Title of the Story: Engaging Guests and Community in Environmental Conservation through Policies, Programmes and Technology

Destination Name: Sentosa Island, Singapore
Country: Singapore

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Nomination Category: (Please check the boxes that indicate the focus of your story)

☐ Localizing the destination supply chain
☐ Decarbonizing the destination supply chain
☐ Culture & Communities
☒ Environment & Climate
☐ Nature & Ecotourism
☐ Tourism Reset & Recovery
☐ Other

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DESCRIBE YOUR GOOD PRACTICE STORY

Address each aspect of your good practice story in the different sections being specific including relevant quantitative and qualitative information.

Issues faced
What was the problem/issue solved with the good practice? Click to add your text

Sentosa’s natural assets and backdrop

Sentosa is an island leisure destination in Singapore located just minutes from the central business and shopping districts. It is home to a wide array of offerings; from themed attractions, hotels, world-renowned golf courses, F&B restaurants and a marina to also lush rainforests and golden sandy beaches.

Fig 1. Aerial view of Sentosa’s Siloso Beach

The threat of climate change is an existential threat for many island destinations around the world, including Sentosa. The potential impacts that may affect Sentosa in the long term are the rise in sea levels and stronger and more frequent weather events. These impacts could affect the habitats on the island and biodiversity loss, and also affect the safety and experience of visitors.

Beyond its wide variety of attractions, clear waters and sandy beaches, Sentosa is also home to a variety of coastal marine habitats and rich terrestrial secondary forests. Sentosa Development Corporation (SDC) conducts biodiversity surveys throughout the years to track our biodiversity. Based on the latest comprehensive survey conducted in 2018 by a third-party consultant, Enviro Pro Green Innovations (S) Pte Ltd, Sentosa’s habitats house 474 flora and fauna species, of which approximately 80 species are estimated to be of species of conservation concern (see Annex A for a summary of the findings). The 2018 survey featured 10 months of comprehensive ecological survey work across Sentosa and covered all major...
habitat types present on the island as well as an analysis of the current status of biodiversity and methods that could either safeguard or enhance biodiversity in the long term. Sentosa has also been referenced as a potential migratory stopover for birds as the island is situated along the East Asian-Australasian Flyway (EAAF). Migratory bird sightings have drawn nature photographers and bird watchers in 2017 and 2018 to nature sites around the island.

Since the inception of COVID-19, there has been an increase in public interest in visiting nature areas. While Sentosa welcomes the opportunity to delight guests through its inherent natural assets, there is also a need to maintain and protect ecologically sensitive sites (see Figure 1) from negative impacts such as waste pollution (including littering), trampling of the soil/intertidal flats and noise/light pollution from urban developments.

There have been initiatives set out to ensure that we defend against and abate the long term climate change impacts and protect existing ecologically sensitive habitats from tourism impacts. This Good Practice Story will outline the steps that SDC has undertaken to ensure that the environment can continue to provide precious ecosystem services and for our future generation to appreciate nature.

Fig 2. Environmental receptors around Sentosa

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1 Key migratory species include the Asian emerald cuckoo, Watercock, and Chestnut-winged cuckoo which make their way south to Southeast Asia to escape from the cold winter weather of Northern Asia during the Sep to Apr months.

2 See these links: Rare birds on Sentosa draw shutterbugs, Singapore News & Top Stories - The Straits Times and Migration dates | Singapore Bird Group (wordpress.com).

3 Please refer to B14 and B15 under additional references for relevant articles.

**Sentosa’s sustainable operating philosophy**

Since its incorporation in 1971 under the SDC Act of Parliament, SDC, as a statutory board, has served as the government custodian over Sentosa precinct, with the responsibility to develop the precinct for tourism and leisure purposes. SDC adopts an environmentally-sensitive approach towards its development by applying environmental planning policies and protective measures to maintain the balance between development and nature, incorporating various programmes such as forest restoration and biodiversity conservation.

SDC facilitates the proper management of the overall land use planning and development for Sentosa. SDC understands that it is crucial to protect and manage nature and biodiversity on Sentosa which gives the island destination its charm. At the planning level, developments on Sentosa over the last 40+ years has been guided over the years by a series of Masterplans, the latest of which is the Sentosa-Brani Master Plan which takes into consideration the various existing assets and island’s defining geographical qualities. The design of the Sentosa-Brani Master Plan was guided by several Sustainability Visions and a set of Sustainability Objectives that also support the international Sustainable Development Goals as well as SDC’s Environmental Sustainability Strategy.

