process of robust decision making in the face of uncertainty, with an aim to reducing uncertainty over time via system monitoring.

Biodiversity: Biological diversity" means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.

Biodiversity hotspot: hotspots of biodiversity refer to bio-geographic regions where significant levels of biodiversity with richness and unusual concentration of endemic species are found. Across the world, 36 areas are marked as hotspots of biodiversity, representing approximately 2.3 percent of the Earth's land surface, and supporting more than half of the world's endemic plant species and almost half of birds, mammals, reptiles, and amphibians as endemic – all threatened with exploitation and destruction. Aruba is included in the Caribbean Islands Biodiversity Hotspot.

Biome: a biome is a specific geographic area notable for the species living there. A biome can be made up of many ecosystems. Not all scientists classify biomes in the same way. Some use broad classifications and count as few as six biomes: forest, grassland, freshwater, marine, desert, and tundra. Other scientists use more precise classifications and list dozens of different biomes.

Biosphere: the biosphere, also known as the ecosphere, is the worldwide sum of all ecosystems. It can also be termed the zone of life on Earth, functioning together with the lithosphere, atmosphere, and hydrosphere.

Biosphere Reserve: Biosphere reserves are areas comprising terrestrial, marine and coastal ecosystems that together function as a 'Science for Sustainability support site' – a special place for testing interdisciplinary approaches to understanding and managing changes and interactions between social and ecological systems, including conflict prevention and management of biodiversity. Biosphere Reserves are designated under the intergovernmental Man and Biodiversity (MAB) Programme by the Director-General of UNESCO following the decisions of the MAB International Coordinating Council (MAB ICC). There are currently 727 biosphere reserves in 131 countries, that belong to the World Network of Biosphere Reserves.

Botanic garden: Botanic gardens are institutions holding documented collections of living plants for the purpose of scientific research, conservation, display and education. Following the Botanic Garden Conservation International (BGCI), ACF places a greater emphasis on conserving rare and threatened native/endemic plants through dedicated botanic gardens, in compliance with (inter)national policies, and sustainability and ethical initiatives.

Building with Nature: a concept where nature is used to cope with climate change risks, such as sea level rise, drought, and climate warming. It is also called 'nature-based solutions' or 'eco-engineering'. The Government of Aruba (i.e. the Department of Nature and Environment (DNM)) applies its own 'Build with Nature' concept and framework, see: Build_with_Nature.pdf (dnm-aruba.org)

(Ecological) Carrying capacity: In ecology, carrying capacity refers to an environment's maximum load: the maximum population size of a biological species that can be sustained by that specific area or environment, given the food, habitat, water, and other resources available. These physical characteristics of the surroundings function as restraints (e.g. food, water, competition, etc.). As a result, the population limit is likely to be influenced by these factors. Note that the species being referred to can also be the human species.

(Ecologic) Connectivity: the unimpeded movement of species and the flow of natural processes that sustain life on Earth.

Conservation: Conservation is a broad approach to preserving what is already there and the due care and attention to protecting it for the future. It is also dedicated to restoring something to a natural state and maintaining equilibrium. It is a practice and a philosophy, utilizing scientific tools and methods with applied ethics, and, where necessary, regulation and environmental law to limit the use of certain materials. It can apply to many areas, not just the natural environment. Typically, it covers three broad areas:
-Conservation of cultural heritage and the built environment of archaeological monuments, buildings of historic importance, and landscapes. This promotes cultural awareness and respect and preserves a built heritage for future generations to enjoy;
-Conservation ecology: the branch of ecology and evolutionary biology that deals with the preservation and management of biodiversity and natural resources. It is a discipline that is emerging rapidly as a result of the accelerating deterioration of natural systems and the worldwide epidemic of species extinction. Its goal is to find ways to conserve species, habitats, landscapes, and ecosystems as quickly, as efficiently, and as economically as possible;
-Resource conservation: the careful use of resources without wastage and to reduce the strain on the supply, as well as the active way in which we seek to protect valuable resources like minerals, wildlife, trees, water and others, and allowing for or actively inducing regeneration.

Conservation education: Conservation Education (CE) helps people of all ages understand and appreciate our island's natural resources and learn how to conserve those resources for future generations. Through structured educational experiences and activities targeted to varying age groups and populations, CE enables people to realize how natural resources and ecosystems affect each other and how resources can be used wisely. CE helps people develop the critical thinking skills they need to understand the complexities of ecological problems. CE also encourages people to act on their own to conserve natural resources and use them in a responsible manner by making informed resource decisions.

Conservation management organization (CMO): is a professional and authoritative organization that actively advocates for and executes conservation management to secure the health of ecosystems and the integrity of biodiversity in a most favourable condition for nature and people, for current and future generations, and for contemplation, education, and applied natural science, in perpetuity, while counterbalancing the unchecked and unsustainable exploitative use of natural resources.

