About Mandai Wildlife Group

Mandai Wildlife Group is dedicated to caring for the planet and protecting animals and nature. Conservation education is intrinsic to all interactions with the Group, to inspire action for a healthier world.

Mandai Wildlife Group is the steward of Mandai Wildlife Reserve, a unique wildlife and nature destination in Singapore that is home to world-renowned wildlife parks which connect visitors to the fascinating world of wildlife. The Group is driving an exciting rejuvenation plan at Mandai Wildlife Reserve, adjacent to Singapore’s Central Catchment Nature Reserve, that will integrate five wildlife parks with distinctive nature-based experiences, green public spaces and an eco-friendly resort.

The wildlife parks managed by the Group are accredited by two of the top international regional zoo associations, European Association of Zoos and Aquaria (EAZA), and Zoo and Aquarium Association of Australasia (ZAA), and the Group is an active member of the Southeast Asian Zoo and Aquarium Association (SEAZA) and the World Association of Zoos and Aquariums (WAZA).

Mandai Wildlife Group is committed to the vision of sustainable populations of wildlife and human communities thriving in functioning ecosystems. The Group will contribute by connecting people with wildlife, championing sustainable living, as well as participating in and supporting conservation efforts to safeguard wildlife and their habitats. The actions and contributions of the Mandai family of entities and brands are also aligned to the UN Sustainable Development Goals, in their focus to nurture a healthier world. The Group will work with our partners and like-minded collaborators to make a positive impact.

The Group provides funding and in-kind support to Mandai Nature for conservation work across Southeast Asia.

Mandai Global, an entity that is part of the Group, will establish and operate new lines of business anchored in creating positive outcomes for nature and wildlife.

Vision
To be a world-leading zoological institution that inspires people to value and conserve biodiversity.

Mission
We provide meaningful and memorable wildlife experiences with a focus on protecting biodiversity in Singapore and the region.

Values

Excellence
We strive for the highest standards in all we do.

Integrity
We are honest and fair in all our dealings.

Teamwork
We achieve more together.

Care for Wildlife
We protect wildlife and provide excellent care for our animals.

Hospitality
We serve from the heart.

Sustainability
We embrace sustainable best practices.
Over this period, our road to recovery from the global pandemic was strewn with obstacles. Time and again our park operations and development workstreams were disrupted by spikes in Covid-19 cases. But despite the difficult circumstances, we found reasons to cheer.

The start of the financial year coincided with giant pandas Kai Kai and Jia Jia’s seventh breeding season. Five months later, Singapore’s first giant panda cub arrived – the happy culmination of extensive efforts to learn from our Chinese partners and implement best practices in giant panda care and reproductive science. Amidst the doom and gloom of the global pandemic, Le Le’s birth was like a beacon of hope, marking another step in the right direction towards conserving this charismatic species. This reminded us of the wonders that can be achieved when nations share knowledge and unite behind a common cause.

In another international cooperative effort, our conservation arm Mandai Nature engineered the transfer of another small population of lady’s and long-nosed turtles from Singapore to their native Indonesia. Endemic to Roti Island, these extraordinary turtles are believed to be extinct in the wild. Since 2015, we have been caring for an assurance colony of this species in Singapore Zoo, and 13 individuals from our colony were selected for the reintroduction programme. A great deal of work was put in to raise healthy individuals, restore the turtles’ natural habitat and engage with the local community to ensure the turtles remain safeguarded. We did this collaboratively, working close with like-minded conservation organisations and the highly supportive Indonesian government. This is a remarkable example of how applying the IUCN’s One Plan Approach of assessing, planning and acting for the good of a threatened species can bring it back from a state of near extinction.

In order to protect biodiversity, we must do our bit to protect the environment. Working towards our goal to be carbon neutral by 2034, we prioritise sustainable operations to reduce carbon emissions and water consumption. The solar panels on our new quarantine building and multi-storey car park are in operation, while we have built and commissioned two wastewater recycling plants that are expected to meet 21% of our precinct’s future water needs. We have also begun construction of a dedicated quarantine building and multi-storey car park, which will be in place by the end of 2022.

To meet 21% of our precinct’s future water needs. We have also begun construction of a dedicated quarantine building and multi-storey car park, which will be in place by the end of 2022.

Our collective commitment to a healthy, biodiverse planet is now embodied in our Mandai master brand. After months of planning, we are embarking on a new chapter with a new corporate brand – the Mandai Wildlife Group – along with a conservation arm in Indonesia and a commercial accelerator in Mandai Global. Mandai Wildlife Reserve encompasses our existing and upcoming wildlife parks and other offerings, including the indoor attractions, resort and green public spaces that are under construction. The rebirading comes at a time when action is critically needed to reverse the devastating decline in the earth’s biodiversity. As such, we will redouble our commitment to work for a more sustainable future.

This commitment is what drives us to constantly innovate. Ranger Buddies (RB) is a novel programme that inspires children to care for wildlife and the environment every day and everywhere. Through a connected learning ecosystem, Ranger Buddies can participate in fun missions in schools, at home and in parks with a view to making the world a better place. This will be anchored by our new KidzWorld under development within the Singapore Zoo which promises to be a place where children can nurture a love for animals and nature, while creating positive memories with their families through discovery and play.

Brand new experiences are nearing completion at Bird Paradise, our new bird park. The aviaries and amphitheatre look more impressive with each passing day, as the finishing, theming and planting work come together. We have also commenced work on a new Night Safari amphitheatre, with an increased capacity and protection from the elements.

We were honoured that our Night Safari was presented with the prestigious Thea Classic Award by the Themed Entertainment Association (TEA) for standing the test of time as an outstanding wildlife park, delivering the unique experience of viewing nocturnal animals in a tropical forest. Our congratulations go out to everyone who has contributed to Night Safari’s enduring success!

It will take a while before tourism recovers to pre-Covid levels, but we will ride the recovery and explore tapping on new market segments and new lines of business to strengthen Mandai Wildlife Group. Our collective ability to innovate and seek out new opportunities in these challenging times has strengthened the organisation. We would like to thank our board members, staff, volunteers, members, donors and sponsors for your steadfast support to help us stay the course. With your support, we look forward to even better things to come in the years ahead!
The Triple Bottom Line, Strategic Thrusts & Sustainable Development Goals (SDGs)

Our Commitment To Key Sustainable Development Goals (SDGS)

<table>
<thead>
<tr>
<th>3Ps</th>
<th>STRATEGIC THRUSTS</th>
<th>SDGs</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLANET</td>
<td>Provide World-class Care For Our Living Collection</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Be A Regional Leader In Environmental Sustainability &amp; Conservation</td>
<td>7, 11, 14, 16, 18, 20, 21</td>
</tr>
<tr>
<td>PEOPLE</td>
<td>Apply Leading Organisation &amp; HR Practices</td>
<td>7, 12, 13, 16, 17</td>
</tr>
<tr>
<td></td>
<td>Forge A Strong National Love &amp; Pride For Our Parks</td>
<td>4, 11, 14, 15, 16</td>
</tr>
<tr>
<td>PERFORMANCE</td>
<td>Create Exceptional Guest Experiences</td>
<td>4, 10, 13, 14, 17</td>
</tr>
<tr>
<td></td>
<td>Ensure Long-term Commercial Viability</td>
<td>12, 13, 14, 17</td>
</tr>
</tbody>
</table>

QUALITY EDUCATION
Our parks are living classrooms that strengthen early childhood and multi-disciplinary learning, including the mother tongue languages, as well as 21st century competencies through volunteerism, work attachment and career guidance. Through our educational offerings, we empower guests, including those with special needs and from disadvantaged backgrounds, with the chance to learn about wildlife and connect with nature. Robust training for our staff facilitates lifelong learning and acquisition of specialist skills.

AFFORDABLE AND CLEAN ENERGY
We monitor energy consumption in our parks through a comprehensive energy metering network. We are converting to energy-saving electrical devices and solar panels. Our entire tram fleet runs on electricity. The principle of reducing energy consumption guides all development work in Mandai.

SUSTAINABLE CITIES AND COMMUNITIES
We galvanise the community to refuse single-use plastic and to choose sustainably sourced products. 80% of plastic items used in our F&B front-of-house operations have either been eliminated or replaced by reusable or alternative materials. We serve wildlife-friendly coffee and sustainable seafood at our F&B outlets and offer sustainable merchandise at retail outlets to advocate for sustainable living.

RESPONSIBLE CONSUMPTION AND PRODUCTION
Our green procurement road map, with its clear targets, guides us to work with suppliers to procure sustainable goods and services. We diversify and source for more sustainable alternatives for our animal feed, supporting local produce where possible, to reduce our carbon footprint. Other than reducing energy and water consumption, we are working towards achieving zero waste through circularity.

CLIMATE ACTION
Our operation is guided by sustainable best practices in every possible way to reduce direct or indirect carbon emissions to mitigate climate change and to support our goal to be carbon neutral by 2024.

LIFE BELOW WATER
Through River Wonders, we highlight the fragility of river ecosystems to our guests, and encourage them to take action to protect freshwater life forms, which are disappearing faster than those on land or in the sea. We support local and regional conservation projects to protect biodiversity in aquatic ecosystems. We spread the message on plastic pollution and rally our guests to join us in taking sustainable action.

LIFE ON LAND
We provide world-class care for our animals, many of whom serve as ambassadors to connect people with the natural world. Through conservation messaging with a strong call to action, we encourage people to do their part for wildlife. We work with other zoos through Managed Species Programmes to help save threatened species. We contribute to these global programmes as species coordinators for 14 threatened species. Through our conservation arm Mandai Nature, we support local and regional conservation work to reverse species loss, protect ecosystems, and engage local communities. We are directly involved in saving threatened wildlife such as the Sunda pangolin and the Raffles' banded langur.

PARTNERSHIP FOR THE GOALS
We forge strong partnerships, locally and globally, with wildlife institutions, conservationists, NGOs, governmental agencies, businesses, sponsors, donors, schools, volunteers and various communities to achieve our goals.
Mr. Tan Chuan-Jin is the current Speaker of the Parliament of Singapore. He has served as the Minister for Social and Family Development and Minister for Manpower. He is currently Adviser to the National Council of Social Service and Governor of the Singapore National Commission for UNESCO and for ASEAN. He is also a member of the Advisory Board of the Singapore National Commission for UNESCO and of the Singapore National Commission for the UN Decade of Education for Sustainable Development.

Mr. Tan Chuan-Jin serves on the boards of the Singapore National Commission for UNESCO and for ASEAN. He is also a member of the Advisory Board of the Singapore National Commission for the UN Decade of Education for Sustainable Development.

Mr. Tan Chuan-Jin has also served as Chairman of Mandai Global, a wholly-owned subsidiary of Mandai Park Holdings which focuses on establishing new lines of business in adjacent industries, and on the board of Mandai Nature, the conservation arm of the Mandai Wildlife Group. Mr. Tan Chuan-Jin acts as an Advisor to the Board of the Changi Airport Group.

Ms. MC DIANE NICHOLSON is the Chief Executive Officer of National Gallery Singapore and Head of the Visual Arts Cluster (VAC) Singapore comprising the Singapore Art Museum, Singapore Tyler Print Institute and the National Gallery Singapore. She is the Chair of Yong Siew Toh Conservatory of Music in NUS, a member of the Yale-NUS Governing Board and Singapore’s Non-Resident Ambassador to the Republic of Chile. She chairs the Singapore Book Council and Shirin Tazad Program in Singapore Management University. In 2021, she was appointed an Advisory Board Member of the Conferences, Global Sustainability Centre, Europe and the Climate Governance Singapore Advisory Board.

Mr. Adrian CHUA is the Deputy Secretary (industry) and Chief Sustainability Officer at the Ministry of Trade and Industry. Prior to this, he served as Deputy Secretary at the Ministry of Development for the National Environment Agency and the Executive Board of the International Monetary Fund, and in the Monetary Authority of Singapore. Mr. Chua is currently Chair of the Audit Committee and board member of OSO National Laboratories, and a board member of Santos Singapore Defence and Construction Corporation.

Mr. NG Long is the CEO of the Land Transport Authority. Prior to this, he has served as CEO of the Jurong Town Corporation, Urban Redevelopment Authority and the National Parks Board. He currently serves as a member of the Advisory Board for SMU Real Estate Programme.

Ms. NAM KYOOL JUN is the President of the Singapore National Commission for UNESCO and for ASEAN. She chairs the Singapore Book Council and Shirin Tazad Program in Singapore Management University. In 2021, she was appointed an Advisory Board Member of the Conferences, Global Sustainability Centre, Europe and the Climate Governance Singapore Advisory Board.

Mr. Dilhan Pillay is the CEO of Temasek International, a position he has held since April 2019.

Dilhan has held various leadership roles in Temasek, including Head of the Investment, the Portfolio Management and the Enterprise Development Groups. He has also led the Temasek market teams in Singapore and the Americas.

Dilhan serves on the boards of the National Research Foundation in Singapore, Enterprise Singapore and the Peterson Institute for International Economics. He is also a member of the Future Economy Council, the Financial Centre Advisory Panel of the Monetary Authority of Singapore, the National Jobs Council, the Singapore Judicial Service Commission and the Singapore National Commission for UNESCO. He is also a member of the Peterson Institute for International Economics and the Singapore National Commission for UNESCO.

Mr. Adrian LOO is a Lead Independent Director of listed companies including Head of the Investment, the Portfolio Management and the Enterprise Development Groups. He has also led the Temasek market teams in Singapore and the Americas.

Dilhan has held various leadership roles in Temasek, including Head of the Investment, the Portfolio Management and the Enterprise Development Groups. He has also led the Temasek market teams in Singapore and the Americas.

Dilhan serves on the boards of the National Research Foundation in Singapore, Enterprise Singapore and the Peterson Institute for International Economics. He is also a member of the Future Economy Council, the Financial Centre Advisory Panel of the Monetary Authority of Singapore, the National Jobs Council, the Singapore Judicial Service Commission and the Singapore National Commission for UNESCO. He is also a member of the Peterson Institute for International Economics and the Singapore National Commission for UNESCO.

Mr. Mike BARCLAY is a Senior Independent Director of listed companies including Head of the Investment, the Portfolio Management and the Enterprise Development Groups. He has also led the Temasek market teams in Singapore and the Americas.

Dilhan serves on the boards of the National Research Foundation in Singapore, Enterprise Singapore and the Peterson Institute for International Economics. He is also a member of the Future Economy Council, the Financial Centre Advisory Panel of the Monetary Authority of Singapore, the National Jobs Council, the Singapore Judicial Service Commission and the Singapore National Commission for UNESCO. He is also a member of the Peterson Institute for International Economics and the Singapore National Commission for UNESCO.

Ms. MSCLAIRE CHIANG is the co-founder of Banyan Tree Hotels & Resorts, Chair of the Science and Technology Advisory Board, Chair of the Singapore National Commission for UNESCO and for ASEAN. She is a Singapore National Academy of Science and Governing Member of the Singapore Environmental Council.

Mr. Stephen FORSHAW is a Non-Resident Ambassador to the Republic of Chile.

Mr. TAN Chuan-Jin is the current Speaker of the Parliament of Singapore. He has served as the Minister for Social and Family Development and Minister for Manpower. He is currently Adviser to the National Council of Social Service and Governor of the Singapore National Commission for UNESCO and for ASEAN. He is also a member of the Advisory Board of the Singapore National Commission for UNESCO and for ASEAN.

Mr. Tan Chuan-Jin has also served as Chairman of Mandai Global, a wholly-owned subsidiary of Mandai Park Holdings which focuses on establishing new lines of business in adjacent industries, and on the board of Mandai Nature, the conservation arm of the Mandai Wildlife Group. Mr. Tan Chuan-Jin acts as an Advisor to the Board of the Changi Airport Group.

Ms. MC DIANE NICHOLSON is the Chief Executive Officer of National Gallery Singapore and Head of the Visual Arts Cluster (VAC) Singapore comprising the Singapore Art Museum, Singapore Tyler Print Institute and the National Gallery Singapore. She is the Chair of Yong Siew Toh Conservatory of Music in NUS, a member of the Yale-NUS Governing Board and Singapore’s Non-Resident Ambassador to the Republic of Chile. She chairs the Singapore Book Council and Shirin Tazad Program in Singapore Management University. In 2021, she was appointed an Advisory Board Member of the Conferences, Global Sustainability Centre, Europe and the Climate Governance Singapore Advisory Board.

Mr. Adrian CHUA is the Deputy Secretary (industry) and Chief Sustainability Officer at the Ministry of Trade and Industry. Prior to this, he served as Deputy Secretary at the Ministry of Development for the National Environment Agency and the Executive Board of the International Monetary Fund, and in the Monetary Authority of Singapore. Mr. Chua is currently Chair of the Audit Committee and board member of OSO National Laboratories, and a board member of Santos Singapore Defence and Construction Corporation.

Mr. NG Long is the CEO of the Land Transport Authority. Prior to this, he has served as CEO of the Jurong Town Corporation, Urban Redevelopment Authority and the National Parks Board. He currently serves as a member of the Advisory Board for SMU Real Estate Programme.

Ms. NAM KYOOL JUN is the President of the Singapore National Commission for UNESCO and for ASEAN. She chairs the Singapore Book Council and Shirin Tazad Program in Singapore Management University. In 2021, she was appointed an Advisory Board Member of the Conferences, Global Sustainability Centre, Europe and the Climate Governance Singapore Advisory Board.

Mr. Adrian LOO is a Lead Independent Director of listed companies including Head of the Investment, the Portfolio Management and the Enterprise Development Groups. He has also led the Temasek market teams in Singapore and the Americas.

Dilhan serves on the boards of the National Research Foundation in Singapore, Enterprise Singapore and the Peterson Institute for International Economics. He is also a member of the Future Economy Council, the Financial Centre Advisory Panel of the Monetary Authority of Singapore, the National Jobs Council, the Singapore Judicial Service Commission and the Singapore National Commission for UNESCO. He is also a member of the Peterson Institute for International Economics and the Singapore National Commission for UNESCO.

Mr. Mike BARCLAY is a Senior Independent Director of listed companies including Head of the Investment, the Portfolio Management and the Enterprise Development Groups. He has also led the Temasek market teams in Singapore and the Americas.

Dilhan serves on the boards of the National Research Foundation in Singapore, Enterprise Singapore and the Peterson Institute for International Economics. He is also a member of the Future Economy Council, the Financial Centre Advisory Panel of the Monetary Authority of Singapore, the National Jobs Council, the Singapore Judicial Service Commission and the Singapore National Commission for UNESCO. He is also a member of the Peterson Institute for International Economics and the Singapore National Commission for UNESCO.
Mandai Wildlife Group has a conservation arm in Mandai Nature and a commercial accelerator in Mandai Global.
Year In Review
FY 2021 – 2022

Singapore’s first giant panda cub, Le Le, was born to Kai Kai and Jia Jia on 14 August 2021, the 7th day of the 7th month of the lunar calendar.

Lowered carbon footprint by 10% from baseline in FY19/20, taking us closer towards our goal.

Soft launched Ranger Buddies programme which inspires children to care for wildlife and the environment every day and everywhere through fun missions.

Engaged 205,000 people through conservation and sustainability education. Though we could not conduct many programmes in-person, we kept up the engagement virtually and achieved more than half of pre-Covid numbers.

Night Safari won the prestigious Thea Classic Award presented by the Themed Entertainment Association.

Worked with other wildlife institutions on 155 Managed Species Programmes (up from 136 last FY) to save threatened species. 14 of these programmes (up from 11 last FY) are coordinated by our staff.

Held our inaugural Innovation Forum. Featuring speakers from tech-industry luminaries like Grab, Singtel and Google, the forum had 276 participants from across the globe and garnered 15,000 social media views.

Embarked on a new chapter with a new corporate brand – the Mandai Wildlife Group – along with a conservation arm in Mandai Nature and a commercial accelerator in Mandai Global.

Operationalised new quarantine facilities.

Completed roof installation of Bird Paradise entrance.

Received Temporary Occupation Permit (TOP) for large water treatment plant.

