

MANDAI PARK HOLDINGS
YEARBOOK
2020-2021

our vision

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

our mission

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

our values

ethics



excellence

We strive for the highest standards in all we do.



hospitality

We serve from the heart.



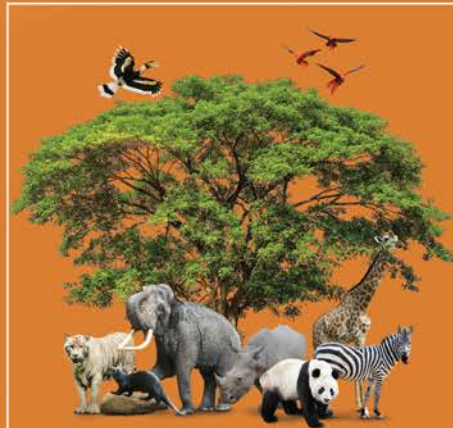
integrity

We are honest and fair in all our dealings.



care for wildlife

We protect wildlife and provide excellent care for our Living Collection.



sustainability

We embrace sustainable best practices.



teamwork

We achieve more together.

Mandai

OUR HOME, SANCTUARY AND HERITAGE

Mandai Park Holdings (MPH) is the parent company for Wildlife Reserves Singapore (WRS) and Mandai Park Development (MPD).

WRS is the operating arm of MPH, and is responsible for Jurong Bird Park, Night Safari, Singapore Zoo and River Safari. WRS is dedicated to the management of world-class leisure attractions that foster conservation and research, while educating guests about animals and their habitats.

A self-funded organisation, WRS also collaborates with various partners, organisations and institutions aimed at protecting local and global biodiversity. In this pandemic-impacted financial year, we welcomed 1.9 million guests, with Jurong Bird Park contributing 0.3 million, Night Safari 0.3 million, Singapore Zoo 0.8 million and River Safari 0.5 million.

MPD works on refreshing the Mandai district to become a world-leading nature and wildlife district. Once the project is completed, Mandai will feature five zoological parks, two indoor nature-themed attractions, a variety of accommodation options, an array of new restaurants, extensive public spaces and a wildlife bridge to allow animals safe passage across Mandai Lake Road.



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MESSAGE

from Chairman & Group CEO



S Dhanabalan
CHAIRMAN
MANDAI PARK HOLDINGS



Mike Barclay
GROUP CEO
MANDAI PARK HOLDINGS

2020 will be remembered as the year that was dominated by the spread of the Covid-19 pandemic: the single, biggest disruptor to our business since we began operating half a century ago. Not only was the movement of residents heavily constrained within Singapore, but border closures to stem the transmission of the disease brought international travel and tourism to a standstill. As a zoological institution operating within the attractions industry, we have been heavily impacted.

Our 2020/21 Financial Year began with Singapore entering into a 'circuit breaker' lockdown. Our zoological parks were closed to the public on 7 April 2020, the first time we have had to do this in the history of our organisation. The Mandai Development Project worksites had to close too. For a period of three months, only core teams of essential staff were allowed back to work to look after the animals under our care and to keep vital services running. Many of our employees took the opportunity to learn new skills by volunteering to be cross deployed over this period, some to support our Zoology staff and others to be seconded to other organisations. The rest of our staff had to quickly adapt to working from home, devoting their collective efforts to managing our financials, digitising our

business and planning for our re-opening. We launched a number of on-line initiatives to stay engaged with our guests, shifted all ticketing and reservations activity online, while laying the foundations for our guests to enjoy cash-free, touch-free experiences in our parks.

It was touching to see the outpouring of heartfelt sentiments and well wishes for our staff and animals during the circuit breaker period. We are also grateful to the community for rallying around our 'Support Us' initiatives, including new micro-sponsorship programmes.

When our parks were allowed to reopen, our staff and volunteers sprang into action and worked tirelessly to ensure safe management measures were strictly adhered to. We continued to refine and redesign our work processes to respond to the inevitable changes in operating requirements as the Covid-19 situation evolved through the year.

It is clear to us that Covid-19 has changed how we will conduct business for the long-term. The pandemic has encouraged us to accelerate our organisation-wide drive to enable transformative change through our people, processes, platforms and products.

To grow our digital guest segment, we accelerated the roll-out of new initiatives like My Animal Buddy, featuring virtual programmes and digital content for home audiences and schools alike. Having such digital outreach programmes to complement visits to our parks has helped us to strengthen our connection with Singaporeans, and in turn their connection with wildlife.

Through these trying times brought about by the Covid-19 pandemic, we have stayed true to our calling as a conservation-minded organisation and to our core mission of protecting wildlife. Being acutely aware that years of effort can be undone in a matter of months if habitats and species are left unprotected, we have continued to support our conservation partners across Southeast Asia so that they can remain focused on what they do best – conserving species, protecting habitats and engaging local communities.

Indeed, in order to elevate our field conservation activities to a new level, we collaborated with Temasek to jointly establish Mandai Nature. Set up as a not-for-profit organisation and Institution of Public Character based in Singapore, Mandai Nature will further grow the impact of the conservation work we currently fund, while also applying nature-based climate solutions to protect the region's green and blue ecosystems, including forests, grasslands, wetlands, mangroves, and seagrass beds.

In order to support our zoos and grow our impact in the fields of conservation, research, education and community engagement, we will

need to fully achieve our commercial potential. To that end, we have established a commercial start-up Mandai Global, which will operate new lines of business anchored in creating positive outcomes for nature and wildlife that span the experience economy, ecotourism, edutainment, and green technology. As 2020 progressed, we saw good progress being made by the Mandai Development Project despite the worksite closures and other disruptions faced by our construction teams. 2020 was also a very good year for our breeding programmes, including the arrival of Simba, Singapore's own lion cub, as well as a pair of critically endangered Malayan tiger cubs.

These breeding successes and other achievements would not have been possible without extraordinary levels of passion and commitment on the part of our staff and volunteers, who have pulled us through this uniquely challenging financial year. We extend a very big "thank you" to every one of you. We would also like to thank our board and committee members for their guidance, and our partners, members, adopters and donors for their unwavering support.

With Covid-19, the linkages between environmental destruction, the illegal wildlife trade and human health have become crystal clear: the health of the natural world is inextricably linked to our health. The impetus has never been stronger for us to build empathy for wildlife and get more people to care about living sustainably in a biodiverse world. We look forward to your continued support for our cause.



THE TRIPLE BOTTOM LINE, STRATEGIC THRUSTS & SUSTAINABLE DEVELOPMENT GOALS (SDGs)

3Ps | STRATEGIC THRUSTS | SDGs

3Ps	STRATEGIC THRUSTS	SDGs
PLANET	Provide World-class Care For Our Living Collection	14 LIFE BELOW WATER, 15 LIFE ON LAND, 17 PARTNERSHIPS FOR THE GOALS
	Be A Regional Leader In Environmental Sustainability & Conservation	7 AFFORDABLE AND CLEAN ENERGY, 11 SUSTAINABLE CITIES AND COMMUNITIES, 14 LIFE BELOW WATER, 15 LIFE ON LAND, 17 PARTNERSHIPS FOR THE GOALS
PEOPLE	Apply Leading Organisation & HR Practices	7 AFFORDABLE AND CLEAN ENERGY, 11 SUSTAINABLE CITIES AND COMMUNITIES, 12 RESPONSIBLE CONSUMPTION AND PRODUCTION, 14 LIFE BELOW WATER, 15 LIFE ON LAND
	Forge A Strong National Love & Pride For Our Parks	4 QUALITY EDUCATION, 11 SUSTAINABLE CITIES AND COMMUNITIES, 14 LIFE BELOW WATER, 15 LIFE ON LAND, 17 PARTNERSHIPS FOR THE GOALS
PERFORMANCE	Create Exceptional Guest Experiences	4 QUALITY EDUCATION, 14 LIFE BELOW WATER, 15 LIFE ON LAND
	Ensure Long-term Commercial Viability	12 RESPONSIBLE CONSUMPTION AND PRODUCTION, 14 LIFE BELOW WATER, 15 LIFE ON LAND, 17 PARTNERSHIPS FOR THE GOALS

OUR COMMITMENT TO KEY SUSTAINABLE DEVELOPMENT GOALS (SDGs)



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 review energy consumption in our parks through comprehensive audits. We are converting to energy-saving electrical devices and solar panels. 80% of our tram fleet now runs on electricity and we target to reach 100% by end 2021. 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 reusables or alternative materials. We serve wildlife-friendly coffee at F&B outlets and expanded our sustainable product ranges at retail outlets to advocate for sustainable living.



RESPONSIBLE CONSUMPTION AND PRODUCTION

Our green procurement road map, with clear targets, guides us to work with suppliers to procure sustainable goods and services. We use certified mass balanced sustainable oil for cooking and we serve sustainable seafood in all F&B outlets. We source for sustainable animal feed, and local produce to reduce our carbon footprint. Other than reducing energy and water consumption, we are working towards achieving zero waste through closed loop systems.



LIFE BELOW WATER

Through River Safari, 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 the animals in our living collection, which 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 save threatened species. We contribute to these global programmes as species coordinators for eleven threatened species. We support local and regional conservation and are directly involved in saving endangered wildlife such as the Raffles banded leaf 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.

BOARD OF DIRECTORS

MANDAI PARK HOLDINGS

CHAIRMAN

Mr S DHANABALAN

Mr S Dhanabalan is also Chairman of Temasek Trustees Pte Ltd, the philanthropic arm of Temasek. He is a member of the Council of Presidential Advisers as well as the Presidential Council for Minority Rights. Mr Dhanabalan has been the Patron of the Singapore chapter of Habitat for Humanity since September 2003.

DEPUTY CHAIRMAN

Mr TAN Chuan-Jin

Mr Tan Chuan-Jin is the current Speaker of the Parliament of Singapore. He has served as the Minister for Social and Family Development, as well as the Minister for Manpower. He is currently Advisor to the National Council of Social Service, and also oversees SG Cares, the national movement that works towards building a more caring society. He is the President of the Singapore National Olympic Council and Chairman of the Advisory Board of Healthway Medical Corporation Ltd. Mr Tan is also the Patron of the Centre for Fathering, Club Rainbow (Singapore), and SHINE Children & Youth Services.