Conservation Standards: The Conservation Standards (CS) are a widely adopted set of principles and practices that bring together common concepts, approaches, and terminology for conservation project design, management, and monitoring. See: The Open Standards for the Practice of Conservation (conservationstandards.org).

Corporate Social Responsibility (CSR): a management concept whereby companies integrate social and environmental concerns in their business operations and interactions with their stakeholders.

Cultural heritage: an expression of the ways of living developed by a community and passed on from generation to generation, including customs, practices, places, objects, artistic expressions, and values.

Degradation: the process of something becoming worse or weaker or being made worse or weaker.

Ecotourism: is defined as responsible travel to natural areas that has minimal impact on fragile natural environment and provides nature-based experiences that conserve the environment, sustains the wellbeing of local people and involves interpretation and education.

Ecology: the branch of biology that deals with the relations of organisms to one another and to their physical surroundings.

Ecological sustainability: means that, based on a long-term perspective, we conserve the productivity of the waters, the soil and the ecosystem, and reduce our impact on the natural environment and people's health to a level that the natural environment and humanity can handle.

Ecological Network: An interconnected system of protected nature areas, other natural areas of (potential) national value and connecting zones. The Ecological Network is an important part of ACF's nature policy and consists of a coherent network of existing and future nature reserves in Aruba with the aim of at least stabilizing biodiversity, and thus preventing further decline (see the standstill principle accepted by the EU). The Ecological Network consists of:

- Core areas: national parks, nature reserves and other nature areas, estates, dry forests and scrubland areas, water catchment and containment areas (I.e., dams) and valuable agricultural cultural landscapes
- Nature development areas: areas with good opportunities for developing natural values, of national and/or international significance.
- Connecting zones: areas that connect core and nature development areas, as it were; ecological corridors (a functional zone of passage).

Ecosystem: An ecosystem is a natural environment and includes the flora (plants) and fauna (animals) that live and interact within that environment as a functional unit. Flora, fauna, and bacteria are the biotic or living components of the ecosystem. Ecosystems are dependent on the abiotic or non-living components climate, soil, and water. The biotic parts of the ecosystem have a complex relationship with the abiotic components - changing one will lead to a change in the other. A variety of ecosystems are spread across the world, each with distinctive interacting characteristics and components. They range from small (e.g. a freshwater pond) to global (e.g. the desert biome).

Ecosystem-based conservation: the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. Application of the ecosystem approach will help to reach a balance of the three objectives of the Convention. It is based on the application of appropriate scientific methodologies focused on levels of biological organization which encompass the essential processes, functions and interactions among organisms and their environment. It recognizes that humans, with their cultural diversity, are an integral component of ecosystems.

Ecosystem-based management (EBM): is an integrated management approach that recognizes the full array of interactions within an ecosystem, including humans, rather than considering single issues, species, or ecosystem services in isolation. EBM allows for consideration of resource tradeoffs that help protect and sustain diverse and productive ecosystems and the services they provide.

Ecosystem services: the direct and indirect contributions ecosystems (known as natural capital) provide for human wellbeing and quality of life. This can be in a practical sense, providing food and water and regulating the climate, as well as cultural aspects such as reducing stress and anxiety.

Endemic species: species that are found only in a limited, restricted, and defined area or habitat, with no traces of its populations in any other part of the world.

Endangered species: species that is endangered is close to extinction — meaning there aren't very many of that type of species left in the world. This word is used mostly to describe species that are not doing very well. Species usually become endangered because of over hunting, harvesting or the destruction of their habitat.

Environment: 1. the surroundings or conditions in which a person, animal, or plant lives or operates. 2. the natural world, as a whole or in a particular geographical area, especially as affected by human activity.

Environmental tourism: tourism that takes place in natural settings with an emphasis on understanding and conserving natural environments.

Erosion: the gradual destruction of something by natural forces (such as water, wind, or ice) or through human activity.

Evidence-based: is defined as systematically assessing scientific information from published, peer-reviewed publications and texts, practitioners' experiences (including best practices), independent expert assessment, and local and indigenous knowledge – amongst other information sources - on a specific (conservation) topic. This includes assessing the current effectiveness of different management interventions, threats and emerging (ecological) problems, and economic and social factors.

Ex-situ Conservation: Ex-situ ('off site', 'out of place') conservation is a set of conservation techniques involving the transfer of a target species away from its native habitat to a place of safety, such as a zoological garden, botanical garden, or seed bank. Its primary objective is to support conservation by ensuring the survival of threatened species and the maintenance of associated genetic diversity. To do so, ex-situ institutions preserve the genetic or reproductive material of a target species or take care of the living target species for the purpose of reintroduction.

Extinction: a situation in which a species no longer exists.