Successfully repatriated 13 Roti snake-necked turtles from the assurance colony in Singapore Zoo to their native country of Indonesia: a significant milestone in ongoing conservation efforts for the recovery of the species’ wild population.

Worked with other wildlife institutions on 155 Managed Species Programmes (up from 136 last FY) to save threatened species. 14 of these programmes (up from 11 last FY) are coordinated by our staff.

Held our inaugural Innovation Forum. Featuring speakers from tech-industry luminaries like Grab, Singtel and Google, the forum had 276 participants from across the globe and garnered 15,000 social media views.

Embarked on a new chapter with a new corporate brand – the Mandai Wildlife Group – along with a conservation arm in Mandai Nature and a commercial accelerator in Mandai Global.

Operationalised new quarantine facilities.

Completed roof installation of Bird Paradise entrance.

Received Temporary Occupation Permit (TOP) for large water treatment plant.

Successfully repatriated 13 Roti snake-necked turtles from the assurance colony in Singapore Zoo to their native country of Indonesia: a significant milestone in ongoing conservation efforts for the recovery of the species’ wild population.

Worked with other wildlife institutions on 155 Managed Species Programmes (up from 136 last FY) to save threatened species. 14 of these programmes (up from 11 last FY) are coordinated by our staff.

Held our inaugural Innovation Forum. Featuring speakers from tech-industry luminaries like Grab, Singtel and Google, the forum had 276 participants from across the globe and garnered 15,000 social media views.

Embarked on a new chapter with a new corporate brand – the Mandai Wildlife Group – along with a conservation arm in Mandai Nature and a commercial accelerator in Mandai Global.

Operationalised new quarantine facilities.

Completed roof installation of Bird Paradise entrance.

Received Temporary Occupation Permit (TOP) for large water treatment plant.

Successfully repatriated 13 Roti snake-necked turtles from the assurance colony in Singapore Zoo to their native country of Indonesia: a significant milestone in ongoing conservation efforts for the recovery of the species’ wild population.
Singapore’s First Giant Panda Cub

Giant panda reproduction is unique and complex. Females ovulate only once a year, and are only receptive to the male for about 48 hours. Missing the narrow window for conception means having to wait for the next breeding season next year. Kai Kai and Jia Jia’s breeding journey began with the building of a conducive environment in their exhibits, which was complemented by attentive monitoring and behavioural conditioning as well as refinement of the artificial insemination process with the help of specialists in gynaecology and giant panda experts from China.

Jia Jia has come into oestrus quite regularly every year since 2015 and there have been annual attempts to encourage Kai Kai and Jia Jia to mate. When natural mating proved unsuccessful during the 2021 breeding season, experts from China advised our vets to perform artificial insemination before the end of Jia Jia’s receptive period. On 24 April 2021, Jia Jia underwent artificial insemination during the final stretch of her fertile period – the 47th hour of the 48-hour window.

On 10 August 2021, a foetal heartbeat was detected on an ultrasound scan on Jia Jia. A second ultrasound scan two days later revealed clear images of a giant panda foetus. Another two days later, on 14 August 2021 at 0600hrs, Jia Jia went into labour. At 0750hrs, she gave birth to a healthy panda cub - a success on her seventh breeding season!

The cub’s arrival was like a ray of light shining through the doom and gloom of the global pandemic. The people of Singapore, China and around the world rejoiced with us when the news broke. China experts lent 24/7 support to advise the team in supporting Jia Jia to raise her newborn cub, especially during the first seven days of the cub’s birth – the period of time most critical to the survival of her newborn. We are extremely grateful for their generous guidance, which has empowered our inexperienced team, boosting their confidence and providing them with the knowhow to provide the best of care for Jia Jia and her cub.

Prime Minister of Singapore Mr Lee Hsien Loong makes a special mention of Kai Kai and Jia Jia’s cub during his National Day Rally speech. The cub’s birth in the month of August 2021 coincided with our nation’s 56th birthday. It also coincided with Chinese Valentine’s Day – the seventh month and seventh day of the lunar calendar.
亲爱的凯凯和嘉嘉：
恭喜你们荣升为爸爸和妈妈了！当
我们听到嘉嘉生宝宝的消息时，我们都
非常的开心！在老师的邀请下，我们一
起用图画和文字写下来对你们的祝福!
祝福熊猫宝宝健康成长!

来自于LSH-DTE K2的小朋友们

Jaysyo Tan

Vinodh Chee

Jenny Kyu

Hedzina Hanslots

Oppenakku No

Lin Ee Tom

Juin Cheang

Jen M. Lee

Congratulations to Kai Kai and Ji Jia for the arrival of this new addition!! Good job to the WRS caregivers to the pandas @ Singapore!
A media event was held on 10 March 2022 to announce Le Le’s debut at the Giant Panda Forest with his mother, Jia Jia. The event was graced by Deputy Prime Minister and Coordinating Minister for Economic Policies Mr Heng Swee Keat (third from left) and Ambassador of the People’s Republic of China Mr Hong Xiaoyong (second from right). They were hosted by members of our Board and Senior Management, including Mr S. Dhanabalan, Chairman, Mandai Park Holdings (first from left), Mr Mike Barclay, Group CEO, Mandai Wildlife Group (second from left) and Mr Tan Chuan-Jin, Deputy Chairman, Mandai Park Holdings (first from right).

Singapore’s Deputy Prime Minister Mr Heng Swee Keat and Chinese Vice-Premier Mr Han Zheng reveal our panda cub’s name at the 21st China-Singapore Bilateral Cooperation Mechanism Meetings held virtually on 20 December 2021. The winning name – Le Le (叻叻) – garnered more than 31,000 votes out of more than 64,000 votes received in the online poll.
Launch Of A New Brand

On 13 October 2021, a new corporate identity as well as a new Masterbrand and park logos were unveiled. The new visual identity unites the Group’s wildlife parks, nature precinct and commitment to conservation.

Brand relaunch

A new corporate identity, Mandai Wildlife Group, replaces Wildlife Reserves Singapore and encompasses both our wildlife park operations and the ongoing rejuvenation work at the Mandai precinct.

The rebranding comes at a critical time when action is urgently needed to mitigate climate change and reverse the devastating decline in the earth’s biodiversity. In looking to the future, Mandai Wildlife Group will redouble its commitment to work for a more sustainable future, together with new entities - Mandai Nature and Mandai Global.

With the ongoing development for the Mandai Rejuvenation Project, the expanded suite of offerings including the existing wildlife parks will be clustered together in the new integrated destination that is Mandai Wildlife Reserve.

With the parks now under one brand, the Group also announced changes to the visual identities of its parks. While the ever-popular Singapore Zoo and Night Safari retain their names, River Safari is renamed River Wonders to better reflect the experience it offers of taking guests on a meandering walk through the aquatic world of freshwater habitats. Mandai Wildlife Reserve will also later welcome Singapore’s new bird park, replacing Jurong Bird Park. The new park, to be named Bird Paradise, will bring guests on a journey into the world of avian wonders. Rounding up the wildlife park experiences in Mandai Wildlife Reserve will be Rainforest Wild, which offers explorations within a rainforest setting where habitats, adventure and animals are woven together into one compact experience.

A new Masterbrand Mandai that embodies the passion and commitment for a thriving, biodiverse planet was also unveiled alongside the new corporate identity. The new brand world is inspired by nature and the animals under its care, which continue to spark a sense of wonder amongst guests. Its new tagline, ‘Come to life’, serves both as an invitation – to come closer to nature and experience the wonders of wildlife at Mandai Wildlife Reserve, and a call – to take action and protect the planet by making better choices every day.
Urgent action is needed to reverse the devastating decline in the earth’s biodiversity and we continue to be at the forefront of conservation efforts, starting with animals in our care and wildlife in our precinct. The Mandai Rejuvenation Project is in its fifth year, and we are getting closer to creating even more opportunities to connect people to nature. Through our conservation arm, Mandai Nature, we fund and provide in-kind support for conservation work in Singapore and across Southeast Asia.

To bring about a more sustainable future, one in which wildlife and humans can thrive together in well-functioning ecosystems, we have committed to changes in how we operate. We prioritise sustainable operations through responsible sourcing and resource optimisation to become a carbon neutral destination by 2024.

FY21/22 HIGHLIGHTS

• Provided care for **978** animal species, **28%** of which are threatened in the wild

• Admitted **1,379** rescued native animals to our veterinary facilities for medical attention, of which **61%** were successfully released back into the wild.

• Invested **$1.4 million** through Mandai Nature, in support of local and regional conservation projects, as well as conservation partnerships

• Reduced carbon footprint by **10%** since baseline in FY19/20, as part of our 2024 carbon neutral target

• Engaged and empowered **205,000** people with conservation and sustainability messaging through virtual, in-person, hybrid, and Ranger Buddies programmes.

• Obtained **Temporary Occupation Permit (TOP)** for newly constructed large water treatment plant; completed roof structure for Bird Paradise entrance and new Night Safari amphitheatre
The Mandai Rejuvenation Project is into the fifth year of construction. Development work has picked up, with construction activities now in progress for all features. Piling works and tree surveys commenced at the worksites for Rainforest Wild, East Arrival Node, Indoor Attractions and the eco-friendly resort. Over at the West Node, planting and theming works are also taking shape while construction at the northern edge is in progress.

Development work continued to be guided by the Environmental Impact Assessment, and Environmental Management and Monitoring Plan (EMMP) which details a comprehensive set of mitigation measures in consideration of the surrounding flora and fauna.

The principle of inclusion is one of the key pillars that shapes our design approach for the development work in Mandai precinct. We are pleased that our efforts to promote inclusivity have been recognized by Building and Construction Authority (BCA) through the conferment of the BCA Universal Design Mark (Design) Gold Plus Awards for Mandai Resort, East Node and the two indoor attractions.

Amidst the ongoing pandemic, the safety and wellbeing of staff and site workers remain a priority and precautions continue as needed.
Infrastructural Upgrades

It has been more than 50 years since Singapore Zoo was first constructed in Mandai, and the infrastructure was showing signs of wear and tear. The Mandai Rejuvenation Project presents an opportunity to upgrade the sewage and water treatment plants, stormwater drains and water tanks to serve the entire Mandai precinct, and with features that allow for sustainable best practices. The external water discharge pipe was completed in September 2021 while the Mandai Wildlife Reserve Wastewater Recycling Plant (WRP) received Temporary Occupation Permit (TOP) in March 2021 and will soon be operational.

Eco-friendly Resort

A new resort experience will open to guests of Mandai Wildlife Reserve. Based on a biophilic design, the resort integrates the buildings with their natural surroundings. It is elevated several metres above the ground to allow native wildlife to move across the site wherever possible. The eco-friendly resort will offer different types of accommodation including elevated treehouses that will be set amongst the trees surrounding the property. Designed to resemble a seed pod, a prototype of the treehouse has been developed.

Bird Paradise Developments

Construction activities are underway for Bird Paradise. Theming works and planting have also begun.

Building The Boardwalk

The boardwalk will be a green space accessible to public, outside of the ticketed parks. Works for the boardwalk commenced in 2021 along the perimeter of Singapore Zoo. Given the proximity to the Upper Seletar shoreline and Singapore Zoo, precautionary measures have been taken to reduce impact on the surroundings as well as guest experience in the existing parks, in adherence to the mitigation measures set out in the Environmental Management and Monitoring Plan (EMMP), the deployment of heavy machinery is not permitted at the boardwalk site. Work is carried out manually to minimise disturbance to the environment.
Providing World-Class Animal Care

We continued to provide the best possible care for our animals despite challenges including the financial impact and manpower crunch brought about by the pandemic. One key area of focus in the FY was to elevate animal welfare standards with an evidence-based approach, and much progress has been made through the launch of the Behavioural Management Framework, and collaborative efforts with zoo associations on certification, audit, evaluation and implementation processes. Apart from deepening subject matter knowledge and building in-house expertise, the Animal Care and Veterinary Teams also leveraged on technology for innovative solutions to enhance efficiency and effectiveness.

Over the FY, we

• Launched the Behaviour Management Framework for optimal husbandry and elevate animal welfare standards

• Participated in 155 global managed species programmes to help save these threatened species from extinction

• Attended to 3,841 clinical cases, of which 26% required hospitalisation for close medical supervision

• Contributed to scientific knowledge and global wildlife management decision-making through the publication of 24 papers, of which 20 appear in peer-reviewed journals
Animal Care Updates

Improving Animal Welfare Standards

The Behavioural Management Framework (BMF) was launched to offer support for all animal care staff towards optimal husbandry and increased welfare standards for our animals. The BMF guides animal care staff in natural history research of the species in their care and to identify potential issues their charges might face. Through a problem-solving process, animal care staff can tackle prioritised behavioural challenges with evidence-based implementation and evaluation. In line with the World Association of Zoos and Aquariums’ (WAZA) goal for all members to undergo an accredited evaluation of their animal welfare standards by 2023, we supported the rollout of a modular system for a zoo animal welfare certification process. In November 2021, the Auditor Training Course for Southeast Asian Association of Zoos and Aquariums (SEAZA) was conducted online for our Animal Care staff as well as those from zoos in the region. All 32 auditor candidates were subsequently certified as SEAZA Welfare Auditors.

Total Animal Collection (FY21/22):
978 species, 21,861 specimens

Threatened species*:
255 species (26%), 3,537 specimens

*Threatened species include animals that are
- Extinct In The Wild
- Critically Endangered
- Endangered and
- Vulnerable;
classification is based on The IUCN Red List of Threatened Species.

Non Evaluated (NE) & Data Deficient (DD)
124 Species, 7,482 Specimens

Least Concern (LC)
531 Species, 9,723 Specimens

Vulnerable (Vu)
102 Species, 930 Specimens

Critically Endangered (Cr)
60 Species, 489 Specimens

Endangered (En)
93 Species, 2,118 Specimens

Near Threatened (NT)
68 Species, 1,119 Specimens

Notable Newcomers

Despite uncertainty and challenges posed by the pandemic, including limited flight options and additional veterinary testing (Covid-19 test), we orchestrated a total of 48 inter-zoo transfers, up from 37 in the previous FY. A tremendous amount of coordination and logistical planning goes behind every transfer. A total of 25 new species joined us, and here are some significant new arrivals.

1. Rothschild’s Giraffes ‘Adhil’ & ‘Balaji’
   - Arrived in May 2021
   - From Mysuru Zoo, India
   - New Home: Wild Africa @ Singapore Zoo

2. Northern Cassowary
   - Arrived in Aug 2021
   - From Avilon Zoo, The Philippines
   - Temporary home: Dinosaur Descendants @ Jurong Bird Park
   - New Home: Bird Paradise

3. Woylies
   - Arrived in Sep 2021
   - From Menagerie du Jardin des Plantes, France
   - New Home: Wallaby Trail @ Night Safari

Tall Order

Transporting the world’s tallest animals is a tall order. Already 1.8m at birth, giraffes may grow to be 2.5m by their first month. Zoos rarely transport giraffes above two years of age and only those 3.5m or below in height can clear the height limit for air cargo. When Mysuru Zoo confirmed they could send us two giraffe calves, we had to time the journey with their growth while navigating Covid-19 travel restrictions. Eventually, we decided to transport them here by sea. Two of our animal care staff travelled to India to ensure the safe journey of the giraffes over a seven-day sea voyage.
Saving Species At The Global Level

Our parks are part of a global network of zoos that play a pivotal role in maintaining genetically healthy populations of animal species. By collaborating with other zoos on internationally managed programmes, we help save threatened species from extinction. Transfers of animals between zoos for breeding are based on genetic compatibility and aimed at sustaining the genetic viability of the species in human care. We participated in 155 international Managed Species Programmes, up from 136 last FY (see Annex for full list).

The coordinator in charge of each programme makes recommendations for inter-zoo transfers of individuals to achieve the best welfare and conservation outcomes for the species. We continue to develop the competencies of our animal care staff to perform the specialised role of species coordination. Our staff helm the international coordination of the following 14 Managed Species Programmes (up from 11 in the previous FY).

<table>
<thead>
<tr>
<th>SPECIES</th>
<th>IUCN RED LIST STATUS</th>
<th>PROGRAMME*</th>
<th>SPECIES COORDINATOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Block Hornbill</td>
<td>Vulnerable</td>
<td>EEP</td>
<td>Mark Rusli, Junior Avian Care Officer</td>
</tr>
<tr>
<td>Black-winged Myna</td>
<td>Critically Endangered</td>
<td>EEP</td>
<td>Anais Tritto, Curator, Birds</td>
</tr>
<tr>
<td>Bornean Orangutan</td>
<td>Critically Endangered</td>
<td>SSMP</td>
<td>Wendy Chua, Curator, Animal Data Management &amp; Transactions</td>
</tr>
<tr>
<td>Knobbed Hornbill</td>
<td>Vulnerable</td>
<td>EEP</td>
<td>Luis Neves, Vice President, Animal Care</td>
</tr>
<tr>
<td>NEW Malucan Cockatoo</td>
<td>Vulnerable</td>
<td>EEP</td>
<td>Mark Rusli, Junior Avian Care Officer</td>
</tr>
<tr>
<td>Santa Cruz Ground-dove</td>
<td>Endangered</td>
<td>EEP</td>
<td>Luis Neves, Vice President, Animal Care</td>
</tr>
<tr>
<td>NEW Sloth Bear</td>
<td>Vulnerable</td>
<td>ISB</td>
<td>Anand Kumar, Assistant Curator, Carnivores &amp; Small Mammals</td>
</tr>
<tr>
<td>Straw-headed Bulbul</td>
<td>Critically Endangered</td>
<td>EEP</td>
<td>Rachel Lee, Junior Keeper</td>
</tr>
<tr>
<td>Sun Bear</td>
<td>Vulnerable</td>
<td>SSMP</td>
<td>Anand Kumar, Assistant Curator, Carnivores &amp; Small Mammals</td>
</tr>
<tr>
<td>Sunda Clouded Leopard</td>
<td>Vulnerable</td>
<td>EEP</td>
<td>Cecilia Tang, Assistant Curator, Carnivores &amp; Small Mammals</td>
</tr>
<tr>
<td>NEW Sunda Pangolin</td>
<td>Critically Endangered</td>
<td>SSMP</td>
<td>Ada Kurniawan, Animal Care Officer</td>
</tr>
<tr>
<td>Sunda Slow Loris</td>
<td>Endangered</td>
<td>EEP</td>
<td>Cecilia Tang, Assistant Curator, Carnivores &amp; Small Mammals</td>
</tr>
<tr>
<td>Victoria Crowned Pigeon</td>
<td>Near Threatened</td>
<td>ESB</td>
<td>Anais Tritto, Curator, Birds</td>
</tr>
</tbody>
</table>

Bornean orangutans exported to Mysuru Zoo, India

In August 2021, Bornean orangutans ‘Merlin’ and ‘Atina’ were transferred from Singapore Zoo to Mysuru Zoo, India, as part of a recommendation under the SEAZA Managed Species Programme for the species. It is hoped that the two female orangutans will breed and contribute to enhancing the gene pool of their species in human care.

With Covid-19 so rampant, an additional requirement of testing the export animals for coronavirus was requested by the Indian veterinary authority. Besides ensuring that this atypical and time restrictive request was observed, a thorough risk assessment was also conducted to mitigate all potential risks to the animals’ safety – due to flight limitations and road restrictions, their journey was longer than usual.

Only with all risks addressed did ‘Merlin’ and ‘Atina’ board their direct freighter flight from Singapore to Bengaluru. Mysuru Zoo has become the latest participant of the SEAZA Species Management Programme for the Orangutans.

Bornean orangutans exported to Mysuru Zoo, India

In August 2021, Bornean orangutans ‘Merlin’ and ‘Atina’ were transferred from Singapore Zoo to Mysuru Zoo, India, as part of a recommendation under the SEAZA Managed Species Programme for the species. It is hoped that the two female orangutans will breed and contribute to enhancing the gene pool of their species in human care.