DIRECTORS

Mr Mike BARCLAY

Mr Barclay holds the position of the Group CEO of Mandai Park Holdings. He also serves on the Board of the Changi Airport Group, the Raffles Hospital Ethics Committee and the Governing Council of the World Association of Zoos and Aquariums.

Ms Claire CHIANG

Ms Claire Chiang is the co-founder of Banyan Tree Hotels & Resorts, Chair of China Business Development, and Learning and Development in Banyan Tree Management Academy. She chairs Banyan Tree Global Foundation, and its Enterprise Environmental and community Fund in partnership with Chinese Environmental Protection Foundation. She is also a member in the Advisory Committee for Guilin Tourism University in China and School of Hotel and Tourism Management of Hong Kong Polytechnic University. In 2021, she was appointed the Advisory Board Member of the Conference Board Global Sustainability Centre, Europe and the Climate Governance Singapore Advisory Board. She chairs the Singapore Book Council and Shirin Fozdar Program in Singapore Management University.

Prof Leo TAN

Professor Tan chairs Temasek Foundation Innovates, and the Science Sub-Commission of the Singapore National Commission for UNESCO. He is Singapore Governor of Asia-Europe Foundation (ASEF), a Fellow of the Singapore National Academy of Science and Governing Member of the Singapore Environmental Council.

Mr Dilhan Pillay SANDRASEGARA

Mr Sandrasegara is the Chief Executive Officer of Temasek International Pte. Ltd. He 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 and the National Jobs Council.

Ms NEO Gim Huay

Ms Neo Gim Huay is Managing Director, Climate Change Strategy of Temasek International Pte Ltd. She is on the Boards of Surbana Jurong Pte Ltd, Intellectual Property Office of Singapore and Science Center Global. Gim Huay is a member of the Creating Shared Value Council for Nestle, board trustee for the Singapore Institute for Technology and also co-chair for the Singapore Eco-Fund.

Mr SIM Hwee Cher

Mr Sim is a Member of Duke-NUS Medical School Centre for Ageing, Research and Education (CARE) Advisory Board, Council Member of the National Youth Achievement Award Association, and Director of The Esplanade Co Ltd, UOL Group Ltd and Asia Capital Reinsurance Group Ltd.

Mr KEE Teck Koon

Mr Kee Teck Koon is the Board Exco Chairman of NTUC Enterprise, and Deputy Chairman of NTUC Income Insurance Co-operative Limited. He is an independent director of two public listed companies, namely, CapitaLand Investment Ltd and Raffles Medical Group Ltd, and is also a Non-Executive Director of NTUC Fairprice Co-operative Limited, Changi Airport Group (S) Pte Ltd, and a member of Angsana Fund Investment Committee (AFIC) of the Singapore Labour Foundation.

Ms CHONG Siak Ching

Ms Chong Siak Ching 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.

Mr Adrian CHUA

Mr Adrian Chua is Deputy Secretary (Industry) at the Ministry of Trade and Industry. Prior to this, he served as Deputy Secretary at the Ministry of Defence, on the Executive Board of the International Monetary Fund, and in the Monetary Authority of Singapore. Mr Chua is currently Chairman of the Audit Committee and board member of DSO National Laboratories, and a board member of Sentosa Development Corporation and JTC.

Mr Stephen FORSHAW

Mr Forshaw is the Head, Public Affairs and Managing Director, Australia and New Zealand for Temasek. He also serves on the board of the Real Pet Food Company, on the Singapore Advisory Board of the Australian Institute of Company Directors and is a Member of the Industry Advisory Council of Singapore University of Technology and Design's School of Humanities, Arts and Social Science. He is a member of the Global Trends Watch Committee of the International Association of Business Communicators and a member of the Singapore Institute of Directors.

Mr NG Lang

Mr Ng Lang is CEO of the Land Transport Authority. He is a member of the Advisory Board for SMU Real Estate Programme.

Er Dr LEE Bee Wah

Er Dr Lee is a Lead Independent Director of public listed Koh Brothers Group Limited and the Non-Executive Chairman of another public-listed company, the Amcorp Global Limited. Er Dr Lee is also a Board Member of the Building and Construction Authority, a statutory board under the Ministry of National Development and also chairs the Nanyang Technological University School of Civil & Environmental Engineering Advisory Committee.

Details are accurate as at 31 March 2021

COMMITTEE MEMBERS

ANIMAL WELFARE & ETHICS COMMITTEE

CHAIRMAN:
Prof Leo TAN

SECRETARY:
Dr CHENG Wen-Haur

MEMBERS:
Dr YAP Him Hoo
Dr Leslie RETNAM
Dr TAN Hwa Luck
Dr Adrian LOO
Dr Stephanie HO
Mr Vinayagan DHARMARAJAH
Prof Joseph CHUN
Mr Mike BARCLAY

WRSCF SPECIALIST PANEL

CHAIRMAN:
Dr Shawn LUM

SECRETARY:
Dr Jessica LEE

MEMBERS:
Dr Benjamin LEE
Dr Norman LIM
Dr Danwei HUANG
Dr Darren YEO
Dr Janice LEE
Dr LEONG Tzi Ming
Dr CHENG Wen-Haur
Dr Sonja LUZ

SENIOR MANAGEMENT

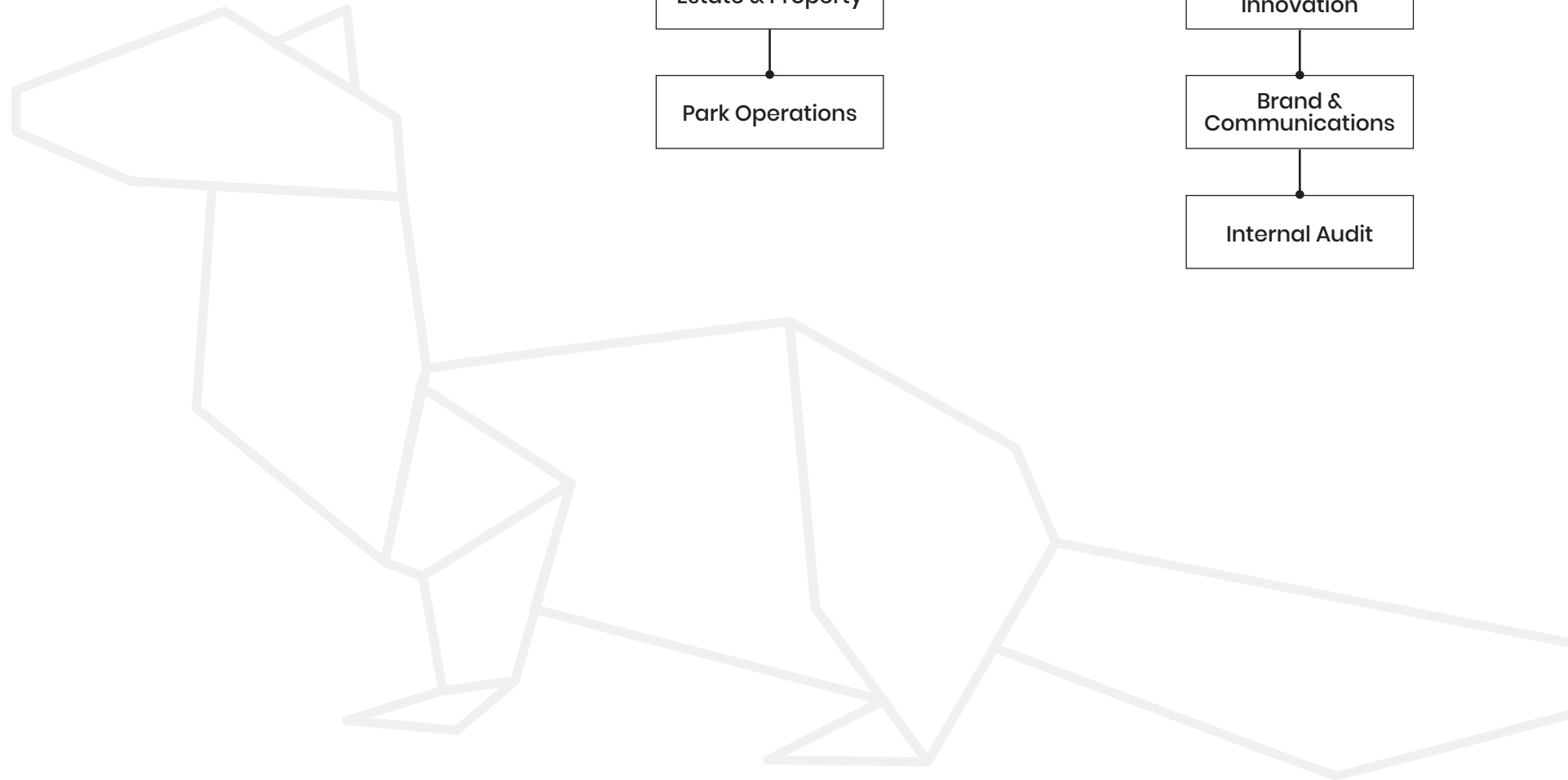
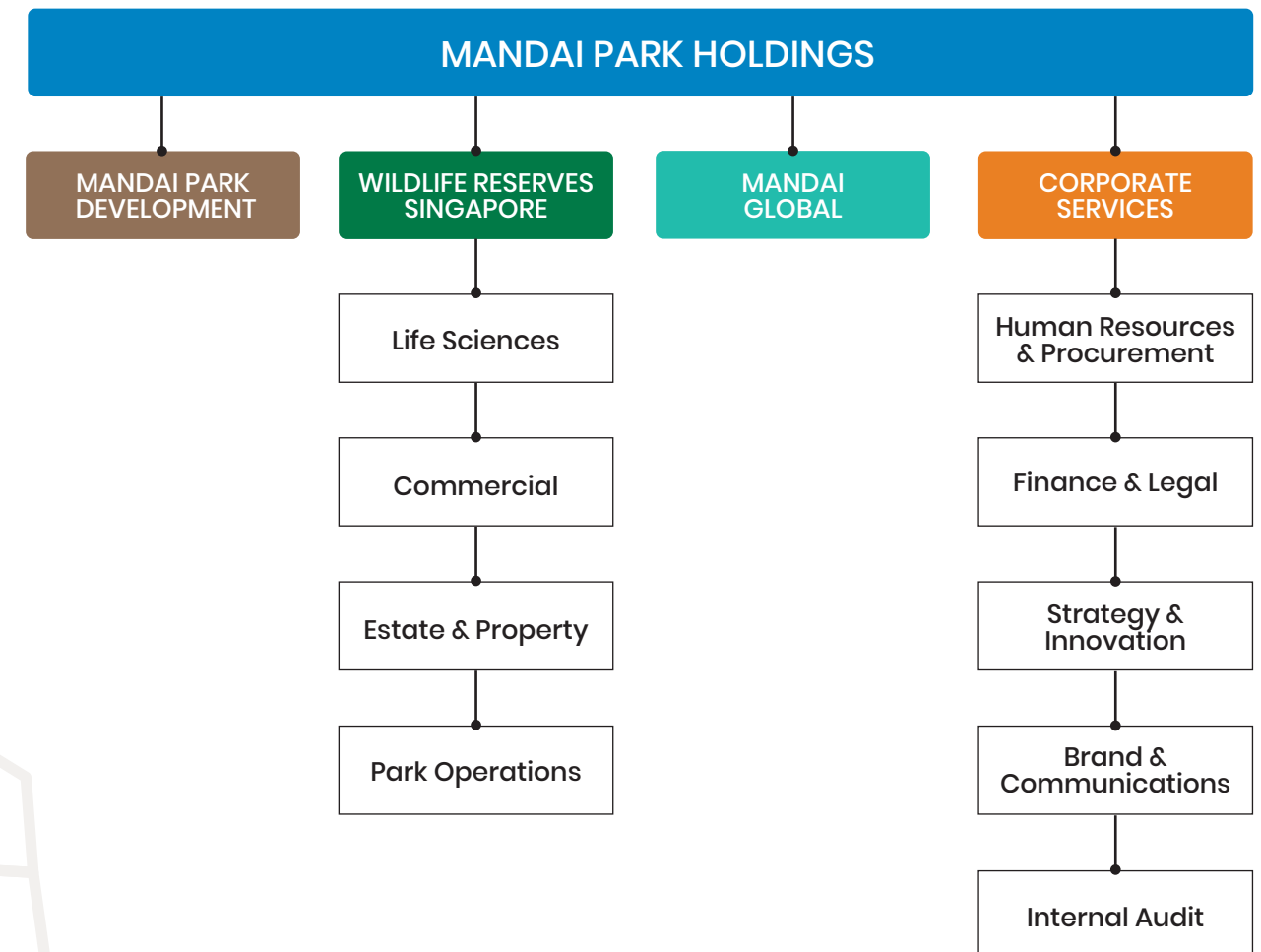
- Mr Mike BARCLAY** • Group Chief Executive Officer & Executive Director, Mandai Park Holdings