Fauna: the animals of a particular region, habitat, or geological period.

Flagship species: species chosen to raise support for biodiversity conservation in a given place or social context. Definitions have varied, but they have tended to focus on the strategic goals and the socio-economic nature of the concept, to support the marketing of a conservation effort. The species need to be popular, to work as symbols or icons, and to stimulate people to provide money or support.

Flora: the plants of a particular region, habitat, or geological period.

Geology: the physical structure and substance of the earth, their history, and the processes which act on them.

GeoPark: UNESCO Global Geoparks are single, unified geographical areas where sites and landscapes of international geological significance are managed with a holistic concept of protection, education, and sustainable development. Their bottom-up approach of combining conservation with sustainable development while involving local communities is becoming increasingly popular and provides new opportunities for Aruba. Unique geological formations and minerals such as Ayo, Casibari, Hooiberg, Canashito and Sero Crystal, as well as man-made structures such as the phosphate mines at Sero Colorado would be applicable for this sustainability management concept.

Habitat: A habitat is a place where an organism makes its home. A habitat meets all the environmental conditions an organism needs to survive. For an animal, that means everything it needs to find and gather food, select a mate, and successfully reproduce. For a plant, a good habitat must provide the right combination of light, air, water, and soil.

High impact recreation: recreation that has a destructive impact on nature and the environment leading to its degradation, e.g. soil erosion and compaction, damage to landscape and vegetation, disturbance to wildlife, soil, water, air and light pollution, vandalism and noise.

Important bird and biodiversity area (IBA): an area identified using an internationally agreed set of criteria (BirdLife International) as being globally important for the conservation of bird populations. Often IBAs form part of a country's existing protected area network, and so are protected under national legislation. IBAs also hold a large and representative proportion of other biodiversity and are a subset of Key Biodiversity Areas (KBAs).

In-situ Conservation: In-situ (‘on site’, ‘in place’) conservation is a set of conservation techniques involving the designation, management and monitoring of biodiversity in the same area where it is encountered. The in-situ concept is best understood in contrast to ex-situ conservation. Ex-situ (‘off site’) conservation techniques are implemented away from the conservation target's natural habitat.

Introduced or non-native species: organisms that do not occur naturally in an area but are introduced as the result of deliberate or accidental human activities.

Invasive species: an introduced organism that becomes overpopulated and negatively alters its new environment. Although their spread can have beneficial aspects, invasive species adversely affect the invaded habitats and bioregions, causing ecological, environmental, and/or economic damage.

Key Biodiversity Area (KBA): 'sites contributing significantly to the global persistence of biodiversity’, in terrestrial, freshwater and marine ecosystems. The Global Standard for the Identification of Key Biodiversity Areas (IUCN 2016) sets out globally agreed criteria for the identification of KBAs worldwide.

Keystone species: organisms, usually animals, that play a crucial role in different habitats and have a huge effect on the environment around them. They may help control the population of other species, or perhaps help the growth of certain types of plants in an ecosystem. A keystone species is an organism that helps hold the system together. Without its keystone species, ecosystems would look very different. Without keystone species, the ecosystem would be dramatically different or cease to exist altogether.

Low impact recreation: consists of activities which are respectful of flora and fauna and conserves the natural values while minimizing any negative impact on the environment.

Marine protected area (MPA): involves the protective management of natural areas according to pre-defined management objectives. MPAs can be conserved for a number of reasons including economic resources, biodiversity conservation, and species protection. They are created by delineating zones with permitted and non-permitted uses within that zone.

Native species: organisms that occur naturally in a given area or region. A species that originated and developed in its surrounding habitat and has adapted to living in that particular environment. Native is sometimes called as indigenous.

National Protected Areas Network: see Ecological Network.

Natural heritage: refers to natural features, geological and physiographical formations and delineated areas that constitute the habitat of threatened species of animals and plants and natural sites of value from the point of view of science, conservation, or natural beauty. It includes private and publicly protected natural areas, zoos, aquaria and botanical gardens, natural habitat, marine ecosystems, sanctuaries, reservoirs etc.

Nature: the physical world and everything in it (such as plants, animals, mountains, oceans, stars, etc.) that is not made by people. Note that the difference between environment and nature is that environment is the surroundings of, and influences on, a particular item of interest while nature is (uncountable) the natural world; consisting of all things unaffected by or predating human technology, production and design e.g. the ecosystem, the natural environment, virgin ground, unmodified species, laws of nature.

Nature-based tourism: a broad term that covers all tourism experiences centred on wild or natural environments.

Nature-based solutions: are actions to protect, sustainably manage, and restore natural and modified ecosystems that address societal challenges effectively and adaptively, while simultaneously providing human well-being and biodiversity benefits. (current socio-environmental challenges include climate change, water security, water pollution, food security, human health, biodiversity loss, and disaster risk management).