With Covid-19 so rampant, an additional requirement of testing the export animals for coronavirus was requested by the Indian veterinary authority. Besides ensuring that this atypical and time restrictive request was observed, a thorough risk assessment was also conducted to mitigate all potential risks to the animals’ safety – due to flight limitations and road restrictions, their journey was longer than usual.

Only with all risks addressed did ‘Merlin’ and ‘Atina’ board their direct freighter flight from Singapore to Bengaluru. Mysuru Zoo has become the latest participant of the SEAZA Species Management Programme for the Orangutans.
Bundles Of Joy, Big And Small

Over the FY, we successfully bred around 900 young—almost double the number in the previous FY. Around a third of these are threatened in the wild. With their numbers dwindling in the wild, each birth is of great significance. 24 of some 150 species bred are also part of globally managed programmes and they represent important additions to the collective gene pool of their species in human care.

Giant Panda ‘Le Le’
Singapore’s very first panda cub ‘Le Le’ was conceived through artificial insemination. Given the technological and biological complexities, Le Le’s birth represents a significant breakthrough in our breeding efforts.

Golden Mantellas
More than 70 endangered golden mantella frogs hatched in Singapore Zoo’s RepTopia. This critically endangered species is only found in central-eastern Madagascar.

Negros Bleeding-heart
The first hatching outside of the Philippines, these chicks are part of a breeding programme set up by Jurong Bird Park and Mandai Natura in partnership with Talarak Foundation Inc (TFI). We hope to build a sustainable population of this species in human care for eventual reintroduction in the wild. Jurong Bird Park is the only zoological institution to hold this species.

Sakishima Grass Lizard
A pair of Sakishima grass lizards hatched over the FY. Once abundant in the Southern islands of Japan, this species is now threatened in the wild. It reproduces slowly as females lay clutches of only one or two eggs.

Straw-headed Bulbuls
A Critically Endangered species native to Singapore, this bird used to be common in Southeast Asia, but capture for the songbird trade has driven it to extinction in many areas. Despite being a challenging species to breed under human care, we have seen consistent breeding success and shared our knowledge and experience through the publication of the Best Practice Guidelines for the species. The three chicks hatched at Jurong Bird Park are welcome additions to the global breeding programme, also coordinated by our staff.

Sunda Slow Loris
This slow loris baby joins the ranks of others of its species in an international breeding programme that is coordinated by our staff. Native to Singapore and other parts of Southeast Asia, wild populations have been decimated by demand in the illegal pet trade.

African Painted Dogs
For the first time in 16 years, we welcomed a litter of pups. Once widespread across the African savannahs, the species is now globally endangered.

Grevy’s Zebra ‘Izara’ and ‘Tari’
Our zebras are part of a population management programme and the birth of these foals are a boost to the population of this highly threatened species in human care. There are only around 2,000 Grevy’s zebras left in their native Kenya and Ethiopia.

Negros Bleeding-heart
The first hatching outside of the Philippines, these chicks are part of a breeding programme set up by Jurong Bird Park and Mandai Natura in partnership with Talarak Foundation Inc (TFI). We hope to build a sustainable population of this species in human care for eventual reintroduction in the wild. Jurong Bird Park is the only zoological institution to hold this species.

Izara
Tari

Sakishima Grass Lizard
A pair of Sakishima grass lizards hatched over the FY. Once abundant in the Southern islands of Japan, this species is now threatened in the wild. It reproduces slowly as females lay clutches of only one or two eggs.

Straw-headed Bulbuls
A Critically Endangered species native to Singapore, this bird used to be common in Southeast Asia, but capture for the songbird trade has driven it to extinction in many areas. Despite being a challenging species to breed under human care, we have seen consistent breeding success and shared our knowledge and experience through the publication of the Best Practice Guidelines for the species. The three chicks hatched at Jurong Bird Park are welcome additions to the global breeding programme, also coordinated by our staff.

Sunda Slow Loris
This slow loris baby joins the ranks of others of its species in an international breeding programme that is coordinated by our staff. Native to Singapore and other parts of Southeast Asia, wild populations have been decimated by demand in the illegal pet trade.
Breeding crocodilians
For the first time ever, the false gharial bred successfully at Singapore Zoo. A threatened species of crocodile in Southeast Asia, false gharials are notoriously difficult to breed under human care as they require very specific breeding conditions. Encouraged by this success, the Herpetology Team is now preparing to breed the Indian gharial under the recommendation of the EAZA Ex-situ Programme. In preparation for this, a breeding pair has been moved into the old saltwater crocodile exhibit, which will hopefully provide an optimal environment for breeding to take place.

Breeding endemic invertebrates
The Chrisangi leaf insect was first described only in 2017 but recent population trends suggest that it is already at risk of extinction. It is found only in Singapore, in tropical forests near mangroves. After acquiring two males and two females in 2021 from local researchers, the Invertebrate Care Team has successfully raised 29 nymphs. These nymphs form an assurance colony that has the function of preserving the gene pool. They ensure the survival of the species in the eventuality that wild populations are wiped out.

Fish breeding efforts
After months of trials with various fish species, our aquarists saw their efforts pay off with the arrival of broods of tiny fry. To provide the ideal environment for their charges, they had to pay meticulous attention to factors like toggling the temperature and pH of the water at the optimal range for the species in question, provision of suitable nesting areas and substrate for egg deposition, as well as timely and abundant in-house production of infusoria (microscopic organisms as food for newly-hatched fry). The knowledge and skillsets gained will stand the team in good stead in future attempts to breed other species of fish as well as increase the sustainability of the fish populations in our care.
Enriching Our Animals’ Lives

Our animal care teams tapped on the Behavioural Management Framework to further expand on efforts to promote evidence-based, welfare-oriented species management. Most of our animals enjoy the benefits of a structured enrichment programme, and huge amounts of time and effort go into designing enrichment devices to elicit natural behaviour of the animals while giving them a mental and physical workout. An enrichment calendar is planned out for them to ensure the enrichment activities are varied to encourage exploration with different devices and in variable settings. Close observations of the animals’ interaction with the enrichment provided are made, which help the care teams finetune enrichment activities. The information gathered is also important for animals that we help protect in the wild, especially in the case of rescue and release centres. By working with our conservation partners to implement best practices in caring for these animals they get a better shot at survival when they are eventually released in the wild.

Here, we have members of the care teams share how they go about improving the physical and mental wellbeing of their charges.

Parrots at Parrot Paradise
Wild parrots can spend up to eight hours of the day foraging, flying long distances to look for food. Foraging in the wild includes not just eating the food, but also the process of finding access to the food, like tearing the husk to get to the fruit and seeds. To extend feeding time and effort, we think of ways to make our parrots work for their food such as having to fly or climb to the food, balance on unsteady perches or hang upside down. The idea is to make the birds actively think about how to use their bodies and their natural abilities to best access food. These activities not only keep them engaged, but also increase the general welfare of the animals.

- Mark Rusli, Avian Care Officer

Refurbishment of Tigerfish Exhibit
Keeping different species in the same area (ie. Tigerfish Exhibit) is complex. Some species prefer shade, some open, bright areas. Some love to hide, others keep swimming around. The results from the animal welfare assessment before the refurbishment of the exhibit showed that functional space and refuge for the African pike and zebra tilapia needed improvement. By adding cut branches and aquatic plants, we increased the number of hiding spaces and visual barriers. After the enhancement, we saw that the fish utilised most of the space, swimming around and foraging. We even observed the tilapia engage in nesting behaviour! The welfare score for all five species improved, especially for African pike, which increased from 47% to 87%.

- Joan Tan, Animal Care Officer & Sandra Muhamad, Senior Aquarist

Greater Hog Badgers at Zoo Amphitheatre
The badgers were skittish and shy when they first arrived. The dens were modified with logs and ramps that led to more hiding spaces as we wanted the badgers to have options. They have access to a pool since these badgers love to swim. Training for husbandry and medical behaviours were introduced as soon as the badgers were settled into their new home. Simple enrichment was introduced once they exhibit natural behaviour such as exploration and foraging. Gradually, they were desensitised to various sounds, people and movement. This was when we moved them closer to the dens near the staging area. We kept their comfort in mind and ensured their participation in shows would be solely voluntary. During showtime, various enrichment activities were provided to allow them to show as many natural behaviours as possible. They are always given an option to exit the show if they wish to do so.

- Kaitri Raveendhran, Senior Animal Trainer/Presenter
**Conditioning For Behaviours On Cue**

Animals are encouraged to cooperate in medical procedures through positive reinforcement training, which affords them an element of choice, while allowing the care teams to build closer bonds with their charges. When animals participate voluntarily in these procedures, the need for physical restraint and the use of anaesthesia – both of which cause stress to the animals and their care teams – is eliminated. A targeted approach is adopted to elicit desired behaviours, which may range from getting an animal to come close enough for visual assessments or weight-taking to challenging procedures like blood collection, injections or even dental care.

**Blood collection**

In comparison to the previous FY, an additional 22 animals are now cooperating for blood draws. After months of hard work, the care teams have seen success with the big cats, including the Asian lions, Sri Lankan leopards, clouded leopards and a puma. Given a number of these are geriatric animals, voluntary blood draw is especially important for effective monitoring of their health. Indian rhinos ‘Thulie’ and ‘Newari’ were trained to cooperate for blood draws within a year of their arrival at Night Safari. Rothschild’s giraffes ‘Adhil’ and ‘Balaji’ were also conditioned within months of their arrival from India to cooperate with a standing sedation for voluntary blood draws within a year of their arrival at Night Safari. Given the risks involved in anaesthetising giraffes, this was a significant achievement.

**Ultrasound scans**

Ultrasound scans are key to confirming a pregnancy and monitoring the health of the foetus. With an increasing number of species now part of international breeding programmes, the care teams have stepped up efforts to train would-be mothers to cooperate with this procedure. An additional 10 animals now cooperate for ultrasound scans and these include the pygmy hippos and babirusa, both species managed under the EAZA Ex-Situ Programme.

**Weighing Mummy Tamarin**

Previous attempts to weigh pregnant and infant-carrying tamarin mothers had not been successful – the fathers would be highly protective of the family and the mothers would be wary and carry their infants a distance away. During the FY, the care team finally succeeded in conditioning an emperor tamarin mother to voluntarily have her weight taken. The success demonstrates the trust the female and her family place in their care team.

**Feeding Goncalves**

Goncalves, a king vulture from the Kings of the Sky show, was conditioned during his stay at the avian hospital to calmly accept the presence of keepers and vets for treatments as well as feeding and handling. He had sustained a serious constriction of the oesophagus. Though the stricture was successfully resolved through surgery, his food intake was limited to small amounts of chopped meat only. This meant he had to be fed 4-5 times a day to meet his nutritional requirements. Frustrated at not being able to eat normally, Goncalves became increasingly aggressive.

Goncalves’ care team trained him to make association between a target and food, and in less than a week, he was able to touch the target in a non-aggressive manner. This allowed his care team to bring food and water to him safely. As a result of this successful training, Goncalves was soon able to return to normal vulture diet proportions and given a clean bill of health to return to the Kings of the Sky show.

**Crate training cassowaries**

With its powerful kicks and dagger-like talons, the cassowary is reputedly the world’s most dangerous bird. Getting our cassowaries to voluntarily enter a crate is the safest way to transport them from Jurong Bird Park to Bird Paradise. Conditioning of the cassowaries using positive reinforcement began with desensitising them to touch. The care team observed that cassowaries enjoy being out in the rain, and arrived at the idea of using showers as an incentive during training sessions. When the cassowaries approach the crates, they are rewarded with a cool shower. Gradually, they became comfortable enough to enter the crate voluntarily, where they are treated to a thorough hosing down.

**Macaw flight conditioning**

To prepare our scarlet macaws for their new home in Crimson Wetlands at Bird Paradise, they are conditioned to fly freely within Waterfall Aviary. This activity strengthens the birds’ flight muscles. Their keepers also perform regular recall training sessions for the macaws to land at specific locations on cue, in preparation for more guest interactions at Bird Paradise.
Veterinary Highlights

The Veterinary Team delivers on the diagnosis and treatment of disease and injury not only in our animals but also rescued animals brought to us from various emergency situations. Health surveillance, preventive medicine and pathology are pivotal to providing top-notch medical solutions and the best healthcare.

Vets On The Case

Over the FY, the veterinarians were kept busy with a total of 3,846 clinical cases, 26% of these required close monitoring and treatment at dedicated facilities. Here, we feature three significant cases.

Covid-19 infection of our lions

From the start of the global pandemic, strict measures were put in place to mitigate the risks of our animals contracting Covid-19. When the Asiatic lions at Night Safari first presented with symptoms, representative samples from two lions were taken, which were later confirmed to be Covid-19 positive. The African lions at Singapore Zoo also presented with similar mild symptoms and tested positive for the disease. Besides the proactive closure of their exhibits, the strictest biosecurity was adhered to by the core group of animal caretakers to look after our recovering lions. Daily veterinary health checks were done to ensure the animals were recovering well. This ubiquitous virus put our safety protocols to the test but after serving a short ‘Stay-Home Notice’, all infected animals made a full recovery.

Standing sedation for elephant tail surgery

When our Asian elephant 'Gambir' sustained a tail injury, best efforts at managing the wound with bandages and medications did not work. Gambir was swinging and rubbing her tail more and the wound was worsening. A severe infection rendered a portion of her tail dead and the tail tip had to be partially amputated.

The Elephant Care Team has been working hard for many years to condition our elephants to voluntarily cooperate for various husbandry and medical procedures. Gambir’s prior training meant she was already desensitised to the needle and when the vets needed to operate on her, she voluntarily presented her ear for the injection of a sedative to keep her calm.

With the use of ropes, the care team guided Gambir to stand still while the vets surgically removed the tip of her tail and cleaned her wound. The entire procedure was stress-free for Gambir and the wound has since completely healed.

Escaped lions at Changi Airport

An incident occurred at Changi Airport where two lions from a shipment of seven lions broke free from their crates while in transit to their destination. Our Veterinary and Animal Care Teams responded swiftly to assist Singapore Airlines with managing the situation. For the safety and welfare of the animals, the lions were transported to the Mandai quarantine facility for temporary care while new crates were constructed. The lions eventually continued their journey to their onward destination. The swift resolution of the incident is testament to the capabilities and expertise of our staff, which extend beyond the confines of our parks when it comes to dealing with emergencies involving wildlife.
Prevention Is Better Than Cure

To look after the health of all the animals in our care, we have in place structured disease-prevention programmes extending from husbandry practices to disease screening techniques and vaccination strategies. We are one of the first zoos to pioneer a geriatric animal care plan to better manage age-related health conditions in our more senior animals. We are also one of the few zoological institutions to have a team of veterinary pathologists who study and diagnose diseases in deceased animals: lessons learnt from the dead can guide us in providing better care for the living.

Preventive healthcare
Over the FY, nearly 900 mammals and birds were vaccinated and over 9,000 parasite checks were conducted. To support ongoing as well as increased health surveillance for various diseases, we have been ramping up capacity in laboratory testing. Our ability to perform many of the necessary tests in-house means timely results and treatment for affected animals. A total of 34,773 tests were completed during the FY, of which 4,239 are PCR tests – more than double the number done in the previous FY.

Amoebic dysentery in reptiles
Amoebic dysentery, or entamoebiasis, is a serious disease in reptiles. Symptoms include reduced appetite, weight loss, vomiting and diarrhoea. The disease can cause sudden death in certain species without any clinical signs. We have been on high alert and surveillance work involving frequent checks was stepped up to facilitate early detection and treatment of the disease in affected individuals.

Hornbill iron storage disease
Hornbills are particularly susceptible to iron storage disease, which occurs when too much iron accumulates within the liver and then in other vital organs, leading to significant damage and eventually death if left untreated. Through a proactive monitoring programme, hornbills in the earlier stages of iron storage disease have been identified. With changes to their diets and the help of medication, quite a few of them showed reduced iron accumulation levels: a sign that the disease is under control.

In-house dental care
Besides causing extreme discomfort, dental diseases have also been linked to cardiovascular problems. Regular oral care and examinations can help prevent and detect dental conditions before they cause serious illness. Working hand in hand with the Animal Care Team, our vets have identified individuals at higher risk of dental problems. Besides diet adaptations, many of these animals are also conditioned for dental health procedures ranging from regular dental hygiene care like toothbrushing and jet-flossing to more complex ones like scaling to remove tartar buildup, and dental radiographs.

Our Veterinary Team is equipped to handle most dental issues and they have also benefitted from the expertise of dental specialists for more complicated procedures. The team now has the expertise to carry root canal treatment for small mammals.

Our ability to perform many of the necessary tests in-house means timely results and treatment for affected animals. A total of 34,773 tests were completed during the FY, of which 4,239 are PCR tests – more than double the number done in the previous FY.
Geriatric animal care plan

To ensure our older animals get the additional attention they require, a geriatric register is maintained: individual animals are added when they reach 75% of their lifespan in human care. The register contains updated information on all health, husbandry, and welfare matters pertaining to these individuals. In the FY, 30 new individuals joined the geriatric animal care plan, expanding its scope to serve a total of 381 senior animals. Every individual is assigned a vet, who oversees medical assessments and builds a customised care plan for it together with its caregivers. The programme can be as simple as an annual visual assessment for those in good health, or something more intensive with full body checks, medical treatment, husbandry adaptations and Quality of Life assessments for those with deteriorating health. These vary in frequency, depending on the needs of the animal. One adjustment common for all geriatric animals is that their diet is modified with the addition of a geriatric supplement suitable to their age and their species. Here, we highlight a few of these senior animals and the care and the treatment they have received under the geriatric care plan.

3D-printed shoes to treat bumblefoot in ageing birds of prey

Bumblefoot causes pressure sores, tissue swelling and bone callus. If left untreated, it could become disabling and even fatal. Arthritis, which is common in older birds, may also lead to bumblefoot. Two of our geriatric birds of prey were afflicted with this foot condition. While the disease can be treated with traditional bandages, the idea of 3D-printed shoes was mooted to provide a more precise way of distributing the pressure borne by the feet away from the areas with sores. To achieve a creative solution for patient care that combines technology and veterinary sciences, the avian veterinary team reached out to the Keio-NUS CUTE Centre of the National University of Singapore’s (NUS). The team at Keio-NUS CUTE Centre had to cater to various design considerations - the shoes must serve their main purpose of relieving and distributing pressure on the feet, while not compromising on comfort and mobility. In addition, the shoes had to be easily removable for cleaning, non-toxic, and durable in nature, as the patients may pick at them with their sharp beaks. The team went through multiple iterations, and took two years before they successfully arrived at a shoe design deemed suitable for use in treatment.

After fitting the patients out with their new bespoke footwear, the vets commenced a weekly regime of monitoring and reviews. The patients were discharged with a clean bill of health after a few months of treatment. They now spend their golden years at the Raptor Retirement Aviary, in the company of fellow retirees.

Kidney disease in Susie the chimpanzee

Susie, our 40-year-old female chimpanzee, has been diagnosed with chronic kidney failure. Unfortunately, dialysis or organ transplant are not viable treatment options for chimpanzees. To manage her condition, it is essential she keeps up a daily water intake of at least 2 litres. Her care team coaxes her with sips of her favourite beverages, like bandung, to encourage her to drink. She has become very picky with her food, so her care team has had to constantly explore different diet alternatives for her. Unlike other chimpanzees, she receives a lot more fruits, while balancing the potential for other medical concerns, such as diabetes and dental conditions. From an all-time low of 34kg, Susie has regained some weight and now weighs more than 40kg, a significant improvement.

Susie has been successfully conditioned for urine collection to facilitate urine analysis. To monitor her condition more closely, her care team is also training her for blood draw. Her vet-in-charge makes a ‘house call’ every fortnight. Susie is reported to be in good spirits.