- Dr CHENG Wen-Haur** • Deputy Chief Executive Officer (WRS) & Chief Life Sciences Officer
- Mr Benjamin TAN** • Deputy Chief Executive Officer (Commercial)
- Mr LEONG Yue Kheong** • Deputy Chief Executive Officer (Mandai Park Development)

- Mr Melvin TAN** • Chief Estate & Property Officer
- Ms LOW Wai Peng** • Chief Financial Officer
- Mr Marcus HENG** • Chief Human Resources Officer
- Ms Irene LIN** • Chief Marketing Officer
- Ms Sherri LIM** • Chief Park Operations Officer
- Ms Belina LEE** • Chief Strategy & Innovation Officer

- Mr WONG Yu Hsiang** • Head, New Business (MG)
- Mr David GOH** • Project Director (East Zone)
- Mr Kenneth NG** • Project Director (West Zone)
- Ms Suzanne HO** • Senior Vice President, Brand & Communications
- Ms Isabel CHENG** • Senior Vice President, Partnership Development
- Ms Gail LAULE** • Vice President, Animal Presentation
- Ms Monet ALUQUIN** • Vice President, Asset Development
- Mr Marc CREMADES** • Vice President, Attractions Development
- Dr Sonja LUZ** • Vice President, Conservation, Research & Veterinary
- Mr Colin CHEW** • Vice President, Cost, Contracts & Procurement
- Mr Damon WEE** • Vice President, Digital Marketing
- Ms May LOK** • Vice President, Education
- Mr Terrence TANG** • Vice President, Emerging Products (B2B)
- Mr Anthony CHAN** • Vice President, Emerging Products (Consumer)
- Mr Chris CHIU** • Vice President, Emerging Products (Creative & Content)
- Mr CHAM Tud Yinn** • Vice President, Exhibit Design
- Mr Donald TAN** • Vice President, Facilities Management
- Ms SEAH Seow Ling** • Vice President, Finance (MG)
- Mr Steven WONG** • Vice President, Finance (WRS)
- Ms LOW Min Hwee** • Vice President, Finance (MPD)
- Mr Steven TAN** • Vice President, Food & Beverage
- Mr Edmas NEO** • Vice President, Group Transformation Office
- Ms Sherie YEO** • Vice President, Guest Experience Management
- Mr George KYAW** • Vice President, Horticulture
- Mr Thomas CHUA** • Vice President, Information Technology
- Ms Karen TAN** • Vice President, Internal Audit
- Ms Daisy LING** • Vice President, Jurong Bird Park
- Ms Jolene GOH** • Vice President, Legal
- Ms Sandy LEE** • Vice President, Park & Attractions Marketing
- Ms Liza CHANG** • Vice President, People & Organisation Development
- Ms Kelly CHEW** • Vice President, Procurement
- Ms Daisy TAN** • Vice President, Retail
- Ms Jean CHOI** • Vice President, Sales & Experience Development
- Mr Kumar PILLAI** • Vice President, Special Projects
- Mr Ivan WONG** • Vice President, Strategic Planning
- Dr LEE Hui Mien** • Vice President, Sustainable Solutions
- Mr Andrew CHAI** • Vice President, Technical Services
- Dr Luis NEVES** • Vice President, Zoology

ORGANISATIONAL STRUCTURE



ADOPTERS & SPONSORS

JURONG BIRD PARK

Amazon Web Services	Waterfall Aviary
ASML Singapore Pte Ltd	Black Faced Spoonbill Exhibit
Equinix Singapore Pte. Ltd	Waterfall Aviary
Facebook Singapore Pte. Ltd	Waterfall Aviary
Goodwood Park Hotel Private Limited	Brahminy Kite, Ronnie II
Hong Leong Foundation	Flamingos From High Flyer Show
Lee Foundation Singapore	Penguin Coast Exhibit
Ms Isabella Loh	A Pair of Toco Toucans, Mr & Mrs Axel at High Flyers Show
Telekomunikasi Indonesia International Pte Ltd	Waterfall Aviary
The Shaw Foundation Pte.	Fly-Pass Macaws From High Flyer Show

NIGHT SAFARI

Goodwood Park Hotel Private Limited	The Fishing Cat Trail
Haw Par Healthcare Limited	Tiger Exhibit
JTB Pte Ltd	Elephant, Neha
JTB Pte Ltd	Asiatic Lion Exhibit
JTB Pte Ltd	Sambar Deer and Elephant Exhibit
Khoo Teck Puat Foundation	The Fishing Cat Trail
Martin Storey	Babirusa Exhibit
Mitsui & Co. (Asia Pacific) Pte Ltd	African White Lion Exhibit
Nium Pte. Ltd	Bongo Exhibit
Singapore Refining Company Private Limited	Barasingha Exhibit
The Shaw Foundation Pte	Slow Loris Exhibit

RIVER SAFARI

Capitaland Limited	Presenting Sponsor & Conservation Donor of Kai Kai & Jia Jia
Khoo Teck Puat Foundation	Red Panda Exhibit
Mitsui & Co. (Asia Pacific) Pte Ltd	Mekong Giant Catfish Exhibit
The Shaw Foundation Pte	Manatee Feeding Programme

SINGAPORE ZOO

96 Capital Management Pte Ltd	Giant Tortoise, Belle
Agrocorp International Pte Ltd	Pygmy Hippopotamus, Divo
DBS Bank Limited	Buddy Barn at Rainforest Kidzworld
Deliveroo Singapore Pte Ltd	Australasia
Equatorial Marine Fuel Management Services Pte Ltd	Asian Elephant, Intan
Haw Par Corporation Ltd	Leopard Exhibit
Henkel Singapore Pte Ltd	Chimpanzee, Gangga
Hong Leong Foundation	Fragile Forest Exhibit
Hotel Properties Limited	Orangutan, Adi
Industrial and Commercial Bank of China Limited.	Treetops Trail Exhibit
Lee Foundation Singapore	Orangutan, Chomel
Lee Foundation Singapore	Tropical Crops Plantation
Mdm Kay Kuok	Asian Elephant, Aprila
Mitsui & Co. (Asia Pacific) Pte Ltd	Elephant Presentation
Mr and Mrs Kenneth Goh Hoon Chuan	Dogs of the Animal Friends Show
Mr Chew Shou Zi and Ms Vivian Kao	White Tiger, Pasha
Mr and Mrs Robin Hu	Falabella, Arabella at Rainforest Kidzworld
Mr Stephan Ritzmann and Ms Mayumi Hori	Naked Mole-Rat Exhibit
Mrs Christina Ong	Orangutans, Binte & Saloma
Ms Carrie Wan Burke	Giant Tortoise, Mahe
MUFG Fund Services (Singapore) Pte. Ltd	Hamadryas Baboon Exhibit
Nomambhoy & Sons Pte Ltd	White Tiger, Keysa
NTT Asia Pacific Holdings Pte. Limited	White Rhinoceros Exhibit
Oiltanking Singapore Ltd	Giant Tortoise, Claude
Petrochina International (Singapore) Pte. Ltd	Lion Exhibit
Petroship Marine Pte. Ltd	Giant Tortoise, Astove
Standard Chartered Bank Recreation Club	Babirusa Exhibit
Starbucks Coffee Singapore Pte Ltd	Komodo Dragon Exhibit
Swee Heng Bakery Pte Ltd	Asian Elephant, Gambir
Tan Chong International	Giraffes, Marco and Jubilee
Temasek International Pte Ltd	Giant Tortoise, Kadoorie
The Norinchukin Bank, Singapore Branch	Giant Tortoise, Andrea
The Shaw Foundation Pte	The Shaw Foundation Amphitheatre
Tipsy Collective Pte. Ltd	African Penguin Exhibit
Tradecom Services Pte Ltd	Chimpanzee, Ida
Unilever Singapore Pte Ltd	Orangutan, Khansa
Wuthelam Holdings Pte Ltd	Rabbit Exhibit
Yuvabharathu International School Pte. Ltd	Elephant, Jati