Nature conservation: the protection, preservation (management), or restoration of flora, fauna and natural resources. It focuses on protecting species from extinction, maintaining and restoring habitats, enhancing ecosystem services, and protecting biological diversity.

Nature First: is a concept applied by ACF which places Nature First, to maintain Aruba's natural values and prevent impairment of protected area resources and objects of natural value; ensuring that conservation is predominant at times of conflict between the protection of nature and its exploitation.

Nature-inclusive: refers to approaches, policies, or initiatives that actively incorporate nature and natural ecosystems into various aspects of human activities and decision-making processes. It involves recognizing the intrinsic value of nature and integrating it into societal frameworks, development strategies, and resource management practices. This concept goes beyond traditional conservation efforts by emphasizing the interconnectedness between people and nature and seeking to integrate nature into various sectors such as urban planning, agriculture, infrastructure development, and economic policies.

Nature-positive: refers to actions, policies, or initiatives that not only aim to minimize harm to nature but also actively contribute to its restoration, regeneration, or enhancement. Nature-positive approaches go beyond simply avoiding negative impacts on ecosystems and biodiversity; they strive to generate positive benefits for nature, such as increasing biodiversity, restoring degraded habitats, and enhancing ecosystem services. Nature-positive approaches are closely related to nature-inclusive approaches but differ in their emphasis on actively generating positive benefits for nature rather than simply incorporating nature into human activities. While nature-inclusive approaches may focus on minimizing harm or integrating nature into decision-making processes, nature-positive approaches take a more proactive stance by seeking to enhance and regenerate natural ecosystems.

Paradigm shift: an important change that happens when the usual way of thinking about or doing something is replaced by a new and different way.

Precautionary principle: The precautionary principle states that if a product, an action, or a policy has a suspected risk of causing harm to the public or to the environment, protective action should be supported before there is complete scientific proof of a risk. In the absence of scientific consensus, the principle implies that there is a social responsibility to protect the public, nature and environment from potential harm.

Preservation: in the context of nature conservation, the act of keeping something in its original state or in good condition (healthy and functioning).

Protection: in the context of nature conservation, the act of keeping something safe from harm or loss, primarily through (emerging) threats mitigation and enacting laws and regulations to protect endangered species, habitats, and ecosystems.

Protected nature area: locations which receive protection because of their recognized natural, ecological or cultural values. There are several kinds of protected areas, which vary by level of protection depending on the enabling laws of each country or the regulations of the international organizations involved. Generally speaking, though, protected areas are understood to be those in which human presence or at least the exploitation of natural resources is limited.

Protection: the process of keeping (something or someone) safe.

Purpose-driven economy: the consumer landscape has evolved to embrace a purpose-driven economy; one based on achieving the right balance between people, place, planet and profit.

RAMSAR site: A Ramsar site is a wetland site designated to be of international importance under the Ramsar Convention, also known as "The Convention on Wetlands", an intergovernmental environmental treaty established in 1971 by UNESCO. The Convention on Wetlands is the intergovernmental treaty that provides the framework for the conservation and wise use of wetlands and their resources.

Rights of Nature: a legal and jurisprudential theory that describes inherent rights as associated with ecosystems and species, similar to the concept of fundamental human rights. The rights of nature concept challenges twentieth-century laws as generally grounded in a flawed frame of nature as "resource", to be owned, used, and degraded. Proponents argue that laws grounded in rights of nature direct humanity to act appropriately and in a way consistent with modern, system-based science, which demonstrates that humans and the natural world are fundamentally interconnected.

Reforestation: the process of regenerating or replanting forest areas that have been destroyed or damaged for the benefits of mankind.

Regenerative tourism: is a concept that goes beyond sustainable tourism. While sustainable tourism aims to minimize negative impacts on the environment, regenerative tourism seeks to actively improve ecosystems, cultures, and communities as a result of tourism activities. It focuses on restoring and revitalizing natural resources, supporting local economies, and preserving cultural heritage. The goal is to leave a positive impact on the destinations visited, enhancing their resilience and vitality for future generations. This approach recognizes that tourism can play a role in both the degradation and regeneration of natural and cultural resources, and it aims to harness the industry's potential for positive change.

Resilience: the ability to recover after disturbances or significant, unpredictable changes in the local environment, such as those caused by a fire, flood, economic development, or climate change.

Restoration: "Ecosystem restoration" is defined as a process of reversing the degradation of ecosystems, such as landscapes, lakes and oceans to regain their ecological functionality; in other words, to improve the productivity and capacity of ecosystems to meet the needs of society. This can be done by allowing the natural regeneration of overexploited ecosystems or, for example, by planting trees and other plants. In general, the term "habitat restoration" means the manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning the majority of natural functions to the lost or degraded native habitat. "Species restoration" is a crucial component of biodiversity conservation aimed at reviving populations of endangered or extinct endemic and native species, as well as restoring their natural habitats.