Pathology

From large mammals to the tiniest of invertebrates, all animals that pass on in our parks are sent to the veterinary pathologists for a necropsy to be done. By ascertaining the causes of death and determining predisposing factors, the pathologists help the clinical veterinarians formulate preventive regimes. Collection of data and tissue biobanking during post-mortems also contributes much-needed information on poorly studied species. Besides the animals in our care, the pathologists also perform post-mortems on native wildlife that are found dead and brought to us by the authorities and our local conservation partners. The findings inform conservation actions such as roadkill mitigation measures and sensitive site development policies.
Research And Innovations For Wildlife

The work of our in-house care teams presents opportunities for the development of scientific expertise in animal handling, advanced veterinary medicine, as well as husbandry and breeding knowhow. These advancements translate to improved welfare and healthcare for our animals. The skills and techniques acquired could also inform species management plans for depleted wild populations in the future.

Aviary Mesh Inspection Proof-of-Concept

A proof of concept is being trialled with a force displacement and vibration sensor network that can help investigate aviary mesh integrity. By conducting automated inspections, the system can detect possible breaches. The initial results are encouraging and the learnings gained will provide valuable insights in the monitoring and management of new aviaries.

Banking On The Data

Biomaterial banks provide a supply of reference material and are essential tools for an evidence-based approach to research and action. Continual improvements in genome resource banks and reproductive technologies have come to fruition with the arrival of our first panda cub and will hopefully help us in sustaining populations of other species in human care.

Fresh Off The Press

Through continued research and publication efforts, we hope to share our knowledge and findings with other institutions and form new collaborations to continue discovering more. In the FY, research focused on animal welfare and care. Total research output for FY21/22 stands at 24 publications, 20 of which are peer-reviewed (see Annex for full list), adding to the body of scientific knowledge.

Successful artificial insemination of the giant panda

The giant panda breeding season in April 2021 started with the mixing of Kai Kai and Jia Jia but natural mating was unfortunately not observed. The decision was made to carry out artificial insemination at the 47th hour of Jia Jia’s annual 48-hour fertility window. The Veterinary Team was able to successfully inseminate Jia Jia using Kai Kai’s frozen semen. The Veterinary and Giant Panda Care Teams had been working closely on medical conditioning of Jia Jia to cooperate for ultrasound scans, which made for stress-free confirmation and monitoring of the pregnancy. Four days after the first detection of the foetal heartbeat on an ultrasound scan, Jia Jia gave birth to a healthy cub on 14 August 2021.

Wild pangolin semen storage and collection

Pangolins are the world’s most trafficked mammals and globally threatened with extinction. Despite steps to protect them from the threat of illegal poaching, the survival of all eight species of pangolins remains on the line. One of the species – the Sunda pangolin – is native to Singapore. Given the slide in wild populations, the formation of an assurance colony in human care is one way to ensure the survival of the species. When wild individuals are found dead, often as a result of traffic accidents, they are brought to our pathologists for a full necropsy. Semen samples are collected from male pangolins and added to our biobank to be used in assisted reproduction efforts in the future. These samples, being from wild specimens, represent important genetic lines and are key to resuscitating the population should wild numbers continue to decline.

Optimum semen collection methods are necessary to ensure successful assisted reproduction but there is a dearth of information on pangolin reproductive biology. The Veterinary Team experimented with different collection methods and observed improvements in the vitality of the sperm collected with adjustments to semen storage methods. Successful preservation of sperm with higher vitality is an important first step for future assisted reproduction efforts to bring the Sunda pangolin back from the brink of extinction.
Playing A Leading Role In Conserving Biodiversity

Besides helping to maintain the population of threatened species in human care, we also play an important role in rehabilitating rescued native wildlife. Harmonising environmental management practices across the organisation allows us to strengthen our efforts in safeguarding the rich biodiversity in Mandai Wildlife Reserve. Through our conservation arm, Mandai Nature, we focus on preventing and reversing species loss in the wild, protecting and restoring ecosystems, and benefitting local communities in Singapore as well as Southeast Asia.

In FY 21/22,

- We provided **$1.4 million** funding to Mandai Nature to support 61 conservation projects and partnerships locally and beyond our shores.
- 1,379 animals were admitted to our veterinary facilities for medical attention, of which 61% were subsequently released back to the wild.
- 0.33ha of degraded land was restored as part of the Mandai Rejuvenation Project.
Saving Wildlife In Singapore

Despite its highly urbanised landscape and dense population, Singapore’s warm tropical climate makes it a haven for rich biodiversity. Our organisation plays a vital role in protecting wildlife outside of the Mandai Precinct.

Rehabilitating Rescued Animals

One of the ways we contribute to the protection of native biodiversity is through the rehabilitation of rescued animals brought to us from around Singapore. Over the FY, 1,379 animals were admitted to our veterinary facilities, of which 61% were successfully nursed back to health by our Veterinary Team and subsequently released back to the wild. Around 40 of the rescued animals made a full recovery but were deemed unsuitable for release – they stayed on in our care or were transferred to other suitable facilities. Unfortunately, some of the rescued animals presented with such grievous injuries it was beyond our vets to save them.

Pedicure For Colugos

Colugos are tree-dwelling mammals native to Singapore. They cling on to trees during the day and glide between trees to forage for food at night. Many rescued colugos present with worn nails, which impair their ability to cling on to trees or land safely. A nail scoring system, and nail shaping procedures were developed to help in their rehabilitation. Reshaping their nails gives them a better shot at navigating their arboreal habitat successfully after their release.

Injured Birds

We adopted a more streamlined approach to diagnostics and treatment of injured birds, including a postmortem for individuals that succumbed to their injuries. The latter provides useful insights for us and our conservation partners in the implementation of measures to reduce incidents of injuries.

Partnership

We assisted in conducting a total of nine handling practicals for reptiles and mammals as part of the animal management course spearheaded by NParks. These practical sessions aim to upskill wildlife management companies with safe, effective and low-stress handling techniques for wildlife rescue.

Here, we highlight some of the animals that were successfully rehabilitated and released together with local wildlife authority NParks:

Greater mousedeer ‘Naputri’

Reportedly attacked by a monitor lizard at Pulau Ubin, Naputri presented pregnant, very weak, dehydrated and with multiple wounds on her body. Her foetus had to be aborted to save her life and she had to undergo multiple surgeries as well as intensive wound care. To complicate matters, she also suffered from a muscle disorder which made recovery an uphill task.

After five months of rehabilitation, Naputri finally pulled through her ordeal to make a full recovery. She was tagged by researchers from the National Institute of Education and released back to Pulau Ubin.

Cinereous vulture

Found on the ground along Cornwall Road, the juvenile bird was rescued by NParks and sent to Jurong Bird Park’s avian hospital for rehabilitation. A full physical examination, blood tests and radiographs were performed upon admission. The bird was suspected to be fatigued from the demands of its migration flight. It was started on fluids and feeding up and its condition improved significantly. After its first two flight attempts, the vulture successfully took off on 10 January 2022.

The largest raptor in Africa, Asia and Europe, the cinereous vulture usually winters in northern India, the Middle East and occasionally South Korea. The rescued individual is thought to have blown off-course during its migration flight.

Horsfield’s flying squirrel ‘Bawang’

Bawang was rescued by a member of public and brought to us via NParks for emergency care after a nasty attack by ants. She was successfully stabilised and treated but her tender age meant that she had not been weaned and would not be able to survive on her own. The vets took on 24/7 ‘nanny’ duties to handraise Bawang and when she was weaned, she was provided a naturalistic environment to hone survival skills like climbing and foraging. After two months, Bawang was finally assessed to be fit for release.

The endangered Horsfield’s flying squirrel is one of three species of flying squirrel native to Singapore. The species is seldom rescued and Bawang was the first of her species to be admitted to our facility in over 10 years.

Changeable hawk-eagle

A changeable hawk-eagle was brought in with shredded feathers that inhibited its ability to fly. Birds would naturally moult to replace these feathers but this process takes several months and for a wild bird that has to fly to hunt and move away from danger, the bird would be unlikely to survive. Feather imping can be done within a few hours to give these birds a brand new set of healthy feathers, allowing them to be released back into the wild quickly. Our avian vets replaced over 50 feathers on the eagle’s wings and tail with donor feathers taken from other birds which had succumbed to sickness or injury. The bird was successfully released a day after the procedure with an NParks tracking device attached. The tracker indicates that the bird has been flying around successfully, covering great distances and is alive and doing well.

Partnering with wildlife authorities

One of the ways we contribute to the protection of native biodiversity is through the rehabilitation of rescued animals brought to us from around Singapore. Over the FY, 1,379 animals were admitted to our veterinary facilities, of which 61% were successfully nursed back to health by our Veterinary Team and subsequently released back to the wild. Around 40 of the rescued animals made a full recovery but were deemed unsuitable for release – they stayed on in our care or were transferred to other suitable facilities. Unfortunately, some of the rescued animals presented with such grievous injuries it was beyond our vets to save them.

Staying on in our care or were transferred to other suitable facilities. Unfortunately, some of the rescued animals presented with such grievous injuries it was beyond our vets to save them.
Local Project Highlights

Conservation projects focusing on protecting local biodiversity continued to grow from strength to strength. Mandai Nature invested over $94,000 to support 15 projects (see Annex for full list). We also continued to work with stakeholders on the local scene towards more concerted conservation outcomes. Here are some key species and projects where we have achieved considerable impact:

Raffles’ Banded Langur

A leaf-eating monkey first reported by Sir Stamford Raffles in Singapore, the Raffles’ banded langur is listed as Critically Endangered on the IUCN Red List. In 2010, there were only approximately 40 individuals left in the Central Catchment Nature Reserve (CCNR) in Singapore. A DNA analysis of the population through faecal samples also showed that the langurs might be experiencing genetic inbreeding due to a small population size, which could drive the species to extinction.

Since 2010, we have been the staunchest supporter of studies on the Raffles’ banded langur led by primatologist Dr Andie Ang, who chairs the Raffles’ Banded Langur Working Group. The findings inform crucial conservation actions to prevent extinction of this critically endangered species in Singapore. Funds disbursed over the FY went towards the salaries of the project team, purchase of field equipment, molecular analysis and publication costs as well as other operating expenses. As members of the Raffles’ Banded Langur Working Group, we continue the implementation of the Species Action Plan (developed at Singapore Zoo in 2016), towards key outcomes in these areas: population monitoring, habitat connectivity and education outreach.

Population Monitoring

An understanding of population size and distribution of the langurs is imperative for conservation planning, such as the protection of core home range areas. The approval for a first-of-its-kind installation of arboreal camera traps in the Central Catchment Nature Reserve (CCNR) research area was secured in the FY. This will allow for the collection of more comprehensive data on the occurrence and habitat use of langurs and other wildlife.

Over the FY, the project team and volunteers performed field surveys within the CCNR, Lower Peirce and Old Upper Thomson areas. Citizen science surveys which started in 2016, allow members of the public to volunteer their time towards the conservation of the langur. Today, the total population count of the Raffles’ banded langurs in Singapore stands at approximately 70. Mothers with infants in tow continue to be spotted, indicating the population is recovering, slowly but surely.

Habitat Connectivity

Canopy connectivity is especially important for tree-living animals such as the Raffles’ Banded Langurs. The roadkill of a juvenile male in August 2021 highlights an urgent need to restore canopy connectivity in fragmented habitats. With the identification of road-crossing hotspots along Old Upper Thomson Road, the National Parks Board (NParks) installed two rope bridges to help arboreal wildlife like the langurs to cross the road safely. Analysis of camera trap footage from the bridges revealed a total of 307 successful crossings times by the langurs between March 2020 and August 2021. Another two rope bridges have been installed by NParks on Rifle Range Road in February 2022, signifying the commitment from the authorities to address some of the threats arising from habitat fragmentation. Such collaborative partnerships with government agencies have allowed for the implementation of successful conservation applications.

Education Outreach

In February 2022, the first resource book on the Raffles’ banded langurs of Singapore and Malaysia was published, providing greater access to the public to better understand their distribution, diet, family structure, even infant development. The book also highlights threats as well as cross-border conservation efforts and plans to safeguard the long-term survival of the Raffles’ banded langur in both countries. It is hoped that the publication will promote a better understanding and appreciation of our shared natural heritage.
Sunda Pangolin
The pangolin is the world’s most heavily trafficked mammal in the illegal wildlife trade. In Singapore, the Sunda pangolin’s main threat is another kind of traffic: the one on roads. Little is known about this enigmatic creature that lives in our own backyard. To increase knowledge of pangolin biology and behaviour, our staff have been actively building up their expertise since we first started caring for pangolins back in 2009. We have also been supporting pangolin research since 2010. Over the years, we have amassed data on the pangolin’s diet, genetics and navigation of the urban landscape. These learnings culminated in the Sunda Pangolin National Conservation Strategy and Action Plan, established in 2018. As co-chairs of the Singapore Pangolin Working Group (SPWG), we led a strategic review of the group’s work and conclusions from 2010 to 2018. One of the key outputs of this review was also achieved: an action plan: to develop a protocol for managing pangolin seizures in Singapore. Progress in the following areas was achieved:

- A systematic study of pangolin roadkill hotspots was conducted by analysing data from a shared database of pangolin occurrence consolidated from various agencies. This information will be used to advocate for enhancements to urban designs to facilitate safe movement of pangolins.

- An analysis of pangolin seizure data to shed light on the scale of trafficking through Singapore and the modus operandi of traffickers. This will enable better enforcement to deter trafficking.

- With the formation of the Communications and Outreach subgroup, outreach efforts were stepped up, including a webinar to mark World Pangolin Day. Our staff were among featured SPWG members who shared about pangolin rescue, rehabilitation and release in Singapore.

DNA-based biodiversity monitoring tool using dung beetles
Species in the wild are part of complex food webs which can be adversely altered by factors such as agricultural expansion and climate change. Given the difficulties of assessing these impacts, scientists are increasingly turning to molecular techniques using invertebrates as samplers for biodiversity monitoring.

Mandai Nature supports a study led by a researcher from Nanyang Technological University on the use of DNA metabarcoding to detect mammal DNA from dung beetles, and to map out dung beetle-mammal food chains in Singapore’s regenerated forests. The technique can be further applied in rapid assessments of mammalian diversity across Southeast Asia, and aid future conservation assessments.

Every Singaporean a Naturalist
Mandai Nature continued to support Every Singaporean A Naturalist (ESN), a citizen science project and nature education programme by Nature Society (Singapore). Now into its fifth year, ESN aims to provide students and teachers with a hands-on conservation experience to deepen their appreciation and knowledge of nature. 14 new schools were successfully recruited, bringing the total number of schools to 44 – more than seven times the number of schools in the programme’s first year. NSS experts and volunteers conduct training sessions for both students and teacher mentors, empowering them to contribute to biodiversity science by uploading their observations to the iNaturalist website, a social network to share observations of biodiversity across the globe. In the FY, 144 new observations were made, around 100 of which are species never recorded before under the project.
Protecting Wildlife Beyond Our Shores

Southeast Asia is home to more than a fifth of the world's vertebrates and plant species – many of which are not found elsewhere. This exceptionally rich biodiversity makes it a hub for tourism and conservation, but also a target for parties out to exploit its resources.

To protect wildlife in the region, Mandai Nature supported 38 projects in the FY, with strong focus on:

- One Plan Approach - an integrated approach to species conservation encompassing conservation and wildlife research efforts within our parks at Mandai Wildlife Reserve and conservation action plans for these species in their natural habitats across Southeast Asia
- Supporting projects that benefit and empower local communities to safeguard species and habitats
- Strategy planning and action for threatened species through global collaborations

One Plan Approach To Saving Threatened Southeast Asian Species

Traditional species conservation planning followed two parallel but separate tracks. Conservationists work in the field to monitor wild populations and develop conservation strategies to conserve threatened species. On the other hand, the zoo and aquarium community develop long-term goals for sustaining populations in human care. The One Plan Approach to species conservation brings together different stakeholders including the zoo community, conservation partners, government, and local communities to formulate conservation action strategies for threatened species. The Approach allows us, as a zoological institution, to align our conservation breeding programmes with field work for the best possible outcomes to fight species extinction. It leverages on our resources and network, and the expertise of conservationists and NGOs working in the range countries of the species. Here are two examples of the impact we have achieved by adopting this approach.

Negros Bleeding-heart

Named after Negros Island, one of the last remaining forested areas in the West Visayan region in the Philippines, this is one of the rarest birds in the world. Mandai Nature joined hands with Talarak Foundation Inc, to set up a conservation breeding programme in Jurong Bird Park. This is the only breeding programme for the Negros bleeding-heart outside its natural range. After just three months into their new home, Jurong Bird Park welcomed its first Negros bleeding-heart chick on 28 November 2021. Since then, two more chicks have hatched (see page 39 ‘Bundles of Joy’).

Successful breeding under human care forms part of the safety net for the species. Meanwhile, we work with multiple stakeholders to protect and restore the wild habitat of the Negros Bleeding-heart, and engage the community to enhance the success of future reintroduction efforts.

"[...] This dove is an ambassador to the conservation of all Negros wildlife. The species is impacted both by local poaching pressure and the loss of its lowland forest habitat, requiring a multifaceted approach to conserve the remaining populations [...]. Our outreach and education team have been working hard to raise the profile of the species in rural communities, using pride campaigns to make the Bleeding-heart an emblem to Negros communities. Our research team is scouring the remaining forest patches of Negros to find any elusive remnant populations, whilst developing a release site for the reintroduction of the animals born under human care back into a protected lowland forest.”

Matthew Ward, Project Manager at Talarak Foundation Inc

Roti Snake-necked Turtle

Severely impacted by overharvesting and habitat destruction, this turtle is believed to be extinct in the wild. The assurance colony we care for in Singapore Zoo is the only one for the species in Asia and was established to help repopulate the species in the wild. In September 2021, 13 of the turtles from the colony were successfully repatriated from Singapore to their native country of Indonesia. This marks a significant milestone in ongoing conservation efforts for the recovery of the species’ wild population led by Ministry of Environment and Forestry of the Republic of Indonesia (MOEF) and Balai Besar KSDA Nusa Tenggara Timur (BBKSDA NTT) Province with the support of Mandai Nature, Singapore Zoo and Wildlife Conservation Society - Indonesia Program (WCS-IP).

The turtles form part of the first structured conservation breeding programme located in Indonesia and they have settled well in a breeding facility in Kupang, East Nusa Tenggara. Constructed with Mandai Nature’s support, the facility was built to house a head-starting programme where eggs and hatchlings are cared for till they are ready to be reintroduced into the wild. Such programmes help increase individuals’ chances of survival when released into the wild. Breeding efforts are underway and both WCS-IP and BBKSDA NTT are closely monitoring the progress.

"This repatriation is the first step in restoring the Roti Snake-necked Turtle population in its natural habitat, as well as showing that species conservation is a concern for the international community.”

Director General Wiratno,
Directorate General of Natural Resources and Ecosystem Conservation (KSDAE) at MOEF

Wildlife research efforts within our parks at Mandai Wildlife Reserve and conservation action plans for these species in their natural habitats across Southeast Asia

One of the turtles being scanned for a microchip at the Singapore Zoo. Each individual is fitted with a microchip to provide a form of identification.

The authorities at the breeding facility in Kupang examine the turtles’ condition upon their departure from Singapore Zoo. This includes blood draws and weight checks.

The turtles undergo a full health assessment to ensure they are healthy and in good condition before their departure from Singapore Zoo. This includes blood draws and weight checks.

One of the turtles being scanned for a microchip at the Singapore Zoo. Each individual is fitted with a microchip to provide a form of identification.

One of the turtles being scanned for a microchip at the Singapore Zoo. Each individual is fitted with a microchip to provide a form of identification.

One of three males and three females that came to Jurong Bird Park from the Philippine island of Negros in September 2023.

First Negros bleeding-heart chick hatched at Jurong Bird Park.

The authorities at the breeding facility in Kupang examine the turtles’ condition upon their arrival, while the Head of BBKSDA NTT Kupang (right, in white) looks on.
Galvanising Community Action For Wildlife

Local communities and indigenous people who co-exist with nature are its strongest guardians. Mandai Nature supports these local communities to ensure they benefit from wildlife and habitat protection through developing sustainable livelihoods, often helping these communities become advocates for nature.