WILDLIFE RESERVES SINGAPORE GENERAL ADOPTION FUND

Amara Resort Sanctuary Sentosa
 Capella Hotel Singapore
 Fraser Hospitality Pte Ltd
 Good Shepherd Convent Kindergarten
 Mr Leong Wah Kheong
 Ms Farida Khory
 Ms Tan Hiang Lee

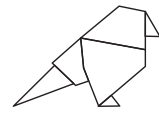
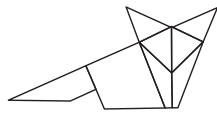
BENCH, SCULPTURE & TREE ADOPTIONS

Arts Kidz Pre-School Pte Ltd	Butterfruit Tree at White Tiger Exhibit
Dr Chris Tan	Bench at Free-Ranging Orangutan Island
Dr Chris Tan	Kapok Tree at Free-Ranging Orangutan Island
Moonday Studio	Bench at Free-Ranging Orangutan Island
Mr Andrew Ng Wai Hung	Bench at Giraffe Exhibit
Mr Felix Lim	Sandu Tree at Garden Pavillion
Mr Indra Widjaja	Rain Tree at African Painted Dog Exhibit
Mr Morven Chin	Butterfruit Tree at White Tiger Exhibit
Mr Naresh Narasimhan	Rain Tree at Zebra Exhibit
Mr and Mrs Ong Seow Leong	Otter Sculptures at Otter Exhibit

YEAR IN REVIEW

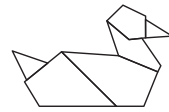


Worked with other wildlife institutions on **136 Managed Species Programmes** (up from 104 last FY) to save threatened species. 11 staff (up from eight last FY) stepped up as coordinators for these species.



Supported 61 (up from 53 last FY) local and regional conservation projects. Formation of **Mandai Nature** to expand our conservation footprint and mitigate climate change in Singapore and Asia.

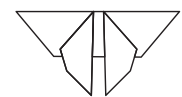
Jurong Bird Park celebrated its **golden jubilee**: over the past five decades, it has connected 30 million guests to the colourful world of birds.



As part of a loan agreement between Jurong Bird Park, Ailon Zoo and the Department of Environment and Natural Resources of the Philippines, 10 **Luzon-bleeding hearts** bred at the Bird Park were repatriated back to the Philippines and successfully released to their native habitats.

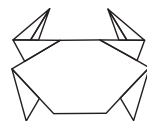


Launched **Micro Sponsorship** and **Adopt An Animal** programmes and garnered tremendous community support.

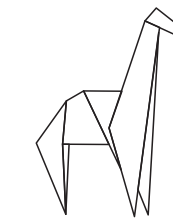
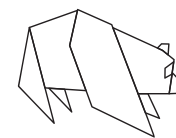


Singapore Zoo topped the **Customer Satisfaction Index (CSISG) 2020** for attractions.

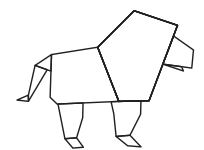
All major packages of work for the Mandai development project are now underway. **New quarantine facilities** has received TOP, and final preparations are underway to operate the facility.



Transformation 2.0 efforts to enhance our digital capabilities to rapidly adapt to business disruptions, reimagine product offerings, operations and animal care.



Despite the historical park closure for three months, managed to engage 120,000 people through conservation and sustainability education. Launched **My Animal Buddy** programme for children to explore our parks virtually.



Commercial start-up **Mandai Global** to pursue growth initiatives and to harness new sources of income.





PHOTO: LOO JIN XIANG

Caring For Our Planet

Besides nurturing a highly skilled team to deliver world-class care for our animals, we also drive conservation efforts by leading field conservation projects, supporting research and education, empowering people to take action, and building relationships with like-minded organisations. By rejuvenating the Mandai Precinct, we hope to create more opportunities to connect people to nature and inspire them to protect wildlife.

FY20/21 HIGHLIGHTS

Obtained TOP for the newly constructed **Animal Quarantine Building**

Provided care for **951 animal species**, 27% of which are threatened in the wild

Invested **\$1.8 million** in conservation projects and related work

Pushed forth with sustainability initiatives to achieve **carbon neutrality by 2024**

Engaged and empowered **120,000** people through conservation and sustainability education

NEW MANDAI PRECINCT TAKING SHAPE

The Mandai Rejuvenation Project continues into its fourth year of construction, but work came to a virtual standstill for four months due to disruptions from Covid-19 global pandemic. During this time, a team was deployed to manage essential services including site security, wildlife responses and rescue, maintenance of earth control measures and stability of temporary structures in the various work sites.

Despite the challenges, we have made progress across most of the remaining features, including Boardwalk, Rainforest Park, East Node, Indoor Attractions and the Mandai Resort.

To enhance efficiency, drone technology is deployed to survey the worksites, monitor construction progress and to inform planning for better site utilisation.

DEVELOPMENT MILESTONES

Notwithstanding restrictions of the split teams mode and extended monsoon season, we made steady progress over the FY. Work for East Node is underway, and we have commenced the laying of the foundation for the future boardwalk. Our new quarantine facilities has received Temporary Occupation Permit (TOP) and is expected to be fully operational by late 2021.

RIGHT: Phase 1 works with shoreline protection for the Boardwalk.



NEW ANIMAL QUARANTINE BUILDING

The facility received Temporary Occupation Permit (TOP) in February 2021 and is expected to be operationally ready in late 2021. The building is specially designed to hold various animal groups in accordance with international guidelines and best practices. These include holding areas and isolation rooms for special quarantine treatment and open yards with appropriate substrates for large mammals. There is also a zone designated for small animals, amphibians, and reptiles.

RIGHT: With a size of 2,320 sqm, the new animal quarantine building prepares us well in handling the anticipated increase in the number of quarantine animals as the new parks open progressively.



NEW BIRD PARK

Development works for the new Bird Park, including the mesh and cable installation for the aviaries, are in full swing. Six massive acrylic sheets, each weighing between 4.7 and 10 tons, have been delivered for installation at Penguin Cove. A key highlight of the new bird park, the exhibit will allow guests to observe the intriguing underwater behaviours of different penguin species through two elliptical tanks.

On-site theming and landscaping works have begun, with the first 1,000 trees planted.



ABOVE: At 12m tall with a girth of 2.7m, this tailpot palm is the largest palm to be planted in the new Bird Park.



ABOVE: Installation of one of the acrylic sheets at Penguin Cove in the new bird park.

CONSERVING AND ENHANCING HABITATS

As part of our Environmental Management and Monitoring plan, we continued with measures to protect and monitor the health of fauna and flora across the development area for the Mandai Rejuvenation Project. Ultimately, we strive to offer conducive, connected habitats to encourage native wildlife to thrive.

MANDAI WILDLIFE BRIDGE

An integral approach of the Mandai Rejuvenation Project involves habitat enhancements to increase biodiversity and restore ecological connectivity. The Mandai Wildlife Bridge was the first feature of the Project to be completed in last FY. Its construction was prioritised to reconnect the two forest patches of the Central Catchment Reserve on both sides of Mandai Lake Road and provide a safe passageway for native wildlife. Since its opening, 57 species of animals including wild boars and civets have been recorded using the bridge. It is heartening to know the bridge is serving native wildlife well.

ONGOING FLORA PROTECTION AND MONITORING

Trees on site are surveyed and tagged by arborists based on their species, health, size, and conservation status. As far as possible, trees of ecological and conservation value are retained and incorporated within park designs. Tree protection zones are established around the retained trees to restrict construction activity. Over the FY, a total of 99 Tree Protection Zones were established within work sites, with monthly monitoring by arborists.

Where it was not possible to incorporate valuable trees in park designs, efforts were made to transplant them into other areas of the development. In the FY, more than 420 trees were transplanted, and over 9,000 saplings were also salvaged before site clearance and transplanted into suitable areas. Clusters of trees were also conserved for their ecological value, and to provide much-needed connectivity for native wildlife. Invasive plant species were systematically removed.



ABOVE: Wild boar with piglets using the wildlife bridge

DEVELOPING SENSITIVELY

We continued efforts to ensure contractors comply with the stringent environmental requirements set out in the Environmental Impact Assessment (EIA) and Environmental Management and Monitoring Plans.

BIODIVERSITY AWARENESS

In-house Biodiversity Awareness Training for staff and construction personnel was carried for over 6,000 attendees – 20% more than last FY. Thematic talks were organised as part of refresher training to encourage the workforce to take proactive actions to reduce impacts to local biodiversity.

ENVIRONMENT, HEALTH AND SAFETY

More than 200 environment, health and safety inspections and over 50 environmental compliance audits were carried out. Two Environmental Safety and Health (ESH) Roundtable sessions and bi-monthly Environmental Management Forums were conducted to facilitate sharing of best practices among the various project contractors.



ENGAGING STAKEHOLDERS

Due to the challenges of Covid-19 and implementation of Safe Management Measures (SMM), in-person meetings with nature and environmental sustainability stakeholders were halted for most of the FY. Nonetheless, we continued to engage them through regular email updates. With the easing of SMM in early 2021, an in-person sharing session with the nature community was organised to update them on project developments.



MANDAI ENVIRONMENT RESEARCH PROJECTS*

A year-long project to assess the possibility and efficacy of using black soldier flies in managing carnivore, herbivore and animal food waste was concluded. The findings would inform the development of a sustainable and closed loop waste management system solution for the existing and upcoming wildlife parks. The other three projects are ongoing, but field work has been delayed due to Covid-19 restrictions.