Responsible tourism: responsible tourism respects the natural and cultural environment and contributes to local economic development in an ethical manner. It helps conserve fragile cultures, habitats and species by maximizing the benefits to local communities and minimizing negative social or environmental impacts.

(Natural) Resource: materials from the Earth that are used to support life and meet people's needs. Any natural substance that humans use can be considered a natural resource. Oil, coal, natural gas, metals, stone and sand are natural resources. Animals, birds, fish, and plants are natural resources as well.

(Ecological) Steppingstone: steppingstones or steppingstone corridors are smaller areas of quality habitat that are. intended to aid movement of individuals by serving as islands of favourable habitat in. between larger core nature areas.

Species action plan: a comprehensive document developed to guide conservation efforts for a particular species that is considered threatened, endangered, or otherwise in need of management and protection. These plans are typically created by governmental agencies, conservation organizations, or experts in the field of biodiversity conservation.

Sustainability: the integration of environmental health, social equity and economic vitality in order to create thriving, healthy, diverse and resilient communities for this generation and generations to come. The practice of sustainability recognizes how these issues are interconnected and requires a systems approach and an acknowledgement of complexity.

Sustainable development: sustainable development aims to facilitate growth that aligns with the present needs without compromising with the availability of resources for future generations. Sustainability is all about long term preservation of resources rather than consuming them incessantly for satiating short-term needs.
There are four dimensions to sustainable development – society, environment, culture and economy – which are intertwined, not separate. Sustainability is a paradigm for thinking about the future in which environmental, societal and economic considerations are balanced in the pursuit of an improved quality of life. Sustainability is often thought of as a long-term goal (i.e. a more sustainable world), while sustainable development refers to the many processes and pathways to achieve it (e.g. sustainable agriculture and forestry, sustainable production and consumption, good government, research and technology transfer, education and training, etc.).

Sustainable exploitation (natural resources): exploitation capable of being maintained at a steady level without causing irreversible ecological damage and exhausting natural resources, allowing resources to renew or replenish themselves.

Sustainable finance: sustainable finance refers to either (1) the process of taking environmental, social and governance (ESG) considerations into account when making investment decisions in the financial sector, leading to more long-term investments in

sustainable economic activities and projects, or specifically (2) aligning our financial systems and services to promote long-term environmental sustainability and economic prosperity.

Sustainable recreation: sustainable recreation is an environmentally and socially responsible form of tourism which focuses on the intrinsic attractions of the natural and cultural environment and minimizes the impacts on biodiversity, ecosystems and the human community, while providing economic benefits to local residents on sustained rather than seasonal or short-term basis. (same as for sustainable tourism but on a smaller scale)

Sustainable tourism: tourism that takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, the industry, the environment and host communities. The aim of sustainable tourism is to increase the benefits and to reduce the negative impacts caused by tourism for destinations. This can be achieved by protecting natural environments, wildlife and natural resources when developing and managing tourism activities.

Sustainable yield: the amount of a certain resource that can be harvested or obtained without causing depletion. Sustained yields are most commonly applied to forestry and fishing activities and limit short-term harvests to allow for longer-term regeneration of resources from the remaining parent material.

Symbiosis: is a close relationship between two different kinds of organisms or living things. There are three basic types of symbiotic relationships: mutualism, commensalism, and parasitism.

Transformational experiences: transformational or transformative experiences are those that challenges a person's assumptions, preconceptions, beliefs, and values, affecting how they understand themselves, others, and the world. People seeking transformational experiences intentionally want to stretch themselves, learn and grow into new ways of being and engaging with the world; they actively seek experiences that enrich, awaken, and transform them, and eventually, the world.