Citizen action for Malayan tigers

Once present in the forests of Singapore and Peninsular Malaysia, the Malayan tiger is now extinct in Singapore and numbers in Malaysia have dwindled by over 90% – fewer than 200 are left in the wild today. Relentless poaching, habitat loss, prey depletion and human-tiger conflict severely impact the species. We have been supporting the Malaysian Conservation Alliance for Tigers (MYCAT) in their work since 2005 to ensure the Malayan tiger’s survival. Over the years, with our continued support, they have empowered and engaged many in the community to be part of the solution to the wildlife extinction crisis.

To deter illegal tiger poaching activity, the Citizen Action for Tigers (CAT) walk was initiated, deploying volunteers on a guided anti-poaching surveillance trek through the Sungai Yu corridor, a critical link between the two largest tiger habitats in Peninsular Malaysia. Since the initiation of the walks in 2010, over 2300 members of the public from 38 countries have patrolled over 15,000km of the forest while disarming 300 snares. In 2018, MYCAT also started working with the indigenous Bateq community to monitor more inaccessible areas not covered by volunteers.

There are now 10 regular Bateq rangers who have all undergone rigorous training in field methodology and threat identification. With these rangers on board, the intensity and coverage of the protection patrols have increased. Over the reporting period, 29 snares and 65 box traps were found and destroyed. Our support over the FY went towards defraying the salaries of key personnel of the MYCAT team working onsite as well as project administration costs.

Gibbons and community-based conservation in Java and Mentawai

Javan gibbons and other rainforest animals in Indonesia face severe habitat loss caused by increasing land use for agricultural activities. Many end up in fragmented pockets of largely unprotected forests, often too small to support them. We have been supporting SwaraOwa, which developed the Coffee and Primate Conservation Project (CPCP) to preserve gibbon habitat since 2014.

The team works with coffee farmers to share techniques on growing and processing shade coffee in an economically viable manner. Shade-grown coffee trees thrive under forest canopies. The forests remain intact while the coffee provides a source of income for local farmers. To ensure the quality of the coffee produced, we funded product development by sending a coffee consultant to introduce industry-level coffee production expertise to the farmers. The result is a high-end product: Owa Coffee. We have been serving Owa coffee at selected F&B outlets in Mandai Wildlife Reserve since 2017. By doing so, we channel income directly back to the coffee farmers while increasing guest awareness of sustainable consumer choices.

Aside from Owa Coffee, the team also worked with local farmers on beekeeping and honey production projects. Part of our FY21/22 funding went towards training, purchase of equipment for beekeeping and honey storage, and quality testing of the honey produced. Results were encouraging. Two villages have started supplying honey regularly to a local rehabilitation centre for slow lorises. This not only provides a regular source of income for the beekeepers but also contributes to the rehabilitation of another threatened primate.
Campaigning for behaviour change to save the Celebes crested macaque

Found only in North Sulawesi, Indonesia, the iconic Celebes crested macaque – known as “yaki” among locals – is facing extinction due to the illegal bushmeat trade and habitat loss. Its population has declined by more than 80% in the last 40 years. To protect the Celebes crested macaques and their habitat, we have been supporting the work of Selamatkan Yaki (SY) since 2016. The North Sulawesi-based programme is focused on education and outreach, protected area management, and biodiversity monitoring. The team works alongside the local community and bushmeat hunters, promoting sustainable livelihoods by providing training in income-generating activities like permaculture hydroponics. FY21/22 funding went toward the salaries of key team members; the continued facilitation of the multi-year trader and hunter engagement strategy aimed at behaviour change; as well as education and outreach events targeted at the youth.

A key programme is the Yaki Pride Campaign, aimed at promoting yaki as a popular icon. Through school engagements and a strong network of Yaki ambassadors – students, celebrities and community leaders – this campaign raises awareness of the ecological and cultural importance of the macaques and inspires the locals to contribute to their conservation. Significant achievements over the FY include:

- Successful engagement of meat sellers at two well-known traditional markets, Tomohon and Langowan, who publicly joined the efforts to tackle illegal wildlife trade and declared that they are proud to not sell meat from protected and endangered species at their market.
- Educational outreach for close to 2,000 students in the Minahasa regency and recruitment of 27 new Yaki ambassadors from the 41 schools visited. To build the Yaki ambassadors’ conservation knowledge, the team organised a 3-day Yaki Youth Camp in end 2021 and a 2-day immersive trip to Tangkoko in March 2022 to see the yaki in the wild. These new Yaki ambassadors have in turn started giving their own outreach talks at schools.

“I am very happy with the Selamatkan Yaki activity. During these few months, we feel entertained in the market, there is new information that we did not know and did not understand before. We were also taught how to be friends with nature and what people can do as traders.”

Evy Sumarandak, trader in Langowan market

Conservation Leadership And Partnerships

The IUCN SSC Asian Species Action Partnership (ASAP) is a partnership platform of over 200 organisations which focuses on conserving Critically Endangered land and freshwater vertebrate species found in Southeast Asia.

Mandai Nature has hosted ASAP since 2018, supporting its secretariat and contributing to other operational and manpower costs.

The IUCN SSC Hornbill Specialist Group (HSG) aims to facilitate conservation efforts for hornbills across the globe, but with a specific focus on Asia. We are the host institution of HSG’s Asian arm and supports its secretariat. Funds went towards maintaining operations, particularly in communications.
Safeguarding Biodiversity Within Mandai Precinct

The Mandai Precinct is situated adjacent to the Central Catchment Nature Reserve (CCNR), which houses almost 97% of Singapore’s biodiversity. To reduce negative environmental impacts and enhance ecological and social benefits, we continued to work hard at improving the way we manage our parks and work sites.

Developing Sensitively

Owing to the ecological sensitivity of the Mandai environment, it is necessary for new developments and upgrading works in the existing parks to minimise negative impacts through environmentally sensitive design, planning and construction.

Mandai Environmental Impact Assessment (EIA)

Undertaken at a conceptual design stage of the Mandai Rejuvenation Project, the Mandai Environmental Impact Assessment (EIA) surveyed the baseline environmental conditions within the project site and evaluated potential environmental impact of the project. The report includes recommended mitigation measures and an Environmental Management and Monitoring Plan (EMMP), which were approved by the relevant government agencies. Our Environmental Advisory Panel (EAP) provides guidance and oversight for the implementation of the EMMP.

Since the publication of the Mandai EIA Report in 2015, regular discussions on environmental management have continued with various stakeholders. As Mandai Rejuvenation project progresses, refinements in environmental management requirements were made. Accordingly, the EIA report was updated in February 2022 with the inclusion of the second addendum.

Please click below image to view the report and addendum for a summary of design updates and approved changes to the Mandai EIA Report.

Compliance To EMMP

With the resumption of work across all developing features in Mandai, the team continues to ensure strict compliance to the EMMP for each work site.

Measures undertaken include:
• More than 200 environmental, health and safety inspections and over 80 environmental compliance audits were carried out.
• 2 Environmental, Safety and Health (ESH) Roundtable sessions were conducted for contractors from different worksites to share learnings and good practices that could be replicated across the work site.

Ongoing biodiversity awareness training conducted in-house for staff and construction personnel. Apart from strict adherence to the tree conservation guidelines, we also adopt a flora protection and re-greening strategy to enrich the surroundings through the removal of invasive plant species and planting of native tree species. By end-FY, 0.33 ha of degraded land had been restored.

Flora protection efforts include:
• Monthly monitoring of over 5,000 trees in more than 200 Tree Protection Zones across development areas of Mandai Rejuvenation Project. Around 11,000 saplings were salvaged, and 350 trees were transplanted.
• Twice yearly monitoring of over 250 planted trees on and around Mandai Wildlife Bridge to ascertain tree growth and progression of vegetation structure to achieve a multi-layered, continuous canopy cover over the bridge.
• A survey of the 1,199 trees within Mandai Project Buffer and adjacent CCNR as part of our long-term tree growth monitoring efforts.
• Planting of more than 300 native saplings along the Mandai Boardwalk with the help of employees from our partners, GIC and Standard Chartered Bank.
• About 500m² of open area infested with the African Zanzibar yam in the Mandai Resort setback was restored with 315 trees.

Connectivity Restored: Mandai Wildlife Bridge

A key feature of the Mandai Rejuvenation Project is a dedicated wildlife bridge that connects the buffer areas leading to the CCNR on both sides of Mandai Lake Road. It is central to the green stitching of Mandai Wildlife Reserve, creating vital habitat connectivity and safe passage for wildlife movement. The movement of over 70 species of mammals, birds, bats, reptiles and amphibians (up from 57 in FY20/21) have been documented.

While the bridge is used mainly as a crossing, and other animal behaviours such as foraging and nesting activities have also been observed. Saplings of recently discovered and locally threatened tree species *Glochidion obscurum* have also been found growing on the bridge. They are the result of animal dispersal, a positive indicator of natural regeneration of flora on the bridge.

Employees from GIC planting tree saplings as part of their Gift A Tree initiative to commemorate their 40th Anniversary.

Camera trap footage of a lesser mousedeer seen near the Mandai Wildlife Bridge in the buffer areas of the development project.
Research And Biodiversity Protection

We continued to rally efforts behind various research which will help us develop more targeted initiatives to protect the wildlife in our own backyard.

Mandai Insect Survey

The Mandai Insect Survey was concluded, with 16,480 insect DNA barcodes obtained from individuals in Mandai forests. 2,811 distinct species were identified, around half of which have not been previously recorded in Singapore. The findings provide important baseline information of the insect diversity present in the Mandai precinct and contribute towards understanding of insect diversity not only in Mandai but also Singapore at large.

Species Prioritised For Conservation

Mandai is home to a remarkable variety of wildlife. A targeted approach is adopted to deploy limited resources to focus on species prioritised for conservation, as follows:

Stingless Bee

Since the Pollinator Project was initiated in 2018 to enhance habitats for pollinators, continued efforts have been taken to protect the stingless bees found naturally in our parks, and have been affected by human traffic and development. To deepen the knowledge of these bees, the Invertebrate Care Team studied hive activities before embarking on their first hive translocation and induction exercise. Following this success, the team has relocated more than 10 hives, and effectively mitigated human-bee conflict. The team also advises contractors in cases where hives are found at the construction sites and assists in the relocation of bee hives to suitable habitats.

Species like the Green Tree Snail are also being monitored and cared for. Green tree snails are endemic to Singapore and endangered. There is a small population of these snails in Night Safari that we have been monitoring since 2019. During the FY, six more snails were added to the study, bringing the total number of individuals monitored to 14.

A snail with a broken shell was identified. To increase its chances of survival, the Invertebrate Care Team brought the snail back to our facility and cared for it. After two weeks, the snail had regrown part of its shell and was assessed to be physically ready for release back into its wild habitat. A few days later, the team encountered the released snail and observed that it had further regrown its shell. This is the first known successful case study of first aid care for the species and adds to the team’s knowledge to care for it.

Sunda Colugo

Sunda colugos occur naturally within our parks and are seen frequently. However, much remains unknown about colugos and further research is needed to fill the gaps in our knowledge. The colugos in our parks are already habituated to human presence, which presents a unique opportunity for us to study this species in its natural habitat. In a study conducted from June 2020 to February 2022, 230 sighting records were logged. By analysing this data, we have been able to map out activity hotspots as well as identify individuals by their coat pattern and other characteristics. These findings will aid us in monitoring the health of the colugo population in our parks.
Wildlife Rescue In Our Parks
Some of the many native animals that call our parks home get themselves into situations that require intervention. Staff on ground are always ready to lend a hand.

Family Reunions –
Colugo pup back to mum
Following learnings from the reunion of a colugo pup with its mother in 2019 (the first ever on record), our vets managed to repeat the success with another mother-child pair on 27 July 2021.

Family Reunions –
Goshawk goes home
Goshawks are small birds of prey. Resident in Singapore, crested goshawks used to be rare but are now more commonly seen. A breeding pair had nested in a large tree within our parks and the fledgling was becoming more active and attempting to fly. On 10 December 2021, the fledgling was found on the ground and rescued by our staff. Our vets did a quick check to ensure the bird was fit for release. As it seemed relatively unscathed, it was returned to the tree it fell from and was quickly joined by one of its parents.

Snake Rescue Christmas
On the morning of Christmas Day, a wild reticulated python was found hanging precariously about 4-5 storeys high from a tree in Night Safari. A closer look revealed the python had its tail knotted around a branch. Despite manpower constraints due to the public holiday crowd, staff from Conservation, Research and Veterinary, Animal Care, Technical Services, Facilities Management and Horticulture Departments leapt to the snake’s rescue, swiftly pooling resources and securing necessary equipment.

The rescue took two hours, from the initial test with the cherry picker to clearing of the ‘dropping ground’ to ensure a safe landing for the python. The snake was safely extricated and sent to the animal hospital. After an X-ray to check for any broken bones, fluid therapy for rehydration and some quiet rest, the snake was confirmed to be none the worse for the ordeal it had gone through and eventually released.
As part of our strong commitment to achieve carbon neutrality by 2024, we continued to follow through on our responsibility to reduce our environmental impacts. Well-defined policies and practices underpin our approach towards our role as stewards of our environment.

During the FY, we:

• Lowered our carbon footprint by 10% below that of our baseline in FY19/20, taking us steadily towards our goal of carbon neutrality.

• Commissioned Mandai Wildlife Reserve Wastewater Recycling Plants for the developing parks. The new Wastewater Recycling Plants are expected to meet 21% of the precinct’s future water needs.

• Won the **Special Award for Sustainability** at the Singapore Tourism Awards 2021 for our contributions to conservation and environmental sustainability.

• Attained **Platinum LEAF (Landscape Excellence Assessment Framework)** certifications for Singapore Zoo, River Wonders and Night Safari.

• Attained **BCA Green Mark (Platinum) Super Low Energy (SLE)** award for Mandai Resort – the first hotel in Singapore to attain this accreditation.

• Attained **BCA Green Mark (Platinum)** for Penguin Cove at Bird Paradise.
Responsible Procurement

Green procurement is an integral part of our sustainable operations, not only to lighten carbon footprint but also to influence the supply chain for sustainable products. Launched in June 2019, our Green Procurement Policy provides detailed guidance to business users on sustainable buying and exemplifies our preference for responsibly sourced products. As far as possible, we incorporate sustainability requirements in tender specifications.

Roadmap for Key Spend Areas

Sustainable Procurement Roadmaps were developed based on top spends and environmental impact to guide our procurement. Palm oil, wood-based products and seafood are among goods that must be sustainably sourced, with set sustainability criteria and targets for the following:

Palm Oil
We have committed to the use of 100% sustainable cooking oil since 2017.

During the FY, we incorporated a sustainable palm oil declaration form into our procurement process to inform suppliers about our commitment and to request for them to source far sustainable options.

Wood Pulp
70% of all Mandai-produced paper-based consumables are either certified sustainable by the Forestry Steward Council or made from recycled paper, and we are on track to achieve our target of 100% by 2025.

Seafood and Meat
Seafood served at our F&B outlets is 100% sustainably sourced, while 24% of all seafood served to our animals were from sustainable sources.

From October 2021, 100% of beef to feed our carnivores met sustainability criteria.

Sustainable Merchandise

All main retail stores have a completed Sustainability Corner featuring merchandise that meets sustainability standards and/or contributes to either wildlife conservation or social causes. 34% of the merchandise sales met our defined sustainable standards. One of these products is Canopy Chocolate, made from sustainable cocoa and palm oil. The chocolates were launched as part of the Fighting Deforestation Campaign in December 2021 to help promote sustainable choices among our guests.

PACT To Reduce Plastic

As a member of World Association of Zoo and Aquariums and WWF-PACT (Plastic ACTion) champion, we are committed to significantly reduce single-use plastics from our F&B and retail operations. At our F&B outlets, 9 out of 10 plastic items like cups and food containers have been converted to reusables or alternative materials. Items like straws, stirrers and carrier bags are offered only on demand.

Greener Menus

Plant-based dishes were made available at two of our F&B outlets, Ah Meng Kitchen and Chawang Bistro – these make up 20% of our F&B menu offerings. Sustainable initiatives are part of our tenancy agreement. F&B tenants are encouraged to work towards sustainable sourcing for 20% of their menu items.
Journey To Carbon Neutrality

Our climate ambition to be carbon neutral by 2024 is in line with the Singapore Green Plan 2030 – a whole-of-nation movement to transform into a global city of sustainability.

Since 2019, we have been tracking our carbon footprint to better understand the sources of carbon emissions in our existing parks. Through a combination of solutions, we have lowered our carbon footprint by 10% below that of the baseline set in FY19/20, taking us steadily towards our goal of carbon neutrality. We also continued to make good progress on our sustainability commitments (see Annex for details).

Clean And Efficient Use Of Energy

Besides prioritising improvements in energy efficiencies, plans to integrate and maximise renewable solar energy throughout Mandai precinct have been put into action, setting the stage for our pivot towards greener sources of energy.

Increased Energy Efficiency

Energy consumption was reduced by 20% when compared with our baseline in FY19/20. Various upgrading projects implemented across the precinct have helped reap energy savings. Key initiatives to improve operational efficiency in our existing parks include:

1. Replacing old and defective air-conditioning units with hybrid thermal units. Six new units installed in the Zoo are projected to yield savings of 43,000 kWh/year. We are also looking at retrofitting existing air-conditioner compressors with energy-saving devices.

2. Upgrading of aging equipment to more energy efficient ones, for e.g. the upgrade of the filtration system at the Zoo Pygmy Hippo Exhibit and that at the sewer pump station are projected to save 46,643 kWh/year.

3. Modifications to wet moat circulation pumps operation for Zoo and Night Safari for e.g. the installation of digital timers to run at alternate hours, with projected savings of 54,678 kWh/year. We also continued to explore the use of solar-powered pumps.

Solar And Other Renewables

We are striving towards 100% renewable electricity by 2030. We will implement on-site solar panels at all available and permissible rooftops across new and existing parks, while exploring how to tap into the electricity generated by larger-scale solar farms at off-site locations.

1. On-site Solar

The installation of solar panels was carried on the roof of the newly constructed animal quarantine building and the existing multi-storey carpark. Consisting of 77 solar panel modules, the system at the animal quarantine building will generate about 50 MWh/year. The carpark houses 694 solar panel modules, which will generate about 450 MWh/year. Around 113% of our current electricity needs can be met from these on-site solar installations and we intend to ramp capacity up to about 5% in 2025.

2. Renewable Energy Certificates (RECs)

To offset our carbon emissions from electricity consumption, we purchased and retired Renewable Energy Certificates (RECs) worth 5,000 MWh in the FY. We are exploring other green energy alternatives to meet our goal of 100% renewable electricity by 2030.

Green Transport

We have been electrifying our internal fleet since 2018 and all electric trams as well as two electric vans are now operational. We also conducted a pilot study to use biodiesel for our Khatib Shuttle Buses and are exploring ways to circularise used cooking oil from our kitchens. Meanwhile, the EV charging lots at our multi-storey car park are well used by staff as well as park guests, and more EV charging lots will be installed within Mandai precinct to support Singapore’s ambition to power all vehicles using clean energy by 2040.

Green Mark of Excellence

We attained Platinum LEAF (Landscape Excellence Assessment Framework) certifications for Singapore Zoo, River Wonders and Night Safari. Two developing projects – Penguin Cove at Bird Paradise and the eco-friendly resort – were accredited with the Building and Construction Authority (BCA) Green Mark (Platinum). Of special note is our resort’s design, which won the Super Low Energy (SLE) award in recognition of its potential to reduce its annual energy consumption by 40% through best-in-class energy efficiency, the use of onsite renewable energy and innovative energy management strategies. Our resort is the first hotel in Singapore to attain this accreditation.
Saving And Recycling Water

Focused enhancement works have yielded water savings of 60,000m³/year.

Manatee Water Recovery System
Each manatee’s food intake is 35 – 60kg a day, with an output to match. To keep the water in the manatee’s habitat at River Wonders clean while optimising water usage, wastewater from the tank is not directly discharged but cycled through a bio bed filter. Specially selected plants such as pandan and alligator-flag are grown in the bio bed to remove contaminants in the water. Besides improving water quality, the alligator-flag attracts bees and dragonflies and provides natural shelter for them. This water recovery system recycles around 30,000m³ of water, which is 50% of our annual water savings.