To achieve the desired outcomes of maintaining our natural assets together with leisure development, we have employed the following initiatives:

1. **Identification** of ecologically sensitive sites
2. **Protection** of key areas through multi-pronged approaches
   a. Controlled access to sensitive ecological sites paired with educational elements
   b. Intrusion prevention to sensitive sites through guest facing guidelines, signages and virtual appreciation through technology
   c. Protect and restore the island habitats and/or biodiversity
3. **Enhancement** of awareness on sustainability issues
   a. Collaborate with researchers/NGOs on research studies and educational talks
   b. Leveraging on the island business community to promote and enhance environmental education efforts
   c. Use Sentosa as a “living classroom” to educate guests on good sustainable practices

**Methods, steps and tools applied**

Sentosa strives to continually protect and restore the island’s precious habitats. We employ an “Identify, Protect and Enhance” approach towards stewarding over these habitats which is reinforced by a series of policies and programmes to maintain balance between visitors and preservation of sites.

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5 Please refer to the subsequent sections for more details.
1. **Identification of ecologically sensitive sites**

SDC and other Government partner public sector stakeholders such as National Parks Board (NParks) help to identify existing habitats on the island and determine their sensitivity based on the species richness and diversity in the area, as well as by the number of species of conservation concern surveyed at the sites. Key habitats and locations (rocky shores, mangroves, forests, beaches, etc.) are protected to ensure the getaway destination is maintained.

SDC also engages a consultant to conduct a satellite imaging study every 4-5 years to determine the extent of greenery coverage, and seeks to maintain 50% greenery coverage island wide to maintain the island charm and also act as a natural defense against the effects of climate change such as more intense rainstorm events. Identified sites of ecological sensitivity include:

- **Tanjong Rimau**: A coastal cliff and rocky intertidal shore located at the western tip of Sentosa Island which is home to corals, seagrass, and a wide variety of marine wildlife.
- **Serapong Nature Area**: Located in Central Sentosa, Serapong Hill is the highest point on the island and comprises of a secondary forest with key ecological connectivity to other forested areas on Sentosa, mainland Singapore and the Southern Islands.
- **Imbiah Nature Area**: Located towards Western Sentosa, Imbiah Hill is the next highest point on the island and comprises of a secondary forest with ecological connectivity to other forested areas on Sentosa, mainland Singapore and the Southern Islands.

2. **Protection of key areas through multi-pronged approaches**

a) **Controlled access to sensitive ecological sites paired with educational elements**

Instead of pursuing the extremes of either allowing uncontrolled visits or outright prohibiting entry to the ecologically sensitive sites, Sentosa adopts a balanced approach which allows for controlled access through pre-organised learning journeys. This allows visitors to appreciate the sites and learn about the importance of conservation and climate change impacts while under close supervision from experienced nature guides. An example of a guided walk curated by SDC is the Siloso Headland Intertidal Programme (SHIP), organized by SDC for the Tanjong Rimau precinct.

The guided tour allows the public to access the ecologically sensitive intertidal areas and learn more about the coastal cliff and rocky shores habitats that are home to plants, corals, seagrass and a wide variety of marine wildlife. Since its inception in 2018, there have been 29 sessions with 470 visitors signing up for the programme. More sessions are intended to be run from July – December 2021 with 220 visitors or more expected to participate in it (subject to ongoing COVID-19 restrictions). The public can sign up for the programme through an online booking system.
### SILOS HEADLAND INTERTIDAL PROGRAMME (SHIP)

<table>
<thead>
<tr>
<th>YEAR</th>
<th>No. of Sessions</th>
<th>Total number of pax</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>8</td>
<td>93</td>
</tr>
<tr>
<td>2019</td>
<td>10</td>
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<tr>
<td>2020</td>
<td>2</td>
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<td>2021 1H (1st Run)</td>
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</tr>
<tr>
<td>2021 2H (2nd Run) July – Dec ’21</td>
<td>11 sessions</td>
<td>Expected - 220 pax or more</td>
</tr>
</tbody>
</table>

**Fig 3. Capacity and sessions of Siloso Headland Intertidal Programme**

As demand grows, the organizing team is also planning to shift the learning journey to other parts of the coasts, to reduce the impact of continuous repeated visits to ecologically sensitive sites.