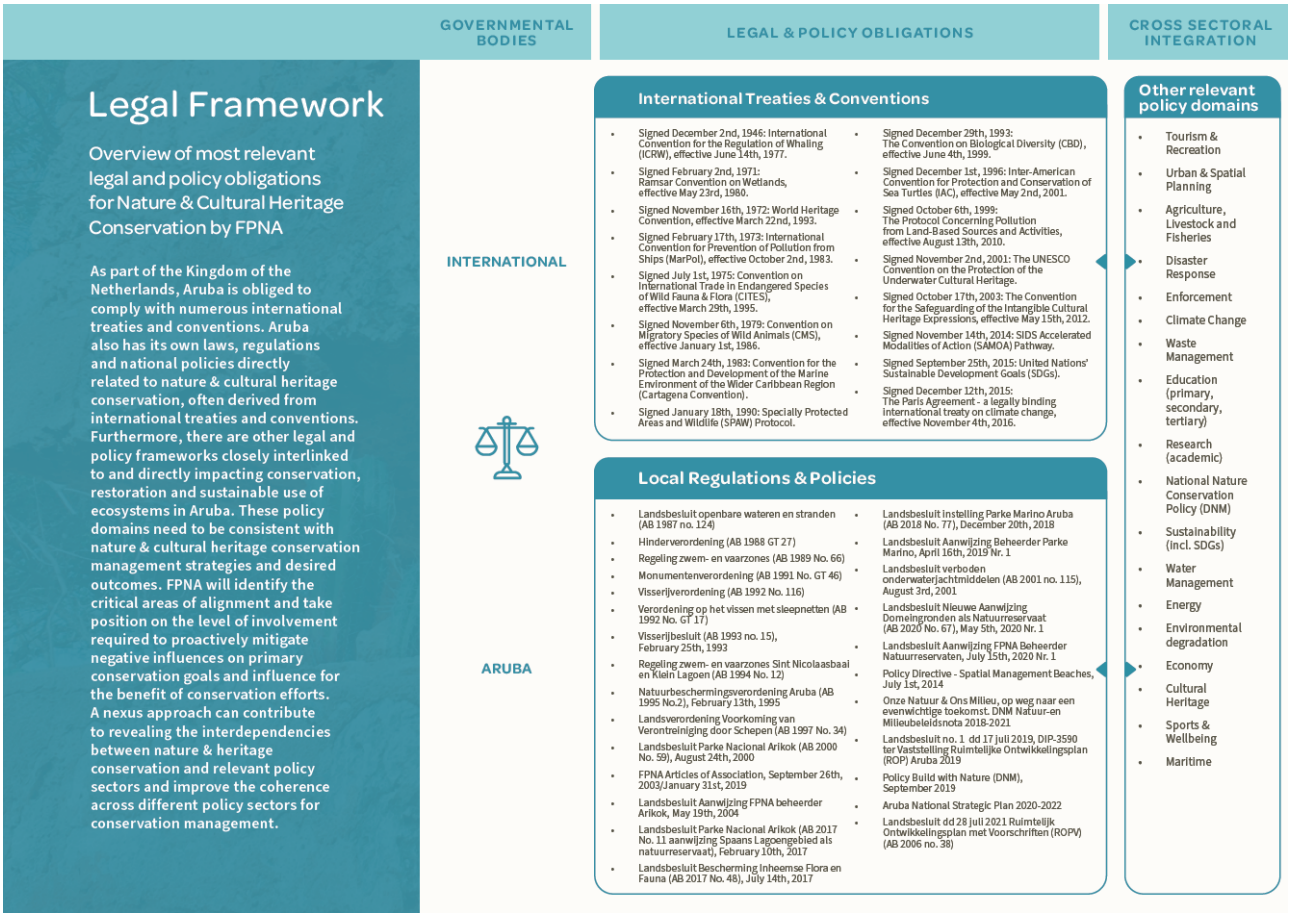
Watershed: is an area of land that drains or "sheds" water into a specific waterbody. Everybody of water has a watershed. Watersheds drain rainfall into streams and rivers (or other sources of water). These smaller bodies of water flow into larger ones, including lagoons, bays, and oceans. Gravity helps to guide the path that water takes across the landscape.

Wetland: Wetlands are areas where water covers the soil or is present either at or near the surface of the soil, either all year or for varying periods of time during the year.

Wildlife tourism: tourism that provides close contact with wildlife and nature in general. This type of tourism can have negative impacts on wildlife and needs to be highly regulated, closely managed and monitored ongoingly for impact and sustainability.

World Heritage Site: a landmark or area with legal protection by an international convention administered by the United Nations Educational, Scientific and Cultural Organization (UNESCO). World Heritage Sites are designated by UNESCO for having cultural, historical, scientific or other form of significance.

Appendix I: ACF's legal and policy obligations



Appendix II: Terrestrial and marine protected areas managed by ACF

Appendix III: Aruba Ramsar Areas

West Point | Ramsar Sites Information Service https://rsis.ramsar.org/ris/2527

Western Wetlands | Ramsar Sites Information Service https://rsis.ramsar.org/ris/2528

South Coast | Ramsar Sites Information Service https://rsis.ramsar.org/ris/2526

Spanish Lagoon | Ramsar Sites Information Service https://rsis.ramsar.org/ris/198

East Point | Ramsar Sites Information Service https://rsis.ramsar.org/ris/2525

Appendix IV: Aruba's biodiversity and main environmental threats

Aruba's Biodiversity

Aruba's biodiversity is surprisingly rich, despite the semi-arid environment and being heavily impacted by centuries of extensive agriculture, grazing, extraction and habitat loss due to conversion of lands. Considering the island is among the most densely populated countries in the world, the natural values, ecosystems and their services, as well as the island's biodiversity are under great pressure.