Reduced Water Consumption
During the FY, a defect reporting application was rolled out for prompt reporting and tracking. The continued upcycling of residues from horticultural activities into animal bedding allows for dry spot clean and therefore reduces water consumption (please also see section titled Branches To Bedding on page 82). To better understand our water usage, we continued to improve our water metering system. A network of meters linked to monitoring software aids us in monitoring water consumption more closely and detect pipe leaks.

Testbed For Automated Misting
One of the orchid arches in Jurong Bird Park Entrance was test bedded with an automated misting system. With a bluetooth-enabled irrigation controller, the automated system activates misting 4 times a day and 5 minutes each time. Data collected showed the water consumption per minute for misting system was 94% lower than when using the watering hose.

Closing Mandai’s water loop
From rainwater collection to the treatment of wastewater, we continued to devise ways to manage our water resources more effectively.

Rainwater Harvesting
Rainwater harvesting features are implemented in developing parks where feasible and are projected to meet 5% of the precinct’s water needs. We are exploring the feasibility of capturing rainwater on-site in existing parks to decrease potable water usage.

Recycling Of Wastewater
The newly commissioned Mandai Wildlife Reserve wastewater Recycling Plants will soon start recycling wastewater from cleaning of animal dens and other back-of-house activities. We can expect 5% of the precinct’s future water needs to be met by this wastewater recycling.
Towards Zero Waste

By using less resources, we take less from the wild and can hence help preserve natural habitats. We continued to work towards our target of achieving 60% waste diversion rate by 2030 through a variety of measures including the facilitation of digital park map downloads and replacing paper cups with reusable ones for dining in at our F&B outlets.

Waste For Worms, Worms As Feed
Staff from the Wildlife Nutrition Centre have started an initiative on vermicomposting using blue worms, which are fed leftovers from animal food preparation. The worms can be used as animal feed and the team has started to trial this with some of our insectivorous animals.

Feeding Our Animals Sustainably
Mandai’s green vegetation has long provided a sustainable source of browse for animals in our care. During the FY, we also tapped on the following sources of sustainable animal feed.

Embracing “Ugly” Greens
Vegetables with holes or yellowing leaves tend to be rejected by human consumers for cosmetic reasons, resulting in the waste of resources like water that went into their growth and production. These “ugly” vegetables are in fact just as nutritious as “good-looking” ones. In FY21/22, “ugly” greens made up about 40% of all fresh vegetables purchased for animal feed.

Towards Zero Waste

By using less resources, we take less from the wild and can hence help preserve natural habitats. We continued to work towards our target of achieving 60% waste diversion rate by 2030 through a variety of measures including the facilitation of digital park map downloads and replacing paper cups with reusable ones for dining in at our F&B outlets.

Waste For Worms, Worms As Feed
Staff from the Wildlife Nutrition Centre have started an initiative on vermicomposting using blue worms, which are fed leftovers from animal food preparation. The worms can be used as animal feed and the team has started to trial this with some of our insectivorous animals.

Feeding Our Animals Sustainably
Mandai’s green vegetation has long provided a sustainable source of browse for animals in our care. During the FY, we also tapped on the following sources of sustainable animal feed.

Embracing “Ugly” Greens
Vegetables with holes or yellowing leaves tend to be rejected by human consumers for cosmetic reasons, resulting in the waste of resources like water that went into their growth and production. These “ugly” vegetables are in fact just as nutritious as “good-looking” ones. In FY21/22, “ugly” greens made up about 40% of all fresh vegetables purchased for animal feed.

Towards Zero Waste

By using less resources, we take less from the wild and can hence help preserve natural habitats. We continued to work towards our target of achieving 60% waste diversion rate by 2030 through a variety of measures including the facilitation of digital park map downloads and replacing paper cups with reusable ones for dining in at our F&B outlets.

Waste For Worms, Worms As Feed
Staff from the Wildlife Nutrition Centre have started an initiative on vermicomposting using blue worms, which are fed leftovers from animal food preparation. The worms can be used as animal feed and the team has started to trial this with some of our insectivorous animals.

Feeding Our Animals Sustainably
Mandai’s green vegetation has long provided a sustainable source of browse for animals in our care. During the FY, we also tapped on the following sources of sustainable animal feed.

Embracing “Ugly” Greens
Vegetables with holes or yellowing leaves tend to be rejected by human consumers for cosmetic reasons, resulting in the waste of resources like water that went into their growth and production. These “ugly” vegetables are in fact just as nutritious as “good-looking” ones. In FY21/22, “ugly” greens made up about 40% of all fresh vegetables purchased for animal feed.
Spreading The Message

With the on-going pandemic, we continued to innovate and leverage on virtual offerings to connect with educators, students, volunteers and public of the members. A key breakthrough was our collaboration with the Ministry of Education (MOE) to curate sustainability and wildlife content on the Student Learning Space (SLS) as resources for 465,000 school leaders, teachers and students in Singapore. With the soft launch of Ranger Buddies programme, we firmly cement the connected learning experience for children, enabling them to explore virtual wildlife conservation and sustainability content at home, in schools and community spaces.

The FY ended with the easing of Safe Management Measures in schools to permit outdoor learning journeys, and we finally saw the return of school groups to our parks.

Over the FY, we:

• Reached out to 205,000 students, park guests and members of the public with conservation and sustainability messaging, mostly through virtual engagement.

• Soft launched Ranger Buddy programme with around 42,000 Ranger Buddies enlisted to go on missions to protect wildlife and the environment.

• Empowered school children to act for wildlife through our inaugural Adopt An Animal (School Edition) programme.

• Launched Conservation Champions webinar series; by featuring conservationists working on the projects we support, we bring conservation stories to life and help the community connect with the wildlife we protect.

• Diversified volunteer opportunities to optimise volunteer talents. 228 volunteers contributed to our cause by committing a total of 6,464 hours towards guest engagement, animal care, and research data collection.
Pandas: The Cute Connection

In an example of how the panda is helping to promote biodiversity conservation to an audience that might not normally visit our parks, we collaborated with the Singapore Art Museum to give an online talk titled “Collection and Connection: The Giant Panda and the Power of Cute”. By leveraging on the panda’s appeal, we sought to shine the spotlight on threatened species that were not as well known to the public. 22% of participants polled pointed out that they liked learning about other endangered wildlife and conservation programmes the most. The joy people feel when engaging with giant pandas became a source of motivation to discover more wildlife conservation issues and may just nudge behaviour change that not only saves the pandas but other species too.
Conservation and Sustainability on Nation-Wide Learning Platform

The Student Learning Space (SLS) is the Ministry of Education (MOE)’s online learning platform. We have created content for a programme that focuses on pandas using a multi-disciplinary approach. Besides learning about how we provide the best of care for giant pandas based on their ecology, physiology and behaviour, the module also examines cross-cutting issues like sustainable practices in panda care, giant panda conservation breeding as well as panda diplomacy and pandas as conservation icons. By offering authentic examples of real-world curriculum applications within a world-leading zoological institution, we hope to nurture global citizens who care for nature and the environment. Having our content on the SLS platform can help us reach all school leaders, teachers and students in MOE schools in Singapore and excite them to take action for wildlife conservation and sustainability.

Teacher Training and Sharing Sessions

Curating outdoor learning experiences was a priority for educators during the pandemic. As part of our continued partnership with PAP Community Foundation (PCF) Sparkletots, we rolled out ‘Creative Facilitation of Outdoor Learning’, a bespoke training programme to support 200 educators in facilitating outdoor learning for preschoolers. The virtual training programme utilises a unique Minds-on, Hands-on, Hearts-on approach to help the educators incorporate outdoor learning, conservation, sustainability and literacy elements as part of their school curriculum.

To increase awareness of our Chinese programmes and resources, we organised a virtual sharing session for 42 Mother Tongue Language teachers. The session was very well-received and within the ensuing month, five schools had confirmed their bookings for 30 virtual programmes which would reach out to some 3,600 students.

Adopt An Animal (School Edition)

Adopt An Animal (School Edition) was developed to empower school children to act for wildlife through fundraising efforts. Beyond fundraising for the adopted animal, the students also honed essential life skills such as critical thinking, taking perspective, teamwork and communication.

Parent Engagement

Promoting an appreciation of the natural world in children requires more than just the efforts of educators; getting parents involved becomes our strategic intent in nurturing the next generation of eco-stewards. A parent education webinar ‘Babies included: Family Bonding Through Wildlife Encounters’ allowed us to share strategies in facilitating nature and wildlife appreciation. One is never too young to connect with nature and through this workshop, we equipped parents with the tools to cultivate a love of animals in their children from age zero.

In another parent workshop titled ‘Brain Matters – Learning Essentials Life Skills With Singapore Zoo’, we invited early childhood expert, Beth Fredericks, to share on the neuroscience research behind the 7 Essential Life Skills, and ways for parents to create animal-inspired brain-building moments while visiting Singapore Zoo with their children.

Working With Educators

In today’s urbanised environment, children risk being cut off from nature in their formative years. By complementing the curriculum in innovative ways, we kept conservation on the agenda for educators, helping them forge connections with nature for young people and inspire them to protect wildlife.
Digital In-Park Programming

With frequent changes to Safe Management Measures, we have to stay nimble and continue to connect with our guests through a diverse range of engaging in-park experiences. By leveraging on cloud-based tools and game dynamics, the Education Team curated various digital trails with highly interactive features that gamify in-park learning explorations that appeal to digitally savvy guests.

Wild About Singapore
In celebration of Singapore’s 56th birthday, the WILDerful Explorer Trail was rolled out to shine a spotlight on native wildlife. 200 guests participated in the digital trail and learnt how to be good neighbours to native species which are our natural heritage.

Back From The Brink
Tying in with the year-end blockbuster Brickosaurs campaign, the Back From The Brink Of Extinction trail was designed to deliver the message that we can help save threatened animals today before they become extinct like dinosaurs. Through the interactive trail, nearly 27,000 guests travelled back in time to encounter the extinct dinosaurs before returning to the present day and pledged to fight extinction.

Giant Panda Q-uiiz
In anticipation of strong turnout for Le Le’s debut in Giant Panda Forest in March 2022, the Giant Panda Q-uiiz was created as part of our queue management efforts and at the same time to provide opportunities for guests to more about our black-and-white panda family. The well-received digital engagement was a great way to fill ‘white spaces’ and generate awareness of wildlife conservation while guests wait in queue.

Wild About Singapore
In celebration of Singapore’s 56th birthday, the WILDerful Explorer Trail was rolled out to shine a spotlight on native wildlife. 200 guests participated in the digital trail and learnt how to be good neighbours to native species which are our natural heritage.

Back From The Brink
Tying in with the year-end blockbuster Brickosaurs campaign, the Back From The Brink Of Extinction trail was designed to deliver the message that we can help save threatened animals today before they become extinct like dinosaurs. Through the interactive trail, nearly 27,000 guests travelled back in time to encounter the extinct dinosaurs before returning to the present day and pledged to fight extinction.

Giant Panda Q-uiiz
In anticipation of strong turnout for Le Le’s debut in Giant Panda Forest in March 2022, the Giant Panda Q-uiiz was created as part of our queue management efforts and at the same time to provide opportunities for guests to more about our black-and-white panda family. The well-received digital engagement was a great way to fill ‘white spaces’ and generate awareness of wildlife conservation while guests wait in queue.
Ranger Buddies (RB)

Ranger Buddies (RB) was conceptualised to nurture every child, every day and everywhere to drive positive change for themselves, others and the world. Filled with exciting missions for children to take part in together with their Animal Buddies as trusty co-explorers, RB seeks to nurture every child into a future-ready global citizen and a responsible steward of our planet.

RB Soft Launch

A soft launch campaign of Ranger Buddies was carried out in October 2021 amidst a resurgence of the delta variant of Covid-19. Rooted in the concept of connected learning experiences, RB soft launch campaign activations spanned the Zoo, PLQ Mall and Marine Parade neighbourhood. Children across Singapore were invited to be Ranger Buddies and join orangutan Khansa on a quest to fight deforestation – the main threat to orangutans in the wild. They could also access RB Mission Web-App at home to learn about deforestation, and to take action for wildlife. By the end of the campaign in December 2021, 8,000 children had signed up on the web app, with 37% completing at least 2 cross-location missions across home, the Zoo, PLQ mall and Marine Parade neighbourhood.

RB Virtual Live Shows

School outreach came to a halt with the pandemic but this did not stop us from reaching out to students. We pivoted to virtual live shows and were pleasantly surprised at the phenomenal response from the schools. The first season featured Sally the hornbill and saw over 10,000 children tuning in. Encouraged by the response, we decided to make available the virtual live shows on a quarterly basis. We also went on to curate a holistic learning experience with pre-show resources for teachers and parents to prepare the children for the live show, and post-show activities for extended explorations. A virtual gallery on RB website allows children to share their artwork and photos of their nature explorations as post-show missions. The virtual live shows enjoyed tremendous support, and the recent sessions garnered participation from some 29,000 preschool and primary school children – a feat close to impossible to achieve for in-person engagement.

The recorded version of the shows enjoys healthy downloads and continues to connect children to the natural world. In the FY, we offered four virtual live shows:

- The Amazing Hornbill Virtual Show
- Pangolin and Pals Virtual Show
- Stop, Look, Listen Virtual Show
- The Tree-Bird Virtual Show

Wildlife Connections Through Social Media

Social media is the tool our guests use to connect with us from a distance – content on our channels become an extension of their experience beyond our parks and serves as a digital mirror for our mission to inspire our guests to care for wildlife and protect biodiversity. By leveraging the power of our social channels, we extended our messaging on animal care and welfare, environmental education and global conservation to 943,000 FB Fans and 67,000 followers on Instagram. The video content on our platforms did exceptionally well, with 4.4 million and 1.2 million minutes watched on Facebook and YouTube respectively.

RB School Programme

A 3-week pilot with Gan Eng Seng Primary School (GESPS) to integrate wildlife conservation and sustainability into the Primary 6 curriculum saw students completing over 1500 environmentally friendly activities including recycling, identifying products with FSC logo and upcycling used paper products. 254kg of paper products were recycled and sold for cash, which was donated to the Zoo.

“IT was seriously great and I had loads of fun!!! I used to think that the deforestation mission was boring but now, I realised how fun and important it is!”

GESPS student participant in RB school programme

Wildlife Connections Through Social Media

Social media is the tool our guests use to connect with us from a distance – content on our channels become an extension of their experience beyond our parks and serves as a digital mirror for our mission to inspire our guests to care for wildlife and protect biodiversity. By leveraging the power of our social channels, we extended our messaging on animal care and welfare, environmental education and global conservation to 943,000 FB Fans and 67,000 followers on Instagram. The video content on our platforms did exceptionally well, with 4.4 million and 1.2 million minutes watched on Facebook and YouTube respectively.
Advocating For Sustainability & Wildlife Conservation

**Staff Advocacy**

Advocating for wildlife and sustainable living is the responsibility of everyone in our organisation. To embed this at all levels across the organisation, we incorporated staff engagement as an essential component of campaign mechanics. All public campaigns are to begin with internal campaigns to equip staff with fundamental knowledge to engage guests. Fight Deforestation was the first campaign to adopt this holistic approach, with activities carefully curated based on insights from a survey on staff attitudes towards conservation and sustainability.

**Conservation Champions Webinar Series**

As part of the Fighting Deforestation campaign, we kicked off the first Conservation Champions webinar in December 2021, focusing on our work in orangutan conservation and our sustainability journey. This was followed by a second instalment on our efforts to save the Malay tiger. By bringing together in-house animal care specialists and partners in the field working on projects supported by Mandai Nature, these in-depth sharings strengthened our positioning as a world-class wildlife institution dedicated to caring for the planet and protecting animals and nature. Recordings of these sessions are available for viewing on our YouTube channel.

**Contributed Case Study To WAZA Palm Oil Guide**

This guide aims to help WAZA members understand and support the World Association of Zoos and Aquariums (WAZA)/Roundtable on Sustainable Palm Oil (RSPO) Memorandum of Understanding (MoU) regarding sourcing of sustainable palm oil. We contributed a case study on our journey in switching to 100% RSPO-certified cooking oil for our F&B outlets, and also our advocacy efforts targeted at staff, suppliers and members of public.

**Presenting at WAZA Sustainability Webinar Series**

In 2021, WAZA hosted a series of five webinars highlighting the sustainability initiatives of its members. We presented at two of the webinars, sharing how we have successfully reduced plastic use in our facilities as well as insights from and challenges faced in our journey to carbon neutrality.

**Sharing Sustainability Solutions**

We “walk the talk” by making more sustainable choices in our procurement and the use of resources like palm oil and plastics. By sharing learnings from our own sustainability journey with a wider audience, we hope to inspire more to join us in choosing more pro-environmental actions.
Engaging Volunteers

Engagement And Training
For most part of the FY, we kept in touch with our volunteers virtually with updates on our conservation projects and refresher training sessions. Remote volunteering opportunities were introduced and enjoyed very good response. Once Safe Management Measures were eased, we resumed in-park volunteer duties with modifications, and on-site training. Our 330-strong members volunteer community continued to show unwavering support, with some 32% of the volunteers having been with us for five years and more.

Long-service volunteers
We would like to thank Cheng Yun and Nien Sien for volunteering with us for the last 20 years!
Their commitment in helping us spread the conservation message is truly inspiring. They shared same reflections on their journey with us.

Going Above And Beyond
Sharon has been a docent with us since 2011. The pandemic did not dampen her volunteer spirit – she continued to volunteer as a Wildlife Ranger at Singapore Zoo and as Zooper Safe Crew at the Squirrel Monkey Forest, River Wonders. Sharon demonstrated her giving spirit further by committing to sponsorship of our young African lion, Simba, together with her partner, Patrick.

"I see my volunteer journey with the zoo as a definitive connection to our natural world and all things of nature."
Cheng Yun

"Fantastic journey, not without its ups and downs, but a fulfilling one... and one of the few places where my heart is kept young."
Nien Sien

Diversifying Volunteer Opportunities
By modifying in-park duties and offering remote volunteering opportunities such as copywriting and data processing, we were able to continue to tap on volunteer resources during the pandemic.

Wildlife Ranger Volunteer
The Wildlife Ranger Volunteer initiative was developed to continue our guest engagement and at the same time observe safe management measures. Instead of having guests clustered at Ranger Stations, the volunteers adopted a roving approach, which also allows them to be on a lookout for guest-wild macaque conflicts. During the reporting period, 45 ranger volunteers collectively logged 105 hours to keep our parks safe for both guests and wild macaques while inspiring an appreciation for native biodiversity.

Remote Wildlife Buddies
Building on the success of the virtual version of Wildlife Buddies rolled out in 2020, we developed a different iteration that would motivate students with varying interest levels and heighten a sense of ownership. We ran a pilot version in collaboration with CHIJ St Theresa’s Convent, by inviting students to develop a solution that would generate awareness of native wildlife among their schoolmates. Students could decide on the mode of engagement and they elected to produce their own video and poster to share the message of human-animal co-existence during school assembly talks and learning week. The programme model is still undergoing refinement, but we have already received enquiries from other schools interested to collaborate and we could potentially expand into other topics such as sustainability.
Building a People-focused Culture

Nurturing an engaged workforce and building an attractive workplace are the twin cornerstones of our organisation’s vision, mission and values. We seek to leverage differences as a rich wealth of resources for our holistic growth and support a #OneUnitedMandai culture. This goes together with efforts to listen to staff concerns and to protect those who were more vulnerable. We continue to upskill and reskill our workforce to get them future-ready while deepening engagement with the community, especially those with special needs or hail from disadvantaged backgrounds.