**Fig 4. The public attending a guided Siloso Headland Intertidal Programme session**

**b) Intrusion prevention to sensitive sites through guest facing signages, guidelines, and virtual appreciation through technology**

To discourage visitors from heading to the sites to explore on their own, signages have been deployed at key strategic entrances near the sites to inform visitors that the identified areas are ecologically sensitive and application for entry is required and strictly by approval only. To complement the signages, there are also patrols from the Rangers team to ensure that there are no trespassers to the sites.
There are also guidelines in place for visiting nature areas and these have been put up on the Sentosa webpage on the Dos and Don’ts, to remind visitors to treat our fragile ecosystems with care and to allow our nature areas to continue thriving. Furthermore, educational signs have also been placed along various nature and heritage trails on Sentosa to highlight significant flora or fauna, conservation and historical information.

In addition, Sentosa utilizes technology to encourage appreciation from afar, providing virtual experiences for guests and school groups who are passionate about sustainability but may not be able to head to the site in large groups or due to COVID-19 restrictions on group sizes. These include:

- Videos on what visitors can expect to see on our shores include Sentosa’s Marine Habitats and Exploring Tanjong Rimau which included educational material for school groups.
- A 360-degree camera view on the website that allows visitors to ‘visit’ the site.
- Introduction of ‘live’ tours for online participants to view the sites, which helps reduces the human impact on the environment through less disturbances to the natural environment.
c) Protect and restore the island biodiversity

SDC has an internal workgroup, Ecology and Environment, which oversees the ecology and environmental aspects of integrative planning, design and development of Masterplan Zones on Sentosa and has the responsibility to compile a centralized database for environmental and ecological information, establish environmental policies and framework and make provision for sustainable long-term conservation.

Current ongoing programmes for the various habitats are listed as follows:

- **Forest habitats:** Forests on Sentosa make up close to 120ha of the land area of Sentosa and restoration efforts have taken place through a tree native tree planting project whereby native flora species are identified and planted in our forests to support the ecosystem richness and increase resiliency against climate change. An example would be the Light Red Meranti (*Shorea leprosula*) that can be found on Sentosa. They are categorised globally as "Endangered" and locally "Vulnerable" from threats such as habitat loss and climate change. Some specimens of this species have been standing tall for more than a decade on Sentosa and the magnificent fast growing trees are great at sequestering carbon dioxide from the air. Corporate groups and staff have also participated in tree planting events to inculcate the message of giving back to the environment and supporting efforts to green the island. Also, in collaboration with NParks, SDC uses a tree registry system to maintain an asset record of the Sentosa trees and their information (e.g. tree species location, girth and height). With the database, it enables the team to better manage and monitor the health of the trees.

- **Marine habitats:** Marine habitats make up close to 20ha of Sentosa’s land area. Despite being one of the busiest ports in the world, Singapore’s shores are still visited by the critically endangered Hawksbill Turtle (*Eretmochelys imbricata*). Female turtles typically come to Singapore’s shores to lay eggs from June to October, and some land at Sentosa’s beaches. Sentosa limits access to the turtle nesting areas at the beach when the phenomenon happens to maintain the conservation site for the turtles while allowing visitors to enjoy other parts of the beach unaffected by the nesting site. A protective barrier will be erected around the nest within the day of discovery to keep the eggs safe.
from natural predators (such as monitor lizards and crabs), human encroachment as well as other potential disturbances during the incubation period. SDC, together with NParks, closely monitors the nests till the eggs finally hatch after a few months. Staff will also measure and weigh the baby turtles before preparing them for release back to sea.

*Fig 8. Hawksbill Turtle hatchlings being released on Sentosa*

- **Bee habitats:** There is a saying that the end of bees will signal the end of the world – SDC’s subsidiary, the Sentosa Golf Course (SGC), aims to do their part in growing the bee population environment by showcasing bee keeping techniques through its sanctuary. SGC’s bee sanctuary was unveiled in 2020 to increase awareness of the declining bee population worldwide and educate guests of its importance in the world’s ecosystem and food chain. SGC also intends to harvest the honey for its restaurant menu, which helps to reduce food carbon miles and promotes local sourcing of ingredients for their F&B outlet.

**d) Addressing landscape degradation and integration of nature and urban developments to provide buffer areas**

Downstream efforts to address landscape degradation include a greenery replacement requirement for impacted trees within development sites where two trees of the same species or species approved by SDC are replanted for every tree removal. The selected species must be native or species with ecological benefits so as to enhance the existing biodiversity as well as to intensify the reforestation of the areas affected by development.