* Mandai Environmental Research Projects aim to establish evidence-based models and systems to anticipate and identify potential environmental problems arising through the course of the development, and to study novel solutions and applications to address these problems. Such studies will also help in more comprehensive assessment, beyond the scope of the EIA, of the impacts of the development. Last FY, a total grant of \$600,000 was awarded to four projects helmed by NUS, SMU, NIE and RP.

PROVIDING WORLD-CLASS ANIMAL CARE

This FY, we continued to implement the behavioural husbandry programme for our animals, with more species and individuals voluntarily cooperating with the care teams on a range of husbandry and medical conditioning behaviours. The Animal Welfare Working Group (AWWG) continued to conduct regular assessments to promote evidence-based, welfare-oriented species management. Our strong commitment to animal welfare is the impetus for us to embark on a major overhaul of our elephant facilities.

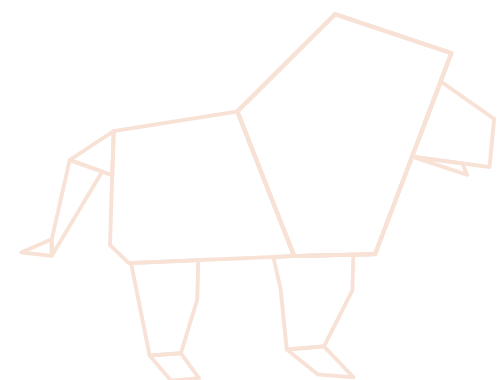
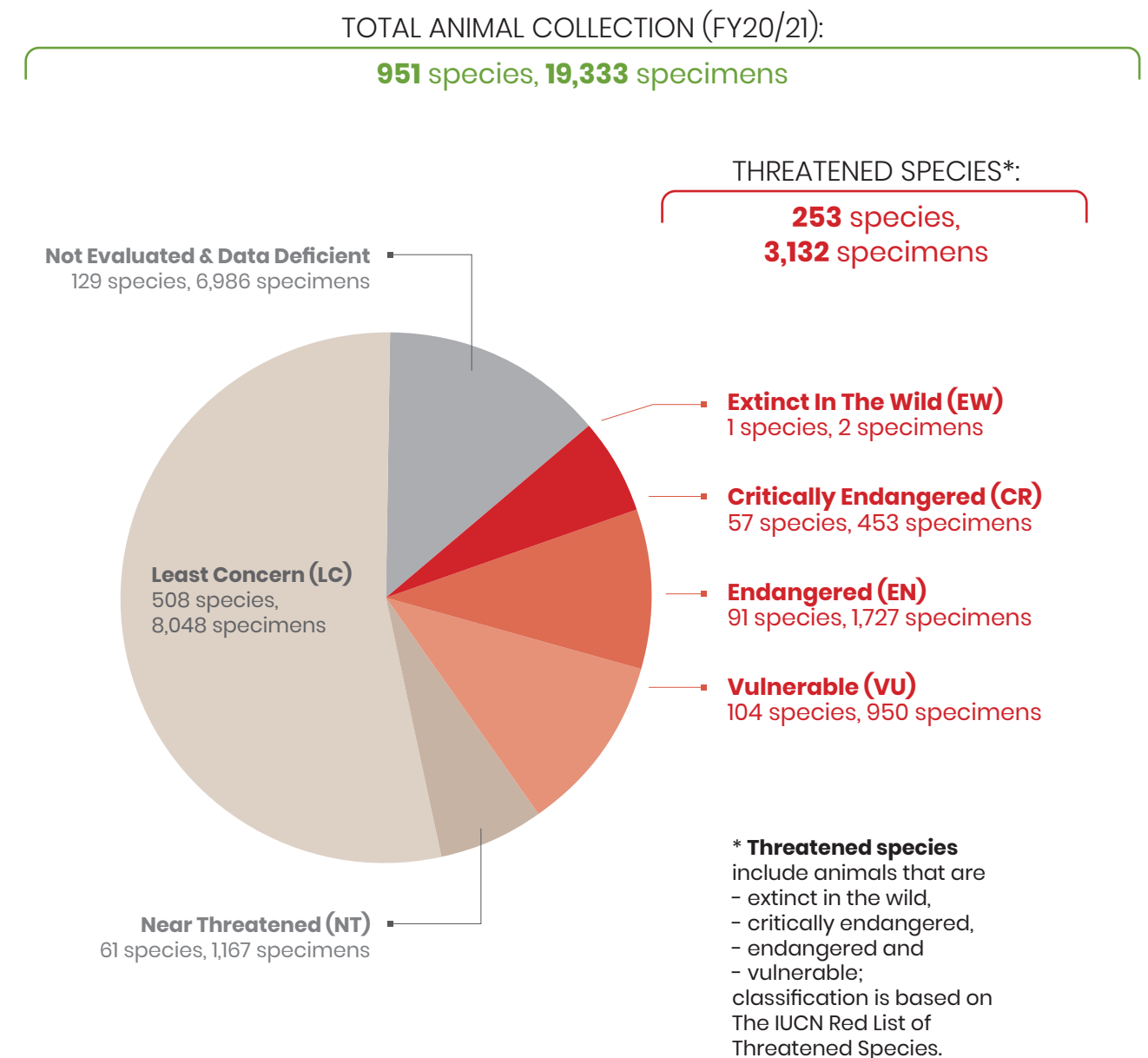
Through our support, training modules in animal welfare certification and process accreditation have been developed, to be implemented at a global level for zoo associations in regions including Latin America, Asia and Eastern Europe. This is in line with the World Association of Zoos and Aquariums goal for all of its members to undergo an accredited evaluation of their animal welfare standards by 2023.

Over the FY, we

- Participated in **136** global managed species programmes to help save these threatened species from extinction
- Attended to **3,673** clinical cases of animals requiring medical care, **20%** of which were admitted for intensive treatment
- Contributed to scientific knowledge and global wildlife management decision-making through the publication of **27** papers, of which **22** appear in peer-reviewed journals

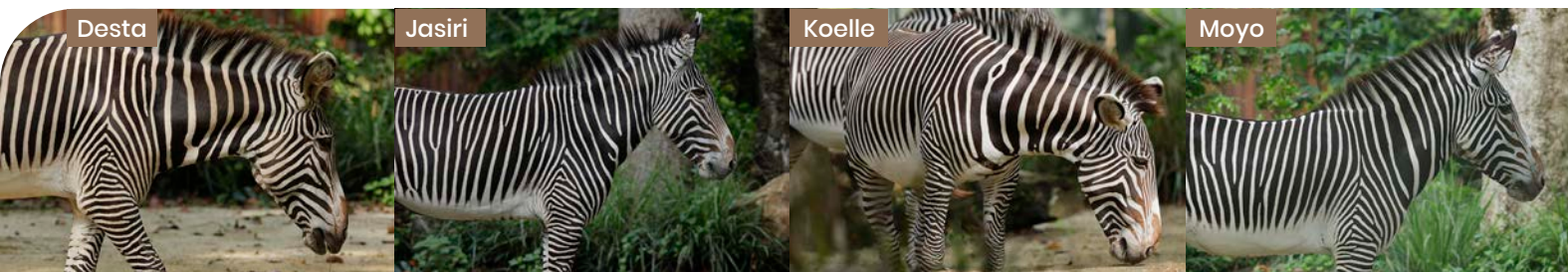
ANIMAL CARE UPDATES

Our parks are home to some 19,000 animals representing nearly a thousand species, of which 27% are threatened in the wild. Besides species of high conservation or population sustainability value, we also focus on the inclusion of species for education. The animals we care for are ambassadors for their species and wild habitats. By connecting guests with our animals, we hope to inspire more people to love, appreciate and take action to save wildlife.



NOTABLE NEWCOMERS

Inter-zoo transfers of animals may take years of preparation and with Covid-19 cases raging globally, travel restrictions made it even tougher for plans to materialise. Despite multiple setbacks such as challenging veterinary requirements and limited freight options, we managed to facilitate a total of 37 inter-zoo transfers over the FY. Given the amount of coordination and logistical planning that must go into each transfer, this is a major achievement. Here are some significant new arrivals at our parks.



Aardvark 'Alika'

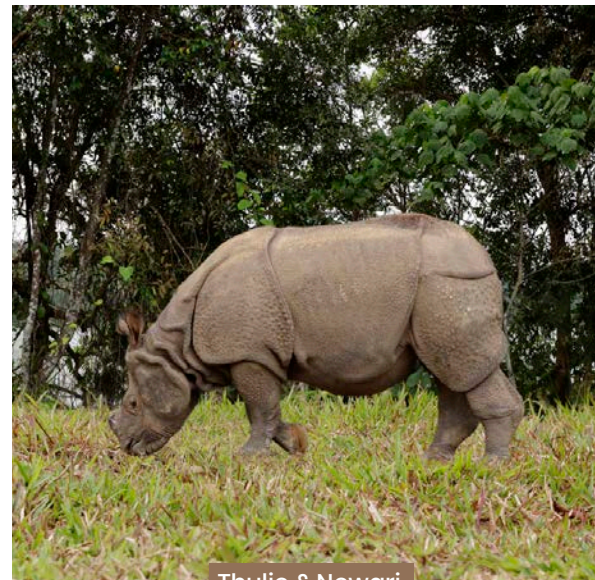
- Arrived in Oct 2020 from Nagoya Higashiyama Zoo, Japan
- New home: East Lodge Trail @ Night Safari

Grévy's Zebras 'Desta', 'Jasiri', 'Koelle', 'Moyo'

- Arrived in June 2020 from Tanganyika Wildlife Park, USA
- New home: Wild Africa @ Singapore Zoo

Indian Rhinos 'Thulie' and 'Newari'

- Arrived in November 2020 from Al-Bustan Zoological Centre, UAE
- New home: Leopard Trail @ Night Safari



Northern Rockhopper Penguin 'Pierre'

In August 2020, our colleagues in Perth Zoo, approached us to find out if we could provide a home for a stranded rockhopper penguin. Found washed up on the beach near Albany, Western Australia, the penguin was suffering from arrested moult. With his feather condition, he was unable to swim nor fish. He was rehabilitated at Perth Zoo, and named Pierre. But as Perth Zoo was not able to house him with other penguins, it was agreed to be in Pierre's best interest to join our penguin colony.