FY21/22 HIGHLIGHTS

• Formalised the Diversity, Equity and Inclusion (DEI) policies; established a DEI panel

• Launched CAREelephant, a workplace well-being initiative

• Bagged #37 ranking by The Straits Times in Top 200 list of “Singapore’s Best Employers 2021”

• Partnered with Temasek Foundation to extend discounted park admission to 7,000+ healthcare workers in appreciation of their tireless work to keep the nation safe

• 4,107 beneficiaries from various social service agencies enjoyed complimentary park admission, and in-park and virtual programming
Human Capital Management

We ranked #37 and came in #4 under the Travel and Leisure sector in the Top 200 list for The Straits Times’ “Singapore’s Best Employers 2021,” which surveyed more than 6,000 employees from more than 1,700 companies. This is a powerful endorsement that we are an organisation where staff have a strong sense of purpose and commitment. We were also conferred the Special Award for Most Exemplary Employer at the Singapore Tourism Awards 2021, which pays tribute to businesses who have displayed exceptional care towards employees and shown exemplary commitment to retain jobs and capabilities, while ensuring staff welfare is protected during challenging times.

Diversity, Equity and Inclusion

In June 2021, we formalised the Diversity, Equity and Inclusion (DEI) policies, which set out explicit guidelines for our corporate behaviour to ensure a fair and inclusive environment for all staff. To foster equitable access and embrace diversity, a DEI panel comprising members of the Senior Management Team and the Human Resources Team has been formed. The panel provides guidance and advice on organisational initiatives to promote and nurture a harmonious and safe workplace.

Delta Senior School work programme

As part of our effort to be an inclusive employer, we collaborated with APSN Delta Senior School (DSS), a post-secondary school that offers vocational training to students with mild intellectual disability. We made special arrangements for three of their students to be attached as interns at our Wildlife Nutrition Centre (WNC) for 5 months for their Onsite Training Programme. We began working with DSS six months prior to the start of the internship on vocation-mapping, site assessments and stakeholder engagements. From January 2022, the three students began working alongside the WNC Team, accompanied by a DSS Trainer.

To cater to the students’ needs and help the students thrive in their roles, the WNC Team had to adapt their way of work and adjust their coaching style. While guiding the students in the preparation of food for the animals, the Team used thoughtful visual cues like putting up fruits and vegetable images on the walls to help the students better remember the process. Through this meaningful experience, the WNC Team report feeling a good sense of achievement when they observe the students’ improvement.

Employee Well-being

As a progressive employer, we remain committed to creating a sustainable work-life culture that supports our employees’ well-being and meaningful work-engage. Our wellness model focuses on four dimensions of renewal – Body, Mind, Heart and Spirit, which shape the design, implementation and evaluation of our workplace well-being initiatives – CARElephant programme, and other wellness activities. Being conferred the Employee Well-being Award (Silver Standard) at the 15th HR Awards Gala Presentation is a testament to our dedication towards our staff members.

CARElephant Programme

During the FY, we strengthened the CARElephant programme by engaging a professional counselling body to provide counselling services for our employees. It was critical to ensure employees’ mental wellness during the prolonged pandemic and we believed it was opportune to make available such services. To complement the counselling services, we partnered Health Promotion Board to provide exercise programmes and talks for our staff members on a regular basis. We also registered for the National Steps Corporate Challenge, which saw 47% of our workforce signed up.

Work-Life Harmony Pledge

Studies have shown that organisations that champion work-life balance are able attract and retain talents better, leading to higher productivity. The Management Team is keenly aware that everyone needs to exercise self-care and to set sensible boundaries between work and personal life to prevent burn-out at work. They committed to a Work-Life Harmony Pledge in November 2021 to encourage healthy work-life practices in staff’s day-to-day activities.
Designing and implementing employee-centred initiatives is key to promote a positive work environment and active employee engagement. Through the inaugural Experience & Innovation Hero Awards, we celebrated staff who embody the outstanding characteristics of service and hospitality, and demonstrate the 5 Innovation Behaviours by enhancing the experience of our staff, guests, and animals. The Awards were presented to 15 Individual Category and four Group Category Champions.
Staying Agile, Building Resilience

Through these unpredictable times, our people have proven their collective resilience. We continued to be nimble in our response to new developments, making rapid adjustments to not only restore business operations, and also ensure future success in the new normal. In recognition of our efforts to adapt to business disruptions by leveraging our digital capabilities, we were presented the 2021 IDC Special Award for Digital Resiliency at the IDC Asia Pacific Future Enterprise Awards. This is one of the industry’s most prestigious awards and we were honoured to be recognised alongside other heavyweights like Changi Airport Group, DBS and Grab.

Mandai Innovation Festival

Mandai Innovation Forum

Our first Mandai Innovation Forum, held in conjunction with Singapore Week of Technology & Innovation (SWITCH) on 11 November 2021, drew a worldwide audience from organisations like WWF, Ocean Park and Google as well as 70 of our staff. Speakers and panelists from Conservation International, Singtel, Lazada etc. were engaged in rich discussions on the use of technology, innovation and data in the conservation of wildlife and biodiversity, sustainability and engagement.

Besides providing a platform to network with like-minded academics, change-agents and start-up companies, the Forum also helped showcase Mandai’s innovation projects to an international audience, and the exposure could be a catalyst for partnerships. By establishing Mandai as the thought-leader in our domain, we hope to ignite interest in global talents to join our mission. The Forum garnered an impressive 15,000 social media views and 276 sign-ups, including participants from Japan and the USA. We received feedback that the forum was engaging and provided our partners with a whole new perspective about us and the transformation efforts we have in the pipeline. Staff members who participated were reported excellent takeaways.

Mandai Hackathon

The Mandai Hackathon, held for 4 days in January 2021, aimed to build an innovative culture in Mandai. A learn-by-doing platform was provided for our staff to develop a chatbot using Power Virtual Agent that would assist frontline staff with answering guest enquiries and to provide them with timely updates on animals and park activities. A total of 29 participants worked in three cross-department teams to create three chatbots each with different features to enhance guest experience.

Leveraging on Technology

We embarked on a Robotics Process Automation (RPA) project for New Joiners Onboarding Process. The bot was successfully launched in February 2022. The end-to-end process was reviewed to identify opportunities for process improvement and repetitive tasks were flagged out for automation.

With the process improvements and automation, the final onboarding process requires less human intervention and provides greater accuracy and consistency which result in faster turnaround time – average time saved is 66%.

Mandai Innovation Week

Held over 25 – 27 January 2021, the event was an opportunity for our staff to learn about sustainability, technology, and guest experience from invited keynote speakers from Changi Airport Group, Grab and ELXR as well as in-house experts from the Commercial, Life Sciences, Park Operations and Strategy & Innovation Teams. The event was hopefully a springboard for our staff to have conversations about new ways of working.
Training And Development

Over the course of the financial year, 93% of our staff members participated in at least three learning activities. We continued to commit to staff development through the Continuing Education Scheme (CES), which will support ten members of staff for studies ranging from specialist diplomas to Masters programmes.

Skilling up for Animal Welfare

Training for Animal Care Staff

The quality of animal care and welfare is intrinsically related to the competency and effectiveness of our Animal Care Staff. A structured training framework guides the implementation and evaluation of the Zookeeper Development Programme (ZDP) and the in-house Animal Management Course (AMC). Together, they provide our Animal Care staff with a robust training and development plan, supported by coaching, and on-the-job and formal classroom learning.

The Zookeeper Development Programme (ZDP)

ZDP was launched in November 2019 to map out a path to guide Animal Care staff in attaining different competencies. It focuses on the hands-on and operational skills of animal care. In FY22, 63 staff completed at least one level of the ZDP. Since the launch of the programme, the total number of Animal Care staff who have completed at least one level of ZDP stands at 101.

Animal Management Course (AMC)

AMC seeks to bring a deeper understanding of the role of Animal Care staff in a modern zoo, and the zoo community at large. Through the training, Animal Care staff are equipped with the skills to deliver best-in-class medical care for our animals.

ZIMS Training

The Zoological Information Management System (ZIMS) is a global source of information on animals and their environments for zoos and aquariums built to serve animal management and conservation goals. Over the FY, the Animal Data Management and Transactions (ADMT) Team conducted in-house training for members of the Life Sciences Division. 34 staff are now proficient in the usage of the ZIMS Husbandry module, which is designed to manage information including animal behavioural observations, enrichment, training and feed logs.

Nine staff members also attended the ZIMS Care and Welfare module to learn to use parameters such as physiological, behavioural, and environmental factors to monitor animals under their care.

Vet Skills Training

Internal skills training in clinical pathology, postmortem rounds, specialised ophthalmology surgery as well as reptile handling and snake relocation was conducted monthly. These sessions ensure veterinary staff are equipped with the skills to deliver best-in-class medical care for our animals.

Collaborations For A Future-Ready Workforce

SGUnited Traineeship

We tapped on SGUnited Traineeship Programme to provide fresh graduates from Higher Institutes of Learning traineeship opportunities amidst a Covid-19 hit labour market.

Of the six trainees who joined under this programme, four of them have stayed on with us in either a permanent or contract role.

Internships Programmes

Internships are a way for us to collaborate with Institutes of Higher Learning (IHL). We welcomed 78 interns who were deployed in various departments across our organisation.

<table>
<thead>
<tr>
<th>INSTITUTE OF HIGHER LEARNING</th>
<th>NUMBER OF INTERNS</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTERNATIONAL BACCALAUREATE</td>
<td>1</td>
</tr>
<tr>
<td>ACS (independent)</td>
<td></td>
</tr>
<tr>
<td>INSTITUTE OF TECHNICAL EDUCATION (ITE)</td>
<td>19</td>
</tr>
<tr>
<td>College Central, College West</td>
<td></td>
</tr>
<tr>
<td>POLYTECHNIC</td>
<td>34</td>
</tr>
<tr>
<td>Ngee Ann Polytechnic</td>
<td></td>
</tr>
<tr>
<td>Republic Polytechnic</td>
<td></td>
</tr>
<tr>
<td>Singapore Polytechnic</td>
<td></td>
</tr>
<tr>
<td>Temasek Polytechnic</td>
<td></td>
</tr>
<tr>
<td>UNIVERSITY</td>
<td>24</td>
</tr>
<tr>
<td>Nanyang Technological University</td>
<td></td>
</tr>
<tr>
<td>National University of Singapore</td>
<td></td>
</tr>
<tr>
<td>University Malaysia Sarawak</td>
<td></td>
</tr>
<tr>
<td>Yale-NUS College</td>
<td></td>
</tr>
</tbody>
</table>

TOTAL 78

Service Training

Customised training courses were developed for various departments such as F&B and Retail to help them deliver good guest experiences. In line with the brand change, service training was also conducted for Retail frontliners to help them tell more conservation stories to engage our guests better and deliver a unique shopping experience.

Culture Building

Mandai DNA

Leading up to our rebranding as Mandai Wildlife Group in October 2021, we ran a series of Mandai DNA workshops for close to 600 staff. The workshops aimed to bring our staff members onboard as wildlife advocates as we renewed our commitment to conservation and a sustainable future. As a wrap-up to the workshop, each participant made a commitment to protect wildlife in his/her own way and be a positive force for change.

Job Redesigning and Reskilling

Reskilling is essential to ensure our workforce is future-ready. Staff from the Commercial Team attended the Job Redesigning and Reskilling Programme to equip themselves with the necessary competencies required to create marketing campaigns and digital sales activities. They were also exposed to analytical skills and techniques to boost digital reach.
Social Sustainability

We continued to work closely with Social Service Agencies (SSAs) to make our parks accessible to more segments of our community. Close to 2,000 beneficiaries from various SSAs like Institute of Mental Health, St Andrew’s Nursing Home, AWWA and AIC Agency for Integrated Care enjoyed a complimentary virtual outing via our ‘Hello From The Wild Side’ programme. More than 2,000 came on in-person visits, bringing the total number of beneficiaries to 4,107 – double the number in FY20/21. We also worked with existing and new partners to co-create wildlife experiences tailored to the specific needs of the communities they serve.

Serving The Community

JBP Gives Back

As part of Jurong Bird Park’s year-long golden jubilee celebration, September 2021 was designated as a month of giving to remember the Singapore community that has continually supported JBP. More than 500 beneficiaries from various SSAs enjoyed complimentary visits, virtual Hello From The Wild Side or My Animal Buddy sessions and received goode bags sponsored by our partners and personally delivered by staff volunteers. In support of the nation’s call for seniors to be vaccinated, we also extended SI admission to some 2,500 vaccinated seniors. We also extended special JBP admission of $5 to more than 150 frontline healthcare workers.

Career Guidance for Youths at Risk

Fei Yue (YouthGo!) Zoo Career Workshops

Fei Yue YouthGo! conducts outreach to support youths-at-risk and keep them off the streets. Collaborating with Fei Yue, we curated Zoo Career Workshops to provide social and work experience for the youths, in the hope that they may eventually seek meaningful careers with us. Besides interactions with animals, the youths gained insights into zoo careers through engagement with Life Sciences teams. Staff members also shared their personal experiences, which resonated well with the youths. Encouraged by the positive impact observed in the youths, an enhanced version of the programme was rolled out in early 2022 to expose the participants to other careers at the Zoo and also hone essential life skills needed in the work place.

Reaching Out To The Disadvantaged

Salvation Army Family Day

For the fourth year running, we co-created Wild Adventures’ with the Salvation Army to bring families affected by incarceration on virtual and in-park outings. In response to feedback from past family days, we tailored the programme to cater to the interests of youths instead of just for young children. While the families enjoyed wildlife experiences virtually and in-park, they also gained exposure to the 7 Essential Life Skills, which are particularly useful to the children and youths. We were very heartened that the programme provided an opportunity of the families to spend quality time together to bond.

Catering To Special Needs

Collaborating For Autism Awareness

The third Autism Awareness Weekend at River Wonders was made more meaningful through a collaboration with St Andrew’s Autism School (SAAS). Prior to their learning journey SAAS students learnt more about freshwater animals through hands-on crafting of their likeness and learning activities for their visit were carefully curated and facilitated.

The children’s artwork was showcased at the Amazon Flooded Forest over 2 & 3 April 2021, when River Wonders was opened an hour earlier to allow families with children on the spectrum to enjoy quiet moments and bonding time. Like in previous years, autism-friendly online resources were shared with families to help them plan their visit. A total of nine families participated in the early opening – a visual schedule and simple activities were prepared for them.

Partnerships For The Underprivileged

In partnership with The Hut, a non-profit organisation that supports underprivileged children, we matched every contribution via the Adopt an Animal Programme by members of the public in December 2021 with complimentary Rainforest Lumina tickets that were gifted to the children and their families. This provided an avenue for the public to make meaningful contributions in support of not only wildlife protection, but also a social cause with a tangible impact. A total of 57 tickets were given to the underserved community through The Hut.

MWG x Temasek Foundation

In further appreciation of healthcare workers who have been working tirelessly to keep the nation safe, we partnered with Temasek Foundation to extend 50% discount on admission tickets to SingHealth, NHG and NHLS healthcare workers. More than 7,000 healthcare workers took up the discounted offer over the months of December 2021 and January 2022. On top of the discount, Temasek Foundation also purchased 12 corporate memberships and three giant panda virtual Hello From The Wild Side sessions for healthcare workers to enjoy with their families.

Pause & Play with Pathlight School

Pause & Play is an online resource co-created with Pathlight School for special needs students. This is the second time we are collaborating with the school on autism-friendly resources, which comprise a video and manual to help teachers facilitate virtual learning journeys at Singapore Zoo. The resource was shared with all special needs schools in Singapore and made available on our website for all parents and educators to use with their children.
Sustaining our Business Performance

Though tourism took a tough hit with the global pandemic, we continued to enjoy staunch support from the locals. We remained nimble in reinventing our business model to not only survive but thrive in the new norm. With strengthened processes and controls firmly in place, we look forward to capitalising on opportunities that the tourism recovery will bring.

FY21/22 HIGHLIGHTS

- Achieved attendance of nearly 2 million at our parks despite disruptions caused by the pandemic. A significant number were locals utilising their SingapoRediscover (SRV) vouchers.

- Launch of a **unified next-gen payments platform** covering all on-site and online channels, and all digital payment modes across the entire Mandai precinct.

- Launch of **Partners Promotions Portal**, an online platform to optimise sales outreach and dynamic collaborations with our Corporate Partners.

- Night Safari won the prestigious **Thea Classic Award** by the Themed Entertainment Association for standing the test of time over nearly three decades.
Driving Footfall

In FY21/22, attendance climbed to nearly 2 million, up 4% from 1.92 million in FY20/21. Visitorship for River Wonders jumped 10%, boosted no doubt by the heightened interest in Le Le, the panda cub who debuted in his nursery on 30 December 2021. Singapore Zoo also enjoyed a 10% uplift in attendance, attributed to unique park offerings and efforts to grow existing and new segments. Member attendance saw healthy growth, a nod towards innovative marketing campaigns that attract repeat visits. Though overall numbers are still less than half of what we saw pre-Covid, the upswing is encouraging, and we are gaining momentum.

A significant number of our visitors were locals utilising their SingapoRediscovers Vouchers (SRV). To offer more channels for citizens to book and spend their SRV voucher with us, we enabled the purchase of admission and other add-ons on both our direct channel and the five official SRV booking platforms. In total, we attracted more than 770,000 Singaporean to spend their SRV vouchers to visit our four parks and Rainforest Lumina.

In-park Campaigns

Discover Mandai
Following the launch of our Mandai brand in October 2021, we partnered Sony on Discover Mandai, an activation that aims to showcase the different facets of Mandai Wildlife Reserve through photography. Seven of Sony’s Alpha Photographers, each with a different area of expertise, were given access to our wildlife parks with the brief to uniquely interpret ‘Mandai Come to Life’ through their work. Displayed across Singapore Zoo and River Wonders, their photographs aim to introduce our transformation in identity and inspire the creation of Mandai moments in our parks. A #DiscoverMandai photo contest and series of photography workshops were conducted to deepen guest and member engagement.

Brickosaurs: Back From The Brink Of Extinction
Dinosaurs beguile young and old alike. To tap on the fascination with these ancient creatures and highlight the plight of threatened species, we brought in Brickosaurs, a unique, first-in-Asia experience. More than 60 structures made from over 1.5 million toy bricks were displayed across Singapore Zoo and River Wonders, from tiny raptors to the towering 4-metre-tall Brontosaurus, and the gigantic T-Rex weighing 1,964 kg. The display was complemented by plants décor featuring plants from prehistoric species, masterfully executed by our Horticulture Team.

The campaign paved the way for our first strategic marketing partnership with the LEGO Group. Exclusive mini figures as door gifts were presented to all children visiting Singapore Zoo during the campaign period of 13 November 2021 to 3 May 2022. Dinosaur-themed Brickosaurs set meals were introduced by F&B to complete the experience.

Wild About Twilight – A Pangolin’s Tale
In response to positive feedback in the previous FY for Wild About Twilight, we followed up with Night Safari’s very first wildlife Virtual Reality (VR) experience to attract young adults who resonate with digital offerings. Guests were invited to venture into the wild with Boran, our rescued Sunda pangolin, to discover hidden augmented reality animals and learn how they can lend a hand in the pangolin’s fight against extinction.

JBP50 Jubilee Promotion
To round off JBP’s 50th anniversary, locals enjoyed 50% off park admission in November and December 2021. Attendance received a boost of 59% against budget, bringing the total JBP visitorship in 2021 to 285,000, ending off the golden jubilee of Singapore’s first wildlife park on a high.

Rainforest Lumina Season 3
For the last season of Lumina from 8 July 2021 to 13 February 2022, we refreshed the experience with two new immersive zones. To tie in with the Chinese Mid-Autumn Festival, which sees families gathering for mooncake parties and other festivities, a special mid-autumn version was run in September 2021, with six new themed zones featuring traditional activities such as lantern making.
Financial Sustainability

To protect jobs, provide for our animals and make impactful conservation investments, we continued with robust commercial approaches to secure the long-term financial sustainability of our operations. The Commercial Team worked tirelessly to offer not just new experiences but also focused on activities that increase yield per guest. Complementing these efforts is the activation of a next-gen payments platform that covers all channels – on-site and online – while unifying all digital payment modes across existing and new attractions in our precinct.