Masterplans provides the long-term vision for new development projects, with references to national initiatives e.g. URA Lush 3.0, to progressively incorporate and update the planning parameters towards sustainable developments. This is to ensure that developers replace the greenery lost through the provision of ground landscaping, roof gardens, vertical green walls, etc within the proposed development site.

Additionally, the native planting palette project mentioned above will serve as a guide for suitable species to be incorporated as part of the greenery for future development sites. This allows for the “greening” of the development as well as provides an ecological connection with the surrounding landscape.
3. **Enhancement of awareness on sustainability issues**

   a) **Collaborate with researchers/NGOs on research studies and educational talks**

   Sentosa works closely with the researchers to gain a deeper understanding of the island environment. By leveraging on the knowledge and expertise of professionals in the field, Sentosa is able to better implement innovative solutions to problems.

   **Coastal Protection:** Sentosa recently partnered the National University of Singapore (NUS) to study potential nature-based climate solutions surrounding the island. This includes researching on the implementation of suitable soft approaches to coastal protection measures so as to reduce usage of built-up structures and maintain the islandness and aesthetic of Sentosa for guests to enjoy. The partnership also includes studies on ecological habitat restoration, enhancement strategies and or targeted species recovery. An example is studying the feasibility of seagrass R&D and planting seagrass in Sentosa waters. The partnership also covers joint development of educational and outreach initiatives to raise public awareness on nature-based climate solutions, including holding specific workshops at Sentosa, and developing educational materials for joint usage (E.g. NUS courses, eco-tourism and school programmes).

   **Wildlife Monitoring and Conservation:** Sentosa also conducts lunch sessions for its staff where experts in the field of nature and conservation (E.g. Conservation International, Wild Singapore) are invited to share their knowledge and inspire a culture of responsible tourism practices within the organization. Conservation International also worked with SDC in 2019 to develop biodiversity monitoring sessions for staff and school groups as a form of citizen science programme to monitor wildlife on Sentosa. It is important to educate all staff, not just the team working on sustainability, to understand the organization’s focus on sustainability. Only then can they impart such a mindset to guests at all touchpoints and also be guided in their day-to-day work.

   ![Fig 9. SDC staff and partners attending a biodiversity monitoring session organised to enhance their appreciation of the biodiversity on Sentosa (Photo Credit: Conservation International Singapore)](image)
b) **Leveraging on the island business community to promote and enhance environmental education efforts**

Our island businesses\(^6\) have ongoing or have committed to introducing sustainable experiences that promote and educate guests on the local biodiversity and/or sustainable solutions which minimizes impact on the environment and climate change.

One example is Siloso Beach Resort (SBR), which was constructed to be an eco-resort and applies sustainability practices throughout its operations\(^7\). SBR conducts an eco tour that runs 6 days a week for guests, partners and suppliers since 2009 to learn about its green initiatives such as the use of composting and natural closed-loop cycles, herb garden, natural spring water pool and environmental planning of the resort to minimize the number of felled trees during construction works. SBR has two natural closed-loop cycles for its food waste, including using 25kg of food waste daily for vermicomposting (using earthworms), which produce castings that are used for vegetation fertilizer and also fresh farm produce in their garden. Secondly, food waste is also fed to local tilapia fishes in their ponds onsite. The tilapia produces nutrient-rich water which is then used for watering the plants. As of 2019, the successful programme has been attended by more than 21,000 people, which is testament to SBR’s strong efforts to reach out to the public and community. There are also numerous environmental outreach messages onsite and in the guest rooms for visitors to adopt during their stay.

Another example would be Ola Beach Club that currently runs free kayak tours for guests who volunteers to pick up marine litter whilst on sea. This is a great way to incentivize and educate visitors to leave a destination in a better place than when they first step foot on it.