“Knowing that Pierre would need extra TLC for some time, our aim has always been to get him fit enough to be able to travel to another conservation zoo which has rockhoppers so he could be with other penguins. His welfare is our priority, Pierre is very social, and we know he will thrive being amongst other penguins. Jurong Bird Park's 'Penguin Coast' is home to various species of penguins. They are experts at caring for these beautiful marine birds and we have no doubt this is the perfect long-term home for Pierre.”

~ Alisa Wallace,
Senior Veterinarian,
Perth Zoo

Pierre arrived in Singapore in December 2020. To get him settled in, the Penguin Care Team maintained optimal temperature and provided different substrates, like turf mat, pebble wash and rocks. Diet-wise, he received capelins filled with nutrients to boost his body fat content and help promote his feather growth. As a result, his appetite improved and he started socialising. A month on, Pierre was moulting properly. With his feather condition improved tremendously, he is now 'rocking' it up at Jurong Bird Park's Penguin Coast.

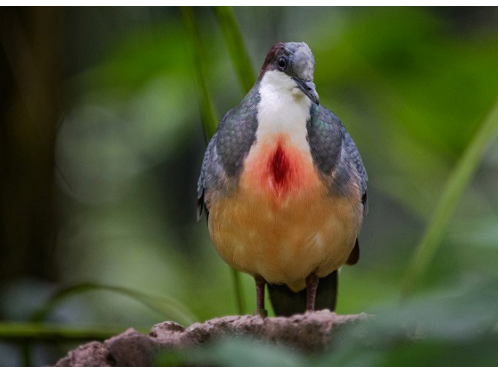
SAVING SPECIES AT THE GLOBAL LEVEL

Our parks are part of a global network of zoos that play a pivotal role in maintaining genetically healthy populations of animal species. We collaborate with other zoos on internationally managed species programmes as one of the ways in which we contribute to saving species from extinction. Transfers of animals between zoos are based on genetic compatibility and aimed at sustaining the genetic viability of the species in human care. We participated in 136 international managed species programmes, up from 104 last FY (*see Annex for full list*).

A species coordinator takes charge of each programme, making recommendations for inter-zoo transfers of individuals to achieve the best welfare and conservation outcomes for the species. We have been systematically developing the competencies of our animal care staff to perform the specialised role of species coordination. Over the FY, we have taken on the international coordination of three additional managed species.

Luzon Bleeding-Hearts Go Home

Two pairs of Luzon bleeding-hearts first came to us in 2012, as part of a tripartite agreement between Jurong Bird Park, Ailon Zoo and the Department of Environment and Natural Resources (DENR) of the Philippines. Since then, we have successfully bred 60 individuals. On 20 August 2020, 10 of them were repatriated to the Philippines, where DENR has successfully released them to their native habitats. A prime target of poaching for the pet trade due to their striking appearance, Luzon bleeding-hearts are dwindling in number in the wild. Their successful breeding and reintroduction underscore the critical role that zoos play in species conservation.



ABOVE (RIGHT): His Excellency Joseph del Mar Yap, Ambassador of the Republic of the Philippines to Singapore (right) receiving the transport crate from Mathias Quek, Junior Animal Care Officer, Jurong Bird Park (centre) and Dr Luis Neves, Vice President Zoology, Wildlife Reserves Singapore (left) as a symbolic gesture to mark the official handover of the Luzon bleeding-hearts to the Philippines.

Sri Lankan Leopard 'Raja'

A male Sri Lankan leopard 'Raja' came to us from Raguna Zoo under a breeding recommendation by the species coordinator of the Sri Lankan leopard managed species programme. 'Raja' is one of some 90 Sri Lankan leopards in human care worldwide. His species is facing extinction due to poaching and the loss of natural habitats – fewer than a thousand are left in the wild. Mating attempts between him and female leopard 'Nuwa' have been observed. If successful, the offspring will be the first to be born at our parks in more than two decades and a boost to the breeding programme.



RIGHT: Successful pairing attempt of Sri Lankan Leopards.

The following species are managed through a global programme, coordinated by our staff:

SPECIES	PROGRAMME	IUCN RED LIST	SPECIES COORDINATOR
Black Hornbill <i>Anthracosceros malayanus</i>	EEP*	VU Vulnerable	Mark Rusli, Junior Avian Care Officer
Black-winged Myna <i>Acridotheres melanopterus</i>	EEP*	CR Critically Endangered	Anais Tritto, Curator, Birds
Bornean Orangutan <i>Pongo pygmaeus</i>	SSMP [^]	CR Critically Endangered	Wendy Chua, Assistant Curator, Records & Transactions
Knobbed Hornbill <i>Rhyticeros cassidix</i>	EEP*	VU Vulnerable	Luis Neves, Vice President, Zoology
Santa Cruz Ground-dove <i>Alopecoenas sanctaecrucis</i>	EEP*	EN Endangered	Luis Neves, Vice President, Zoology
Straw-headed Bulbul <i>Pycnonotus zeylanicus</i>	EEP*	CR Critically Endangered	Manoj Kumar, Junior Avian Care Officer
Sumatran Orangutan <i>Pongo abelii</i>	SSMP [^]	CR Critically Endangered	Wendy Chua, Assistant Curator, Records & Transactions
Sun Bear <i>Helarctos malayanus</i>	SSMP [^]	VU Vulnerable	Anand Kumar, Assistant Curator, Carnivores & Small Mammals
Sunda Clouded Leopard <i>Neofelis diardi</i>	EEP*	VU Vulnerable	Cecilia Tang, Assistant Curator, Carnivores & Small Mammals
Sunda Slow Loris <i>Nycticebus coucang</i>	EEP*	VU Vulnerable	Cecilia Tang, Assistant Curator, Carnivores & Small Mammals
Victoria Crowned Pigeon <i>Goura victoria</i>	ESB [#]	NT Near Threatened	Anais Tritto, Curator, Birds

*EEP – EAZA (European Association of Zoos and Aquaria) Ex-situ Programme

#ESB – EAZA (European Association of Zoos and Aquaria) Studbook

[^]SSMP – SEAZA (Southeast Asian Zoos and Aquariums) Species Management Programme

BUNDLES OF JOY, BIG AND SMALL

Over the FY, we successfully bred a total of 481 young. In the case of threatened species, each hatchling and newborn holds great significance for conservation. As their numbers in the wild dwindle, successful breeding under human care takes us one step closer to the eventual goal of repopulating wild habitats.

African Lion 'Simba'

Singapore Zoo's first lion cub in history, 'Simba' was conceived through artificial insemination. He represents an important bloodline for African lions in human care.



Malayan Tapir 'Bintang'

Night Safari welcomed its 32nd Malayan tapir calf – the first male to be born here since 2011. Successful breeding at Night Safari contributes to ensuring genetic diversity and a sustainable population of the species under human care.



Pygmy Hippo
'Miata'

Goodfellow's Treekangaroo 'Malolo'

A bouncing baby boy 'Malolo' was born to father 'Makaia' and mother 'Nupela'. With only 58 individuals under human care, these tree kangaroos are one of the world's rarest animals in zoos globally. The birth is a significant boon to the population under human care.



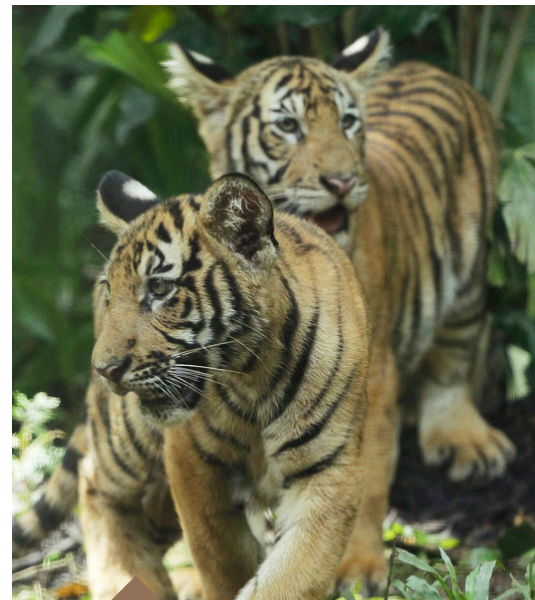
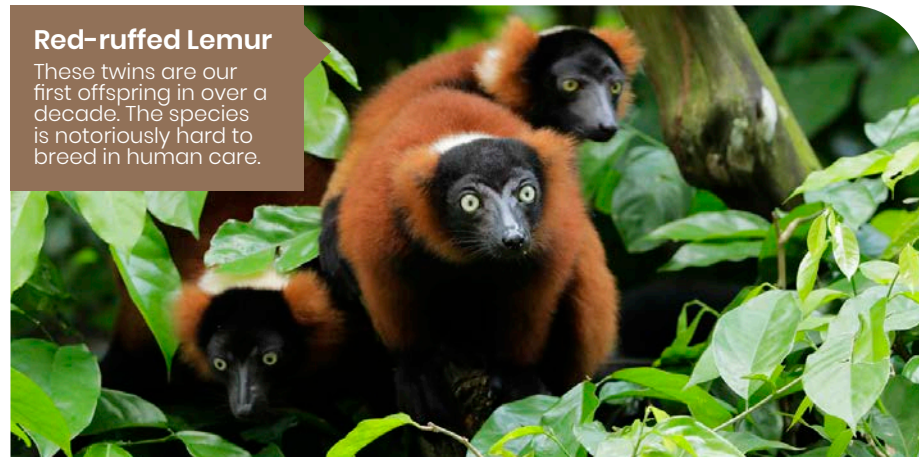
Proboscis Monkeys

We welcomed two babies over the FY, bringing our tally of successful births over the years to 34. One of the babies was born to a first-time mother, representing a new bloodline and a significant addition to the proboscis monkey population outside of Indonesia. We currently have the largest population of these colobines outside their native range.



Red-ruffed Lemur

These twins are our first offspring in over a decade. The species is notoriously hard to breed in human care.



Malayan Tigers 'Sali' & 'Arhaa'

Our first Malayan tiger cubs after more than two decades. This breeding success is a significant contribution to the population of their species, which number fewer than 200 in the wild.

Red-fronted Macaw



Blue-eyed Cockatoos

Celebes Crested Macaque 'Joyo'

Up until recently, Celebes crested macaques were considered one of the world's 25 most endangered primates. The birth of 'Joyo' is a boost for the genetic diversity and population sustainability of this species in human care.