Dining With A Difference

FY21/22 continued to be a challenging year for our F&B Team due to Safe Management Measures limiting dine-in group capacity and types of dining activities that can be carried out. Thanks to the team’s resilience and adaptability to the evolving situation, we were able to continue delivering new dining initiatives and experiences to our guests.

Adapting to Dine-in Limits

For nearly two and a half months in the first and second quarter, no dining-in was permitted at our F&B outlets though our parks continued to be operational. Within a short span of time, the team reworked all menus to offer grab-and-go meals to cater to guests needs. To comply with prevailing dine-in group capacity limits, the team had to respond almost immediately with changes to seating arrangements multiple times throughout the reporting period. The team also refreshed the menus to cater to the largely local crowd.

Themed Dining

To allow for additional seating and dining choices, various set lunch menus were served at event venues like S2 Forest Lodge and JBP Flamingo Lodge. These are welcomed by guests as they provide a fuss-free dining experience in air-conditioned comfort. Flavours of Penang was launched at NS Ulu in July 2021 amidst much aplomb. Encouraged by the popularity of Flavours of Penang, the team launched Taste of Malaysia in January 2022 with expanded menu offerings to feature popular dishes and desserts from other parts of the peninsula.

Adoptions and Sponsorships

The support from individuals and corporates in the form of adoptions and donations grew even stronger in the FY. Key adoptions include the adoption of Sang Wira our male Asian elephant by Toppan Leefung and the adoption of our two giraffes by Kuok Singapore, which runs the PACC Container Line that transported them from India to Singapore in 2021.

Corporates and individuals also showed their support by sponsoring animal presentations, events and experiences in our parks. Bench, sculpture, and tree adoption opportunities continued to gain traction among the community.

We had five like-minded organisations including GIC and Standard Chartered Bank join us in the planting of trees along the Mandai Boardwalk. We also received in-kind sponsorship of veterinary equipment from Philips Healthcare that will help us provide better medical care for our animals. We are deeply grateful to all our adopters and sponsors for their generosity. Their solidarity with our cause helps us stand by our commitment to care for the animals living within and beyond our gates and also make a positive contribution to the fields of wildlife conservation and environmental protection. (see pages 14-15 for a complete list of adopters and sponsors)
Bringing New Experiences To Market

The Sales and Experience Development Team developed a full suite of Wildlife Experience programmes to expand our appeal across different segments. These allowed us to reposition our parks as some of the most iconic venues with one-of-a-kind experiences.

Hello from the Wild Side Season 2
The return of Season 2 of our virtual programme, Hello from the Wild Side, was timely as the relaunch coincided with the implementation of Phase 2 (Heightened Alert). The refreshed programme, titled Zoo Explained! took guests behind the scenes to meet our Veterinary and Animal Care teams to learn about how they care for our animals.

Glamping to Staycation
We have transformed and enhanced Glamping to Staycation series, as the most sought-after staycation product in Singapore. Staycation with the Flamingos at Jurong Bird Park was launched, on the back of the positive reception to Staycation with the Manatees at River Wonders and Staycation in the Wild at Singapore Zoo last year. The nostalgic theme was most apt as this season of Staycation with the Flamingos would be the first and the last for Jurong Bird Park before moving to Mandai. Guests enjoyed exclusive interactions with birds and spent the night in a bell tent next to over 160 flamingos. The majority of the slots had been sold by end-FY.

Evening in the Wild
We continued to roll out different thematic dining to capture the affluent segment. Corporates such as SIA Krisflyer, Audi, Xiaomi are among the companies that have seen value in our exclusive dining programme buyout. We hosted a reporter from CCTV, one of China’s largest media platforms to experience Evening in the Wild Night Safari’s signature dining programme. The reporter shared her positive experience in a video story reaching a large potential key market for the programme.

Wild Weddings
We offer the one and only wildlife wedding concept in a natural setting – a departure from other offerings in the market. More than 20 weddings were held at our venues and we were recognised as one of the most noteworthy wedding venues in Singapore by Wedding Vow SG.

New Private Tours
New private tours such as Babies in the Wild and Panda-mania tour, increased revenue and yield significantly while providing memorable experiences to families and guests seeking a more immersive wildlife experience.
Rejuvenating In-Park Experiences

Despite the manpower crunch and worksite restrictions, we continued with master plan projects for our three parks at Mandai. Through the continual rejuvenation of exhibits and upgrading of back-of-house facilities, we hope to address customer pain points and deliver more uplifting wildlife experiences, and at the same time improve animal care standards.

This spirit of constant renewal in our quest for excellence received a global stamp of approval in November 2021, when it was announced at the IAAPA Expo that Night Safari had won the Thea Classic Award. The award recognises an outstanding themed event or attraction that has stood the test of time. Presented by the Themed Entertainment Association (TEA), the Thea Awards are considered some of the most prestigious honours in the experience industry. Night Safari’s win reinforces the value of experience design and themed approaches to engaging people worldwide. Past recipients include industry luminaries like Disneyland and Tivoli Gardens. We are humbled to join their ranks.

At Night Safari

New amphitheatre and presentation
The new Night Safari Amphitheatre will be home to a new immersive experience that draws guests into the mystery of the nocturnal world. Tapping on state-of-the-art audio, video, and lighting systems to create a magical atmosphere, the new presentation will use technology to complement the presentation of natural behaviours displayed by the animals.

Besides a larger seating capacity of 1,000 – up from 750 at the current one – seating and performance areas are also sheltered, so shows can continue even on rainy nights. A sheltered queue area will help ease congestion of Night Safari entrance plaza. The new amphitheatre and presentation are slated to debut at the end of 2022.

Woylies @ Wallaby Trail

The woylies, or brush-tailed bettongs, arrived on 17 October 2021 from France. To accommodate the new arrivals, an exhibit which used to house the sugargliders was refurbished to simulate the natural habitat of the woylies. In view of their digging behaviour, extensive works entailing the installation of underground mesh had to be undertaken. The works were completed in time for the woylies to meet the Chinese New Year crowd on 28 January 2022.

Indian rhino debut and feeding experience
30 April 2021 marked the official opening of the new Indian rhino complex, which is home to Indian rhino brothers “Thulie” and “Newari”. The duo had arrived from Al Bustan Zoological Centre in the United Arab Emirates (UAE) in November 2020.

Prior to this, the Rhino Care Team had expended much effort to ready the herbivorous heavyweights for their guest interaction and feeding sessions. Given each of the rhinos is nearly 2 tonnes in weight, their training was not a task to be taken lightly by any means. The experience was opened for booking by members of the public on 13 February 2022.

Indian rhino debut and feeding experience
30 April 2021 marked the official opening of the new Indian rhino complex, which is home to Indian rhino brothers “Thulie” and “Newari”. The duo had arrived from Al Bustan Zoological Centre in the United Arab Emirates (UAE) in November 2020.

Prior to this, the Rhino Care Team had expended much effort to ready the herbivorous heavyweights for their guest interaction and feeding sessions. Given each of the rhinos is nearly 2 tonnes in weight, their training was not a task to be taken lightly by any means. The experience was opened for booking by members of the public on 13 February 2022.
Constructing the new Kidzworld

By providing a compelling animal interaction experience that is positive for both guests and animals, the new KidzWorld is where children can nurture a love for animals and nature through discovery and play while creating memories with their families. Programming will differentiate each experience to encourage repeat visits while driving incremental revenue through premium activities. The new Kidzworld is slated to open in the first quarter of 2023.

Up close again with animals and keepers

Since the onset of the pandemic, Buddy Barn had remained closed to the public due to Covid-19 restrictions. With the relaxation of Safe Management Measures towards the end of FY, Buddy Barn was finally reopened to public and guests could come up close and personal with the animals at the barn. Keeper chats at other zones like Primate Kingdom were also resumed, allowing guests to hear first-hand again from the people closest to our animals.

At Singapore Zoo

Poison dart frogs @ Fragile Forest
With careful planning and creative use of space, a corner of Fragile Forest was carved out to become a beautifully planted habitat for the colourful and intriguing poison dart frogs. Through thoughtful refurbishments like this, we hope to spark in our guests a sense of wonder at the diversity of the world we live in.

Giant stick insects @ Australasia
Too often maligned and feared, many species of invertebrates remain unknown and unloved. To heighten guests’ awareness of the indispensable role these unsung heroes play in the ecosystem, a section of the entrance to Australasia was converted into a display for two species of giant stick insects, which makes for an intriguing peek into their fascinating world of disguise, deception, and female domination.

Malawi Exhibit

An exhibit that previously housed the dwarf crocodile was converted to a new display featuring fishes and birds. The colourful and vibrant fishes which occupy the flowing water body of the exhibit can only be found in Lake Malawi of Africa. The exhibit highlights the diversity of animals that live in and around freshwater habitats.

At River Wonders

African Community Exhibit
Open in June 2021, this new exhibit is one of the first to greet guests at River Wonders. It displays the unique and interesting reedfish. Also known as snakefish or ropefish, reedfish use full body movements when moving through the water quickly. They also possess a pair of lungs to help them breathe atmospheric air when they are out of water for an amount of time. The exhibit also showcases other African fishes like the kribensis as well as the yellowtail and oneline tetras.

Giant stick insects @ Australasia
Too often maligned and feared, many species of invertebrates remain unknown and unloved. To heighten guests’ awareness of the indispensable role these unsung heroes play in the ecosystem, a section of the entrance to Australasia was converted into a display for two species of giant stick insects, which makes for an intriguing peek into their fascinating world of disguise, deception, and female domination.

At Singapore Zoo

Poison dart frogs @ Fragile Forest
With careful planning and creative use of space, a corner of Fragile Forest was carved out to become a beautifully planted habitat for the colourful and intriguing poison dart frogs. Through thoughtful refurbishments like this, we hope to spark in our guests a sense of wonder at the diversity of the world we live in.

Giant stick insects @ Australasia
Too often maligned and feared, many species of invertebrates remain unknown and unloved. To heighten guests’ awareness of the indispensable role these unsung heroes play in the ecosystem, a section of the entrance to Australasia was converted into a display for two species of giant stick insects, which makes for an intriguing peek into their fascinating world of disguise, deception, and female domination.

At River Wonders

African Community Exhibit
Open in June 2021, this new exhibit is one of the first to greet guests at River Wonders. It displays the unique and interesting reedfish. Also known as snakefish or ropefish, reedfish use full body movements when moving through the water quickly. They also possess a pair of lungs to help them breathe atmospheric air when they are out of water for an amount of time. The exhibit also showcases other African fishes like the kribensis as well as the yellowtail and oneline tetras.

Malawi Exhibit

An exhibit that previously housed the dwarf crocodile was converted to a new display featuring fishes and birds. The colourful and vibrant fishes which occupy the flowing water body of the exhibit can only be found in Lake Malawi of Africa. The exhibit highlights the diversity of animals that live in and around freshwater habitats.

At Singapore Zoo

Poison dart frogs @ Fragile Forest
With careful planning and creative use of space, a corner of Fragile Forest was carved out to become a beautifully planted habitat for the colourful and intriguing poison dart frogs. Through thoughtful refurbishments like this, we hope to spark in our guests a sense of wonder at the diversity of the world we live in.

Giant stick insects @ Australasia
Too often maligned and feared, many species of invertebrates remain unknown and unloved. To heighten guests’ awareness of the indispensable role these unsung heroes play in the ecosystem, a section of the entrance to Australasia was converted into a display for two species of giant stick insects, which makes for an intriguing peek into their fascinating world of disguise, deception, and female domination.
Financial & Attendance Highlights

REVENUE FOR FY21/22
$67,007,408

- Admission & Rides: 63.8% ($42,717,633)
- F&B: 15.9% ($10,636,414)
- Retail: 8.8% ($5,673,361)
- Others: 7.6% ($5,116,856)
- Adoptions & Donations: 4.0% ($2,663,144)

TOTAL GUESTS FOR FY 21/22
1,997,556

<table>
<thead>
<tr>
<th>Park</th>
<th>FY17/18</th>
<th>FY18/19</th>
<th>FY19/20</th>
<th>FY20/21</th>
<th>FY21/22</th>
</tr>
</thead>
<tbody>
<tr>
<td>River Safari</td>
<td>539,569</td>
<td>565,930</td>
<td>605,890</td>
<td>807,788</td>
<td>962,121</td>
</tr>
<tr>
<td>Jurong Bird Park</td>
<td>281,895</td>
<td>132,719</td>
<td>122,207</td>
<td>401,986</td>
<td>966,890</td>
</tr>
<tr>
<td>Night Safari</td>
<td>1,517,264</td>
<td>930,059</td>
<td>730,051</td>
<td>534,936</td>
<td>867,711</td>
</tr>
<tr>
<td>Singapore Zoo</td>
<td>1,869,358</td>
<td>1,609,091</td>
<td>1,321,718</td>
<td>1,910,936</td>
<td>2,132,270</td>
</tr>
</tbody>
</table>

FY 21/22:
- River Safari: 29.9%
- Jurong Bird Park: 16.9%
- Night Safari: 25.9%
- Singapore Zoo: 38.0%
The Year Ahead

Global travel is picking up, indicating strong pent-up demand, but arrival numbers remain a fraction of Singapore’s pre-pandemic numbers. The slow opening of China, volatile global political and economic environment, as well as the evolving health situation, mean that tourism flows will continue to face headwinds. To navigate the challenges we face, we will focus on three key priorities:

• Rebuild our visitorship and grow our revenue

A huge array of commercial initiatives is being undertaken to rebuild our visitorship and generate the revenue needed to support the business. Our Sales & Marketing Teams are busy engaging with key markets, working with STB and key agents and preparing a whole range of exciting campaigns and experiences to boost interest and visitorship to our parks.

• Complete the development work on Bird Paradise, and sustain our progress on other worksites and the rollout of the masterplan for existing parks

We are confident of completing our construction work on Bird Paradise and West Node and securing the site-wide Temporary Occupation Permit (TOP) in the coming months. As we progress with all the development work, we will continue to work together to minimise the negative impact for guests and animals under our care.

• Continue to innovate and explore new opportunities to grow our influence and transform our business

We will continue to explore new opportunities in this area, including our Transformation 2.0 initiatives as well as collaborations with other leading zoos on long-term species management to ensure we have a genetically and demographically sustainable population of animals under our care. Working hand in hand with Mandai Nature, we will continue to ramp up direct conservation involvement and impact for threatened species locally and in the region.
Conservation Projects supported in FY21/22

Scientific Publications FY21/22

Peer-reviewed publications


The dynamics of songbird ownership and community interconnectedness in Singapore Oryx, 29(3), 2021.


## Managed Species Programmes in FY21/22

<table>
<thead>
<tr>
<th>SPECIES</th>
<th>COMMON NAME</th>
<th>PROGRAMME</th>
<th>IUCN RED LIST STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vulpes vulpes</td>
<td>Red Fox</td>
<td>EEP CR</td>
<td></td>
</tr>
<tr>
<td>Canis lupus</td>
<td>Grey Wolf</td>
<td>EEP CR</td>
<td></td>
</tr>
<tr>
<td>Lycalopex pygmaeus</td>
<td>African Wild Dog</td>
<td>EEP CR</td>
<td></td>
</tr>
<tr>
<td>Canis familiaris</td>
<td>Domestic Dog</td>
<td>EEP CR</td>
<td></td>
</tr>
</tbody>
</table>

## Carbon Emissions FY21/22

**SCOPE 1**
- Gas (Fuel-in-park vehicles, Refrigerant Gas)
  - **EMISSIONS (TCo2e)**: 882

**SCOPE 2**
- Grid Electricity
  - **EMISSIONS (TCo2e)**: 1243

**SCOPE 3**
- **Category 1** - Goods 
  - (Water, Animal food 
  - Fresh food for F&F Outlets, Paper only)
    - **EMISSIONS (TCo2e)**: 4532
- **Category 2** - Fuel and Energy-Related Activities
  - **EMISSIONS (TCo2e)**: 882
- **Category 4** - Upsram Transportation 
  - (Airplane freight, Mandai Shuttle Express, Transport for Waste Disposal only)
    - **EMISSIONS (TCo2e)**: 277
- **Category 5** - Waste Generated in Operations
  - **EMISSIONS (TCo2e)**: 2042

**Category 6** - Business Travel
**Category 8** - Upsram Sponsored Assets
- **EMISSIONS (TCo2e)**: 44

---

**Current Progress of Mandai Wildlife Group Sustainability Commitments**

**COMMITMENTS**

**PROGRESS AS AT END FY21/22**

**Electricity From Renewable Sources**
- By 2030:
  - 100% of electricity consumption from renewable sources through on-site  RECs and/or VPPAs.
- 32% of electricity consumption through RECs and/or VPPAs.

**Electricity Internal Fleet**
- By 2030:
  - 100% of our internal fleet to either electric vehicles or vehicles with lower carbon emission fuel.
- 60% of buggies/homes on electric vehicles (15% of electric vehicles for buses only due to lack of availability for electric models)

**Reduce Water Consumption**
- By 2030:
  - **Target (3L/guest) - reduction by 25% from 2010 baseline**

**Waste Diversion from Incineration**
- By 2030:
  -Achieved in diversion rate of 90%.

**Sustainably-Sourced Palm Oil**
- By 2020:
  - 90% of palm oil and its derivatives used in all on-premises food products will be from certified sustainable sources.

**Paper Products**
- By 2020:
  - 100% of Mandai produced paper-based products will be FSC-certified or ISO recycled.

**Single-use Plastics**
- By 2023:
  - Eliminate all single-use fossil-based plastics from guest operations.

---

**ABBREVIATIONS USED**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABB</td>
<td>Australia Biodiversity Board</td>
</tr>
<tr>
<td>ASMP</td>
<td>Australasian Species Management Program</td>
</tr>
<tr>
<td>CWCA</td>
<td>China Wildlife Conservation Association</td>
</tr>
<tr>
<td>EAZA</td>
<td>European Association of Zoos and Aquaria</td>
</tr>
<tr>
<td>GSMP</td>
<td>Global Species Management Plan</td>
</tr>
<tr>
<td>JAZA</td>
<td>Japan Association of Zoos and Aquaria</td>
</tr>
<tr>
<td>ISB</td>
<td>International Studbook</td>
</tr>
<tr>
<td>NB</td>
<td>N/A (Not Applicable)</td>
</tr>
<tr>
<td>CP</td>
<td>Certified Sustainable</td>
</tr>
</tbody>
</table>
Awards & Accreditations

Awards

- 15th HR Awards Gala Presentation 2021
  Employee Well-being Award (Silver Standard)
- Asia Pacific Loyalty and Engagement Awards
  Campaign: Launch of My Animal Buddy
  Best Engagement Strategy – Specific Audience (Gold)
  Best Use of Experiential / Live (Silver)
  Best Covid-19 Response – Engagement and CX (Bronze)
  Best Use of Consumer Insights / Data Analytics (Bronze)
  Best Engagement Strategy – B2C (Bronze)
  Best Online Experience (Bronze)
- IDC Asia Pacific Future Enterprise Awards 2021
  Special Award for Digital Resiliency
- Mobex Awards for Mobile Experience
  Campaign: Launch of My Animal Buddy
  Best Original Content - Gold
  Best Hospitality & Travel Campaign - Bronze
- Singapore Tourism Awards 2021
  Special Award for Most Exemplary Employer
  Special Award for Sustainability
- TEA Thea Awards 2022
  Thea Classic Award
- The Straits Times’ “Singapore’s Best Employers 2021”
  Ranked #37 in the Top 200 list

Accreditations

- BCA Green Mark (Platinum) Super Low Energy (SLE) Award
  for Mandai Resort
- BCA Green Mark (Platinum)
  for Penguin Building
- BCA Universal Design Mark (Design) Gold Plus Awards
  for Mandai Resort, East Node and indoor attractions
- NParks Landscape Excellence Assessment Framework (LEAF) Platinum
  for Singapore Zoo, River Safari and Night Safari