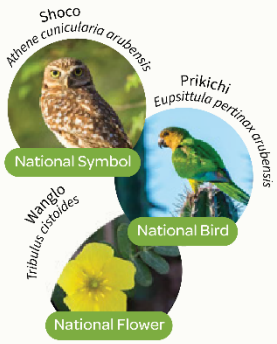
What we currently know about Aruba's unique biodiversity is that besides the 34 species endemic to Aruba, 28 species have been identified that are endemic to the ABC islands, and an additional 37 species have been identified that are endemic to ABC islands, northern Venezuela and Colombia.

Aruba's landscapes typically include windswept Buttonwood or Fofoti *(Conocarpus erectus)*, Watapana *(Libidibia coriaria)*, and different species of cacti. Aloe vera, a non-native species, is readily found all over the island. Hermit crabs and land crabs, butterflies and dragonflies, and different species of lizards and bats are common in the countryside. The Arubian cottontail *(Sylvanus floridanus nigronuchalis)*, the Hummelinck's vesper mouse *(Calomys hummelincki)*, the Colombian four-eyed frog *(Pleurodema brachyops)*, the Crested bobwhite *(Colinus cristatus)* and the Caribbean crown conch *(Melongena melongena)* have become a rare sight in recent decades. Aruba burrowing owl *(Athene cunicularia arubensis)* and Aruba brown-throated parakeet *(Eupsittula pertinax arubensis)* are also decreasing. So far, 282 species of bird, including migratory, have been recorded on the island.

25% of the global population of Cayenne tern *(Thalasseus sandivicensis eurygnathus)*, 90% of the Caribbean population of Common tern *(Sterna hirundo)*, and 25% of the Caribbean population of Black noddy *(Anous minutus)* use the San Nicolas coastal area as their breeding grounds. A further 8 species of bat live on the island and 4 species of sea turtle typically nest on Aruba's beaches.

Caribbean Biodiversity Hotspot

The Caribbean islands support an important biodiversity within its diverse terrestrial ecosystems with a high proportion of endemicity making the region one of the world's greatest centers of biodiversity. Due to a high degree of connectivity, marine habitats share many of the same marine species, especially migrating species.



3 Endemic species of flora

- **1** species of cactus *Melocactus stramineus*
- **2** species of agave *Agave ruttenae*, *Agave arubensis*

31 Endemic species of fauna

- **2** species of pseudoscorpion *Pseudochthonius arubensis*, *Pachyolpium arubense*
- **4** species of crustacean *Including isopod Arubolana imula*
- **18** species of mollusc *(including 17 marine)*
- **4** species of beetle *Epitragus hummelincki*, *Heterachtes arubae*, *Urgleptes hummelincki*, *Meinertellus xerophilus*
- **3** species of reptile Aruba Whiptail Lizard: *Cnemidophorus arubensis*, Aruba Leaf-toed Gecko: *Phyllodactylus julieni*, Aruba Island Rattlesnake: *Crotalus unicolor*

Aruba's Ecosystem Services

Supporting
- Photosynthesis
- Habitat
- Biodiversity
- Soil formation

Regulating
- Flood control
- Climate regulation
- Cleaning water and air
- Pollination

Provisioning
- Water
- Food
- Medicine
- Raw materials

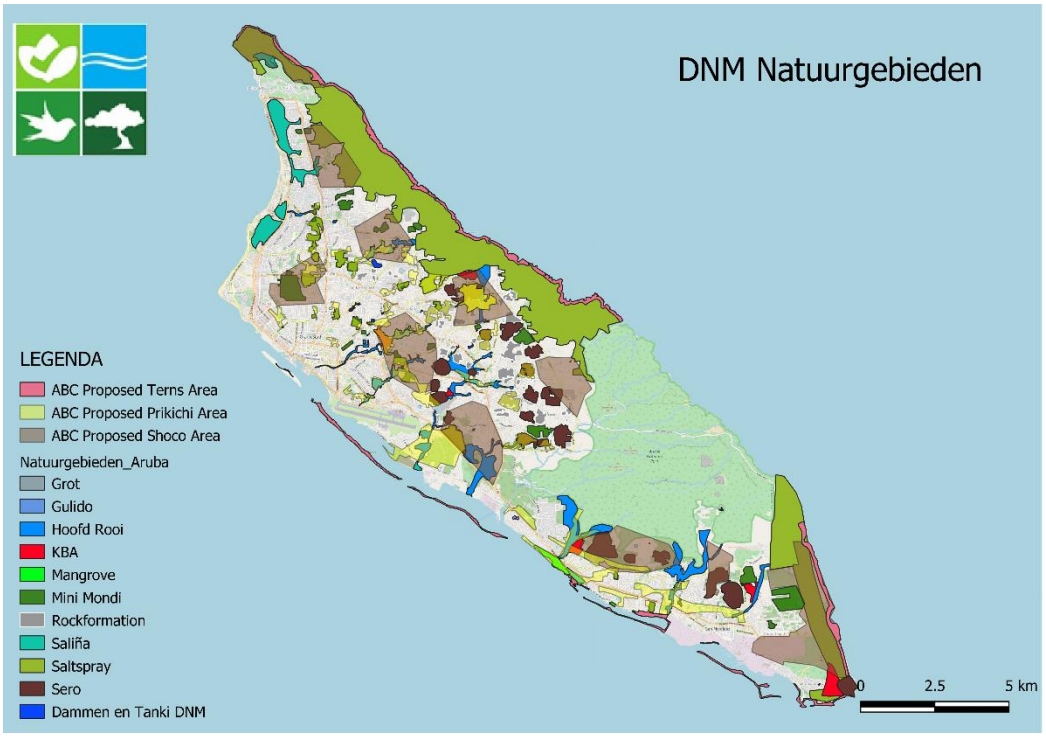
Cultural
- Aesthetics
- Spirituality
- Recreation
- Education