Breeding Invertebrates

Overshadowed by the more charismatic vertebrates, invertebrates are often forgotten, unloved and among some of the least well studied. The dearth of data makes caring for them extra challenging. Through hard work and attention to detail, the Invertebrate Care Team made great strides over FY to improve breeding and husbandry methods for their tiny charges.

Notable breeding success was achieved with native stick insect species such as the Gray's twig, small cigar and jungle nymph. The small cigar is listed as endangered locally, and assessment of reintroduction possibilities will be carried out. The care team is also developing Best Practice Guidelines for the jungle nymph, which will inform husbandry methods for zoos all around the world that care for the species.

Given the short lifespan of most butterfly species, maintaining viable populations for display is a challenge. As caterpillars are host plant dependent, the team must ensure a constant supply of suitable host plants. They must also maintain environmental parameters suitable for each of the differing life stages of the butterfly species. Adopting an evidence-based approach, the team has deepened the knowhow to breed more butterfly species, including the autumn leaf and common mormon.

To cap it off, the team successfully bred and raised the Malaysian flower mantis – this is no mean feat as this species is known to be difficult to care for.

EXHIBIT ENHANCEMENTS

A well-designed exhibit plays a key role in enhancing the fitness and health of its inhabitants. It offers animals a range of options to engage with and display their repertoire of natural behaviours. As part of our continued efforts to improve animal welfare, we carried out exhibit enhancement work as well as introduced new species to existing exhibits to create a dynamic environment through inter-species interactions. Three key projects completed over the FY are outlined below.



Small Ape Meets Great Ape

Encouraged by the successful integration of the Asian small-clawed otters with the orangutans, the Great Ape Care Team planned for the introduction of a pair of pileated gibbons. After months of modifying the physical space, and conditioning the gibbons, they successfully integrated the gibbons with the orangutans. Positive interactions have been recorded from all animals – the gibbons have even been observed grooming the orangutans, a sign of trust and friendship. Such inter-species interactions help keep the animals socially stimulated. The gibbons' unique calls have also livened up the exhibit, and they have been well-received by guests drawn to their high energy levels.



ABOVE: Our oldest star, Rod the Egyptian vulture is often found napping in his favourite spot at the back of the aviary. He wears a light shirt to protect his delicate chest feathers from rubbing on the ground.

Feathered Seniors Retire In Style

Raptor Retirement Aviary was built for Jurong Bird Park's pioneer generation of retired show birds. The spacious area has perches placed in strategic points and at varying heights to suit the individual needs and different movement capabilities of its older residents.

This aviary is home to eight birds of prey including eagles, owls and vultures. Inter-species interactions between the inhabitants encourage higher activity levels, which make for enrichment to stimulate the aging birds mentally and physically. To ensure they coexist amicably, the Animal Presentations Team considered the birds' personalities and selected compatible individuals for the space.

Former stars of the iconic Kings of the Skies show, these animal ambassadors have helped raise awareness of threats faced by their wild counterparts. Retired from the limelight, the birds will live out their golden years in comfort, under the watchful eye of their care team.

Giant Steps In Elephant Care

After a massive overhaul of the elephant facilities at Singapore Zoo and Night Safari, the Elephant Care Team is now able to conduct all positive reinforcement training through a physical barrier, for the safety of the animals and the team. Using positive reinforcement to carry husbandry and medical routines is key to improving animal welfare.

Features like new rubber flooring for the stables and custom-built shelters in the exhibit have also been added for the elephants' comfort.

RIGHT: To increase the comfort of our Zoo elephants, the stable flooring was converted to a rubberised one. Nighttime sleeping hours have since increased among all the elephants and our elderly matriarch Komali has even started taking afternoon naps.





MEDICAL CONDITIONING FOR STRESS-FREE HEALTHCARE

Getting animals to participate voluntarily in healthcare procedures eliminates the need for physical restraint and the use of anaesthesia, both of which often cause tremendous stress to the animals and their care team. Animals are encouraged to cooperate in non-invasive medical procedures through positive reinforcement training. These training sessions offer them an element of choice, while allowing keepers to build closer bonds with their charges.

This FY saw an emphatic upswing in the number of animals successfully trained to participate voluntarily in medical procedures. A total of 106 individuals (up from 26 last FY) are now cooperating for the administration of medications or supplements and there are now 10 species trained for temperature taking, as compared to just 2 last year. With the spread of Covid-19, the Great Ape Care Team stepped up health monitoring of the animals in their care. All our orangutans now have their temperatures taken daily and the team has expanded temperature monitoring to our chimpanzees.

A total of 49 individuals across 15 species are trained to voluntarily participate in vaccination. Of the individuals, 19 are orangutans. They were successfully hand injected with encephalomyocarditis virus (EMCV) vaccines. This is a massive stride forward from when the vaccination programme was first started in 2018 – only 4 orangutans were hand-injected then. EMCV can be fatal in orangutans and it is essential the apes receive their vaccines. Training animals to receive jabs voluntarily requires plenty of patience from their keepers and the vets. The cooperation shown by the animals demonstrates the trust they place in their care team.



ABOVE: First successful blood draw for Asian lioness "Amba", allowing animal care staff to monitor her health.



LEFT: Sloth bear "Krishna" cooperating in the blood draw procedure, putting his left arm in the arm sleeve while getting rewarded with honey.

VETERINARY HIGHLIGHTS

To offer the best healthcare for our animals, the Veterinary Team delivers not just on the diagnosis and treatment of clinical cases. Health surveillance, preventive medicine and pathology are pivotal to providing top-notch medical solutions.

VETS ON THE CASE

Over the FY, the veterinarians were kept busy with a total caseload of 3,673. Around 20% of these were admitted to the animal hospital as they required intensive care and treatment at dedicated facilities. The average length of stay was 12–14 days, with over 90% of patients eventually discharged with a clean bill of health. Here are two significant cases.



Sealion 'Pedro' Cataract Surgery

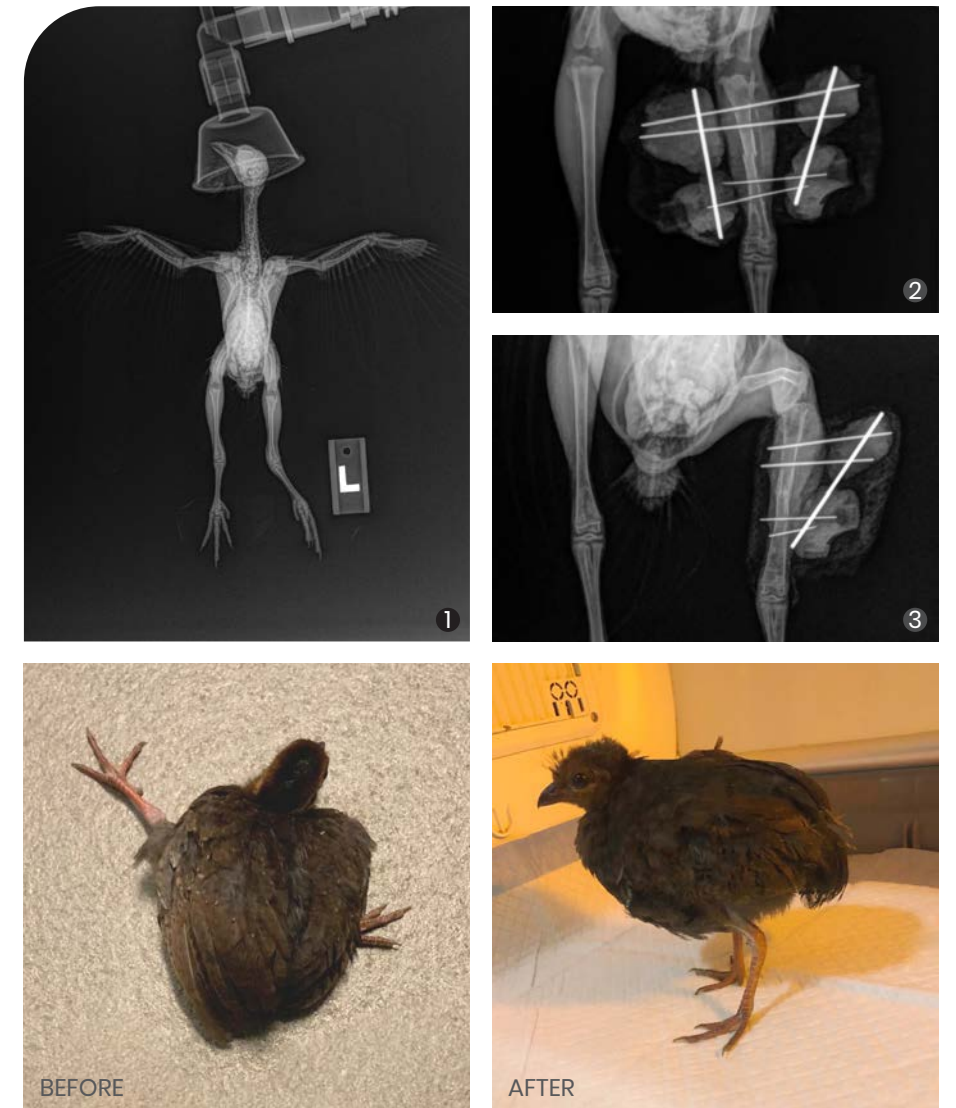
The Sealion Care Team had been monitoring the progression of Pedro's cataracts closely since his first diagnosis. Because of Covid-19, plans to bring in specialists to perform an elective cataract surgery were thwarted. However, when Pedro developed a complication that caused his eye pressures to go up, resulting in immense pain, the vets and his care team decided to carry out an emergency cataract removal. It was the first time an emergency procedure of this nature was to be done on a sealion at the Zoo. Covid-19 restrictions added layers of complexity to the execution. Resources and logistics had to be pulled together in a short time and made complicated under the split-team arrangement. To ensure the best possible outcome, numerous stakeholders and consultants were engaged virtually to weigh in on the procedure.