Resorts World Sentosa (RWS) also has strong efforts in conserving biodiversity and operates sustainably within its premises\(^8\). RWS recently achieved the Global Sustainable Tourism Council certification for Sustainable Destinations and have also received awards such as the Singapore Packaging Agreement Award (Top Achievement Award) in 2019 and Best Business Event Venue Experience\(^9\) for Singapore MICE Forum 2019 (SACEOS). The integrated resort uses compost to enrich soil and organic pesticides to biologically control plant pests and diseases and cares for their trees through regular surveys and soil treatment to ensure no termite infestations occur. On marine biodiversity, RWS sources for sustainable fish feed and conduct careful collection planning in line with the Association of Zoos and Aquariums’ Animal Programme Standards. RWS is also strong in promoting environmental education, such as

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6 They are namely Siloso Beach Resort, W Hotel, Capella Singapore, Shangri-la Rasa Sentosa Resort & Spa, Far East Hospitality Management Singapore, Ola Beach Club, Tanjong Beach Club, Resorts World Sentosa, Mount Faber Leisure Group and Sentosa Golf Club who are part of the Sentosa Carbon Neutral Network. Refer to segment below for further details on the alliance.


their partnership with Early Childhood Development Agency to develop online resources for 15 preschools, trained and equipped 24 teachers, and engaged more than 500 preschoolers in the topic of marine conservation.

As part of an ongoing collaboration with Singapore Tourism Board’s Tour Experience Innovation Lab initiative, SDC is developing a series of sustainability themed signature experiences and tours alongside local tour operators and guides to form unique Sentosa tour itineraries by Q4 2021. The content would be judged based on how it highlights the island’s history, flora and fauna, and marine conservation efforts to our guests.

Prior to COVID-19, SDC also curated and organized events such as the annual International Coastal Cleanup Singapore since 2013. The annual cleanup saw approximately 40-50 staff from SDC Group and island business community (such as Mega Adventure) participating in efforts to keep the beaches free from marine litter and inculcating a sense of ownership and environmental stewardship among employees. Each session collected between 50 – 100kg worth of marine debris ranging from cigarette butts, fishing gear, spare tyres, plastics, styrofoam etc.

Fig 10: Staff participation in the International Coastal Cleanup Singapore in 2019

c) Use Sentosa as a living classroom to educate guests

Sentosa currently partners with the Ministry of Education and schools (from pre-school to secondary level) to offer a wide array of unique learning journey programmes. The island is home to many nature trails and wildlife that educators can leverage on to curate refreshing alternatives to existing structured curriculums. An example would be the Marine ConservAction programme which catered an enriching trip for approximately 100 students from Jurong Calvary Kindergarten and 20 students from PCF Sparkletots Preschool in 2018 to the coasts of Sentosa in small groups over a few days. They were given an introduction to coastal ecology, local marine biodiversity and conservation as well as water safety to allow
them to appreciate the need for a litter-free coastal environment. This is then followed by a service-learning opportunity of picking litter at the beach. Students then analyze the rubbish collected and determine the most common types of litter on our shores. The programme provides the foundation for potential follow-up projects to tackle the problems of coastal pollution. Sentosa’s Animal and Bird Encounter also used to be a designated animal attraction on the island focusing on environmental education, rescue and rehabilitation of injured animals as part of its wildlife management efforts.

**Fig 11. The public learning about Sentosa’s coasts as part of the Marine ConservAction programme.**

**Key success factors**

*What helped you tackle the issues?*

1) **SDC serves as the overall Sentosa island landlord and public precinct operator**

As the single organization that manages the island and landlord of the businesses, SDC is able to develop the strategy for sustainability on Sentosa and coordinate the implementation of our key goals and initiatives amongst island partners in the areas such as reducing carbon emissions, waste generation, encourage renewable energy options and encouraging sustainable experiences for guests. For example, SDC is able to develop the Sentosa Carbon Neutral Network (SCNN) as a landlord with key island businesses to tackle carbon neutrality and share best practices. The guest management policy is also centralized and SDC is also in a position to aggregate the efforts of individual businesses⁹ on the island and encourage them

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⁹ Sentosa Development Corporation is a Statutory Board under the Ministry of Trade and Industry. Its charter since inception in 1972 has been to oversee the development, management, marketing and promotion of the island of Sentosa as a resort destination for locals and tourists. [Link]
to explore joint solutioning and sharing of ideas. SDC will continue to work closely with our island businesses to explore island initiatives that address the impacts of climate change and encourage climate action.