The Changing Landscape of FPNA | Profile FPNA | State of Natural Assets

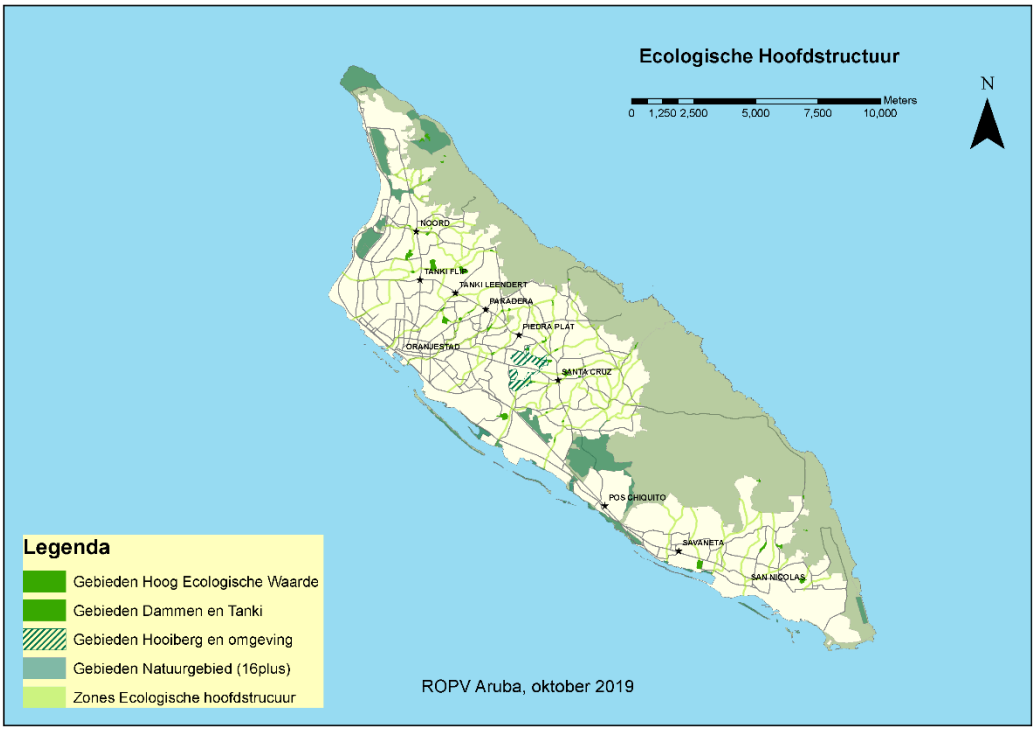
Main threats to ecosystems & biodiversity

- Climate change
- Population growth (over-capacity)
- Unsustainable tourism
- High-impact recreation
- Unsustainable food sources/harvesting (fisheries & agriculture)
- Urban development
- Coastal development
- Private properties and lease land in protected areas
- Land clearing
- Invasive species
- Feral (domestic) animals
- Quarries (sand / stone mining)
- Landfills
- Pesticides, herbicides and insecticides
- Solid Waste pollution
- Water pollution by chemicals
- Sewage pollution
- Marine debris
- Soil degradation and pollution
- Air pollution
- Light pollution
- Noise pollution
- Trash pollution

Appendix V: ROPV Natuurkaart & Ecologische Hoofdstructuur



Source: DIP ARUBA https://www.dip.aw/ropv/ 'Bijlage voorschriften – natuurkaart'.



Source: DIP ARUBA https://www.dip.aw/ropv/ 'Bijlage voorschriften – Ecologische Hoofdstructuur'.