2) Alignment with Singapore government sustainability strategy

As a statutory board, SDC is strongly aligned with the Singapore government who also has a strong emphasis and focus on sustainability efforts. For example, we work closely with National Parks Board (NParks) on biodiversity and conservation efforts, the Urban Redevelopment Authority (URA) on urban and environmental planning, the Public Utilities Board (PUB) on coastal protection, the National Heritage Board (NHB) on heritage conservation, Ministry of Education (MOE) on education for youths and the Singapore Tourism Board (STB) on tourism policies. Working hand in hand with government organizations has enabled SDC to leverage on the expertise of the different organizations and align our efforts to the priority areas and goals under a whole of government effort.

3) Alignment with island business ecosystem

SDC has developed strong bonds with some of the businesses on the island who are aligned with SDC’s goals and see sustainability as part of their business priority and brand value. Embarking on an initiative to form the SCNN10, it would enable all stakeholders to work together towards our common goal of accelerating sustainable and carbon neutrality efforts and becoming a recognized sustainable destination.

Through training sessions and open communication, SDC undertakes the responsibility to educate our island businesses on the best practices when encountering wildlife on the island. With the community more conscious on how their operations impact the environment, the effect of this awareness will trickle down to the visitors they engage with. This provides an opportunity to positively impact and educate the millions of guests that visit Sentosa every year.

10 SCNN is a leadership network of island businesses including beach clubs, hotels, attractions and F&B establishments that with a common goal of accelerating sustainable efforts on Sentosa. Members jointly discuss emerging trends, explore opportunities to build capabilities, share resources and leverage economies towards outcomes that mitigate climate impacts in Sentosa. There are currently 10 active members and they are namely Siloso Beach Resort, W Hotel, Capella Singapore, Shangri-la Rasa Sentosa Resort & Spa, Far East Hospitality Management Singapore, Ola Beach Club, Tanjong Beach Club, Resorts World Sentosa, Mount Faber Leisure Group and Sentosa Golf Club.
4) **Focusing on nature conservation as complementary to our overall sustainability drive to become a carbon neutral destination**

Focusing on nature and biodiversity conservation is part of our overall strategy to be carbon neutral and a globally recognized sustainable destination. While there are ongoing initiatives to look into carbon mitigation solutions and technologies, we emphasize the importance of nature conservation in the organization as providing important ecosystem services, especially its role in carbon sequestration. Our collaborations with Institutes of Higher Learning (IHLs) on research projects enable a more scientific and knowledge-based approach towards meeting our goals and nature conservation amidst the rising threat of climate change.

**Lessons learned**

*What challenges were faced, and how were they overcome?*

*How has the process contributed to your destination’s planning and development?*

1) **Overcoming resource limitations through increasing leverage on technology**

There is a limit to the frequency and number of patrols that rangers can take to ensure that environmental guidelines are adhered to. To maximize productivity and manage increasing costs, SDC is on a constant lookout for ways to leverage technology to increase surveillance at the ecological sensitive. E.g. cameras are placed at key entrance spots of identified biodiversity rich areas as a way to deter unauthorized visitors.

2) **Managing guest demand and expectations through firm and open communication**

Due to the increasing popularity of the nature tours and high interest in the education and outreach programmes, there has been an oversubscription, resulting in many visitors being unable to participate. To ensure fairness, SDC employs an online booking system that allows the public to book their slots 1 month in advance while respecting maximum carrying capacity. The organizing team also keeps to the tour capacity stipulated to ensure that access to sensitive sites remain controlled.

3) **Staying adaptable amidst an uncertain tourism climate**

Due to the pandemic, large group tours were not able to take place due to existing safe distancing measures. The organizing team had to be adaptive to change the group sizes and ensure they meet the existing safe distancing measures as part of the tour. The team is currently also exploring ways to hold live intertidal or biodiversity tours to allow visitors to participate in the tour through their mobile phones and laptops. Through the live tours, it not
only addresses the concerns regarding pandemic-related measures, but also reduces the human impact on the environment through fewer disturbances to the natural environment.

The process has contributed to Sentosa’s planning and development through the following ways:

i) Making sustainability and conservation forefront in Sentosa’s masterplan development strategy, as it focuses on ensure that the environment is not degraded and healthy for the enjoyment and appreciation by future visitors.

ii) Provides emphasis to internal stakeholders and visitors that safeguarding the island’s sensitive habitat sites and protection of biodiversity is an ongoing commitment and requires a collaborative and combined effort with visitors.

Results, achievements and recognitions

Were there any rewards/achievements for the efforts/good practices?
What quantitative/qualitative data can you provide to show the benefits for community tourists and nature?
Ensure solutions can be applied to other destinations (transferability)

1) Positive feedback and increasing demand for nature programmes

For the Siloso Headland Intertidal Programme, we’ve seen a rising trend in the number of persons coming for the sessions throughout the years and this indicates the popularity of our tours as an environmental education tool. In 2020, due to COVID-19, sessions were forced to cancel and only a few can take place under strict guidelines. With the opening up of restrictions in 2021, there’s been more demand for local tours.

This is also complemented by positive reviews and compliments received for the Siloso Headland Intertidal Tour and SDC guides through our feedback channel, as follows:

- “I think such exclusive walks really excite us and had given us a different side of Sentosa many never knew. The bonus on sharing geographical and history of Sentosa Headland really sets an unique tone from other guided walks that we have been.”
- “The guide was knowledgeable about the area we were exploring, and it was obvious that she has great passion and commitment for ecological diversity and management. Through her, a whole new dimension of Sentosa (previously missing in my impressions of the place) emerged – its natural diversity and beauty.”
- “To be honest, i loved it. as to what i would change, nothing. it is a good sharing. personally, i had fun. it is good to share with visitors. i regard myself as a beginning (sic) person in the area (marine biodiversity) so it was great!”
2) Island greenery coverage of 50%
There have been many positive impacts from the implementation of the solutions and measures to balance environmental education and increased visitorship with the protection of our island biodiversity. Thus far, SDC has maintained 50% greenery coverage for the green and open areas on Sentosa based on the latest satellite imaging study conducted in 2019, and this is testament to SDC’s tree planting efforts and commitment to protecting our natural assets.

![Image](image-url)

**Fig 12: Drone shot of Imbiah and Siloso Beach**

3) Positive feedback from staff on internal sustainability awareness efforts
One other successful initiative is the provision of environmental education through lunch talks for staff as many were able to ‘experience’ the beauty of wildlife through photos and videos, and understand the challenges and efforts put forth by conservationists. During a talk conducted by Wild Singapore in Sep 2020 on coral reef and secret shores of Singapore, there was a satisfaction score of 4.8/5 and we received following feedback from participants (when asked what the most useful section was in the session):

- “Surprised that there are (sic) so much beautiful marine life on our murky looking waters!”
- “The whole part on balancing education and conservation was great”
- “Getting to know the different marine animals along our shores”
- “It is the safest and least impactful way to look at the marine life at Tanjong Rimau.”

On the transferable measures, there are a few that can be applied to other destinations looking to mitigate climate change impacts and protect existing sensitive habitats from tourism impacts.

A. Utilize Technology: Digitalization of biodiversity content can be placed on the destinations websites to encourage appreciation and wonderment of the wildlife. One example is highlighting the biodiversity and the unique habitats one can observe if they were on the island. On Sentosa, species such as peacocks can be found in abundance, and are free-roaming and protected on the island. Marine habitats are featured as well to highlight the rich biodiversity on our shores.
Fig 13: Biodiversity content and articles on Sentosa’s webpages (eg. Sentosa’s Perfect Peafowls and Sentosa’s Marine Habitats)

B. Leverage on other stakeholders: Partnerships with local interest groups and stakeholders are important to leverage on the research expertise and efforts of people that can benefit the destination as a whole. It also brings people together for a common cause.

C. Involve all parts of the organization in the sustainability efforts, making it a cultural imperative: Educational outreach efforts to guests and employees/staff will encourage greater ownership towards the common goal of protecting our environment and mitigating negative impacts; it also highlights one’s understanding on the importance of conserving biodiversity for future generations.
Additional references

Provide links to further information. Pictures and videos should be available for download either from Youtube, Vimeo or other Cloud-based (Google/ One Drive) download URL.

A. Programmes and Website Links
1. Sentosa Nature Area Guidelines
2. Sentosa’s Marine Habitats
3. Sentosa Nature Discovery Skills Guide
4. Heritage Trees on Sentosa
5. Sentosa Turtle Encounters
6. Discovering Nature on Sentosa
7. Sustainability and Conservation at Sentosa
8. Siloso Beach Resort Eco Tour

B. News Coverage
1. The Straits Times – Exploring Sentosa’s Tanjong Rimau
3. The Straits Times (2018) – More than 100 hawksbill turtle eggs hatch in Sentosa; fourth turtle hatching there since 1996
4. Today Singapore (2019) - 100 hawksbill turtles released into the sea after rare hatching on Sentosa
5. The Straits Times (2021) – Hidden Sentosa: Spot marine marvels from feisty mantis shrimps to cool blue flatworms on a coastal tour
6. The Straits Times (2021) – Marvels of Marine Life
7. SMBC Singapore Open – All abuzz at Sentosa Golf Club

C. Video Links
1. Hawksbill turtles on Sentosa
2. Marine Spiders
3. Hairy Crab
4. Banded Brittle Star
5. Tanjong Rimau
6. Sentosa’s Nature Spots
Annex A

Findings from Sentosa Biodiversity Survey 2018

Background of Survey

- Enviro Pro Green Innovations Pte Ltd was commissioned by SDC to conduct a Biodiversity Study for Sentosa Island to determine the status of various species present on the island.
- Birds were surveyed between October 2017 and July 2018 to capture the breeding and migratory seasons. All other taxa groups (Mammals, Odonates, Butterflies, Reptiles and Amphibians) and intertidal species were surveyed between October 2017 and April 2018 (7 months). Camera traps were also placed at strategic locations along identified transects.
- Findings from the study have been fed into the Sentosa-Brani Master Plan.

Summary of Survey Findings

- A total of 474 species were recorded over a total of 13,292 observations across the island during the course of the study, of which approximately 80 species are estimated to be species of conservation concern nationally and/or globally. Birds represent the most diverse taxa group which makes up 22% of all records.
- There is notably higher diversity at Serapong and Central Sentosa compared to other areas.
- 99 species were recorded along the Tanjong Rimau intertidal zone, covering a range of taxa including Molluscs (Bivalve & Gastropod), Cnidarians, Crustaceans, Porifera, Worms (Annelid & Platyhelminth), Seagrass, and Algae.
- It is encouraging to note that new species have been recorded across all terrestrial fauna groups. These have even included medium size mammals, such as the Asian Palm Civet (Paradoxurus musangus) and a new snake, the Sunbeam Snake (Xenopeltis unicolor). The study also details the first formal study of Odonates for the island, recording 35 species with some of conservation concern.
- Populations of species either of global or national conservation concern have been recorded island wide. In particular, endangered birds including the Oriental Pied Hornbill (Anthracoceros albirostris), Oriental Magpie Robin (Copsychus saularis), and Red Junglefowl (Gallus gallus) are doing very well.
- A summary table of faunal results is indicated below.

<table>
<thead>
<tr>
<th>Taxa</th>
<th>Species</th>
<th>Observations (Transect + Camera Trap)</th>
<th>Percentage of species found in Singapore</th>
<th>Number of Transects</th>
<th>Number of Surveys</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mammals</td>
<td>17</td>
<td>1065</td>
<td>28%</td>
<td>13</td>
<td>182</td>
</tr>
<tr>
<td>Amphibians</td>
<td>8</td>
<td>440</td>
<td>28%</td>
<td>13</td>
<td>182</td>
</tr>
<tr>
<td>Reptiles</td>
<td>14</td>
<td>460</td>
<td>13%</td>
<td>13</td>
<td>182</td>
</tr>
<tr>
<td>Birds</td>
<td>112</td>
<td>7394</td>
<td>28%</td>
<td>20</td>
<td>300</td>
</tr>
<tr>
<td>Odonates</td>
<td>35</td>
<td>1211</td>
<td>29%</td>
<td>20</td>
<td>180</td>
</tr>
<tr>
<td>Butterflies</td>
<td>89</td>
<td>2701</td>
<td>27%</td>
<td>20</td>
<td>180</td>
</tr>
</tbody>
</table>
Selected Photos of Faunal Biodiversity on Sentosa

Pink-necked Green Pigeon (*Treron vernans*)

Crimson Sunbird (*Aethopyga siparaja*)

Knight (*Lebodea martha*)

Paradise Tree Snake (*Chrysopelea paradisi*)

Blue Sprite (*Pseudagrion microcephalum*)

Long Tailed Macaque (*Macaca fascicularis*)

Selected Photos of Intertidal Biodiversity on Sentosa

Oval Sea Grapes (*Caulerpa racemosa*)

Button Zooanthid (*Zoanthus sp.*)

Tape Seagrass (*Enhalus acoroides*)

Spotted Sea Hare (*Aplysia dactylomela*)

Tiny-in-a-sponge Brittlestar (*Ophiactis savignyi*)

Daisy Green Seaweed (*Parvocaulis parvulus*)