Despite the multiple challenges, the surgery was planned within a week, and executed smoothly with the help of Dr. Laurent Fillon, a veterinary ophthalmic surgeon from the Veterinary Emergency & Specialty Hospital. Pedro's case is a clear example of how medical training of animals for procedures contributes to the success of an operation. Before the surgery, he had been trained to cooperate with medical checks and transfers to the hospital. His trust in the care team meant they were able to conduct a post-op check for him, just a month after the surgery. The scar from the surgery has healed well and Pedro is now back to wowning audiences at the show, where he is very much in his element.

Crested Partridge Congenital Deformity

In May 2020, a 3-week-old male crested partridge hatched at the Breeding and Research Centre (BRC) was observed to have a marked rotational deformity of the shin bone. This caused his lower leg to splay outwards, preventing him from walking normally. As a ground-dwelling bird, his quality of life would be severely impacted if the deformity was left uncorrected. The vets tried using hobbles to rotate the leg but were unsuccessful. They eventually decided to perform a rotational osteotomy surgery on the chick.

The surgery was a success. To expedite recovery, the chick was put on physiotherapy before discharge from the hospital. By September 2020, the feeble chick who could not walk had become a handsome full-grown bird. He now traipses the grounds at Wings of Asia with the rest of the partridges and pheasants.



- 1: The valgus deformity (outward rotation) of the left leg prior to surgery.
- 2: The initial pin arrangement after surgery.
- 3: The pin arrangement halfway through recovery.

PREVENTION IS BETTER THAN CURE

To look after the health of all the animals in our care, we have in place structured health monitoring programmes. Over the FY, 556 mammals and birds were vaccinated and over 8,000 parasite checks were conducted. We are also one of the few zoological institutions to have a team of veterinary pathologists. By studying and diagnosing diseases in deceased animals, lessons learnt from the dead can guide us in providing better care for the living.

The number of senior animals in our parks has grown over the years. To better manage health conditions associated with old age, we pioneered a senior animal care plan. The plan seeks to improve the ‘healthspan’ of the animals by slowing the onsets of age-related diseases and to ensure the aging animals continue to have a good quality of life. Every animal that reaches 75% of its in-care lifespan is included – there were 331 senior animals enrolled in the FY.

Dietary Supplements To Relieve Arthritis

Animals afflicted with arthritic conditions experience constant pain. Through trials, our geriatric animals get a taxon-specific mix of supplements tailored for their additional needs in old age. The supplements include calcium, fish oil with omega-3, vitamins and taurine.

An overall increase in activity and a decrease in arthritis-related behaviours such as lameness and limping were observed. This indicates the supplements significantly reduced the symptoms of arthritis in our geriatric animals and we will continue to explore the potential of nutrition as a form of preventive medicine.

Heart Health Of Orangutan ‘Medan’

Following the comprehensive orangutan health assessments done last FY, we received the troubling diagnosis of an aortic aneurysm in Medan our female orangutan. This occurs when a part of the aorta is weakened by blood pushing against the vessel wall, causing it to bulge. If the balloon-like bulge ruptures, life-threatening internal bleeding will ensue.

As Medan’s aneurysm is relatively small, her condition is managed through regular monitoring. Besides an echocardiogram every six months to a year, her blood pressure is also monitored daily. With an increase in blood pressure, the risk of developing a rupture of the

aneurysm increases as well. The Orangutan Care Team took pains to condition Medan to participate voluntarily in blood pressure monitoring and weight taking. As obesity and heart disease are linked, the care team monitors both the amount and type of food she is eating to ensure she has a balanced food intake and maintains a healthy weight.



Iron Storage Disease Screening In Hornbills

Iron storage disease (ISD) is a common problem in many bird species. It occurs when too much iron accumulates within the liver and then in the heart, lungs and other organs. The accumulation causes significant damage and eventually death. Hornbills are particularly susceptible. The only way to confirm accumulation of iron in cells is through liver biopsy.

To allow for early treatment prior to clinical manifestation, screening for all hornbills at Bird Park is currently underway. Of the individuals screened, 14 required treatment.

Oral medication is dispensed for keepers to give in food. So far, four individuals have shown complete resolution of ISD.

The avian vets are planning to screen every hornbill on an annual basis to track the prevalence of the disease in our birds as well any recurrence in previously recovered birds. It will also allow for targeted dietary evaluation as a preventive measure and to reduce reoccurrence.



RESEARCH AND INNOVATIONS FOR BETTER CARE

The work of our Animal Care and Veterinary teams presents opportunities for the development of scientific expertise in animal handling, specialised veterinary medicine, as well as breeding and husbandry of wildlife in human care. A total of 92 research projects are ongoing, of which 23 were new projects started in the FY – a remarkable effort by the teams considering the hurdles brought about by Covid-19 restrictions

At the same time, the teams have stayed open to new ideas, adapting swiftly to new technology to get work done more effectively. 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.

FRESH OFF THE PRESS

To build up a pool of staff skilled in scientific inquiry, we have ramped up our research capabilities over the years. Total research output for FY2021 stands at 27 publications, 22 of which are peer-reviewed (*see Annex for full list*). Besides adding to the body of scientific knowledge, we hope these will also guide global wildlife management decisions in the zoo community. Of significant mention is the publication of the EAZA Best Practice Guidelines for Straw Headed Bulbul, authored by Manoj Kumar, Junior Animal Care Officer, Jurong Bird Park.



BANKING ON THE DATA

Databases and biomaterial banks are essential tools for an evidence-based approach to research and action. When well-organised, these not only improve operational efficiency, they also provide a supply of reference material. Over time, improvements in genome resource banks and reproductive technologies can help sustain species populations in human care. Here we highlight some key advances made over the FY:

Digitalising The Animal Knowledge Base

The Zoological Information Management System (ZIMS) is a web-based, global database for recording information and facilitating data sharing among some 900 participating zoos. Over the FY, we adopted a new monitoring tool offered by Species360 – ZIMS Care & Welfare. This new module integrates the five-domain model for animal welfare assessment. It provides a user-friendly and visual tool to allow swift and holistic assessment of an animal's key health indicators.

Sperm Banks And Assisted Breeding

Over the years, the Veterinary Team has worked hard to perfect techniques of sperm collection and artificial insemination for individuals of various vulnerable species. The collected sperm cells, stored in the Zoo's cryobank, are important genetic material that could be used for subsequent research or artificial insemination.

This FY, the team's efforts finally paid off when male lion cub 'Simba' was born through assisted reproductive techniques. Moving forward, the team will continue to refine techniques and build expertise in semen harvesting and storage as well as assisted breeding. With wild populations of threatened species on the decline, such expertise is likely to play an increasingly important role in saving species from extinction.



[Click to read more](#)

“ After months of writing up, the collected experience by EEP coordinator Manoj Kumar the manuscript has been under review by the EAZA Songbird TAG for additional months. Now it has finally been published and it is worth taking a closer look. The straw-headed bulbul is a challenging species to breed in captivity and the effort and attention Manoj and his colleagues are putting into a focussed management will be instrumental for establishing an ex-situ assurance population of this species in the long-term. ”

~ Simon Bruslund,
Vice-chair, EAZA Silent Forest Campaign and
Vice-chair, Songbird Taxon Advisory Group

LEFT: Jurong Bird Park has seen consistent success in breeding the straw-headed bulbul and the guidelines set out the husbandry and care requirements of the species for zoo professionals in working with the species.

REINVENTING THE HOW

To improve the quality of life of our animals, the Animal Care and Veterinary teams continued to rely on science-based decisions and evidence-based practices to enhance operational efficiency and effectiveness. By tapping on technological advancements, they have been able to use their time more efficiently to achieve transformational outcomes in animal welfare and healthcare.

Watching Over Neha

Born in May 2016, Neha is the youngest elephant at Night Safari. Her care team is constantly on their guard for symptoms of the Elephant Endotheliotropic Herpesvirus (EEHV). The EEHV can cause severe haemorrhaging and is often fatal when transmitted to young elephants like Neha.

Daily observation of Neha is essential to pick up unusual behaviours that might be red flags for the virus. On days when she shows signs of

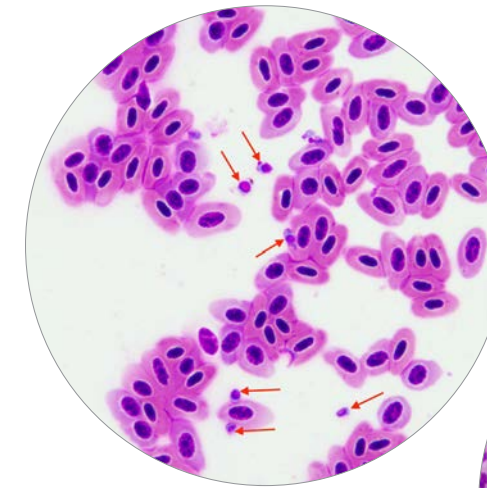
being unwell, time spent on manual observation increases.

Through the use of artificial intelligence (AI), manhours spent on manual observation can be reduced by 30%. By training AI to recognise Neha's behavioral patterns, it can analyse CCTV footage and notify the Elephant Care Team when any abnormalities are observed. Pilot studies are currently underway.

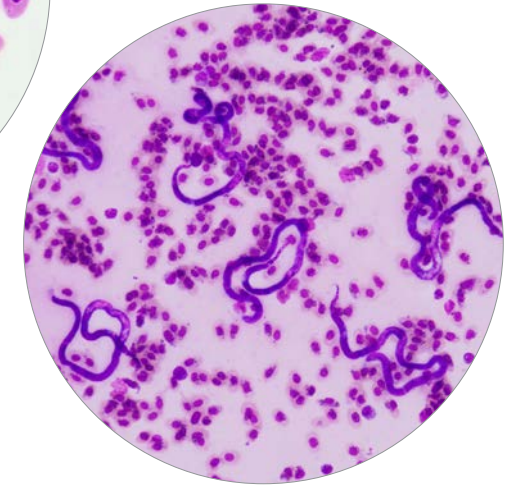


Keeping Parasites In Check

Parasites are naturally occurring and common in animals. A robust parasite surveillance and treatment plan in place for the 19,000 animals in our care is crucial. There are ongoing studies to monitor the efficacy of parasite management with the use of drugs and specialised diets. Learnings have been compiled in the Singapore Zoo Parasite Manual, which will be a useful tool for all staff involved in care of animals.



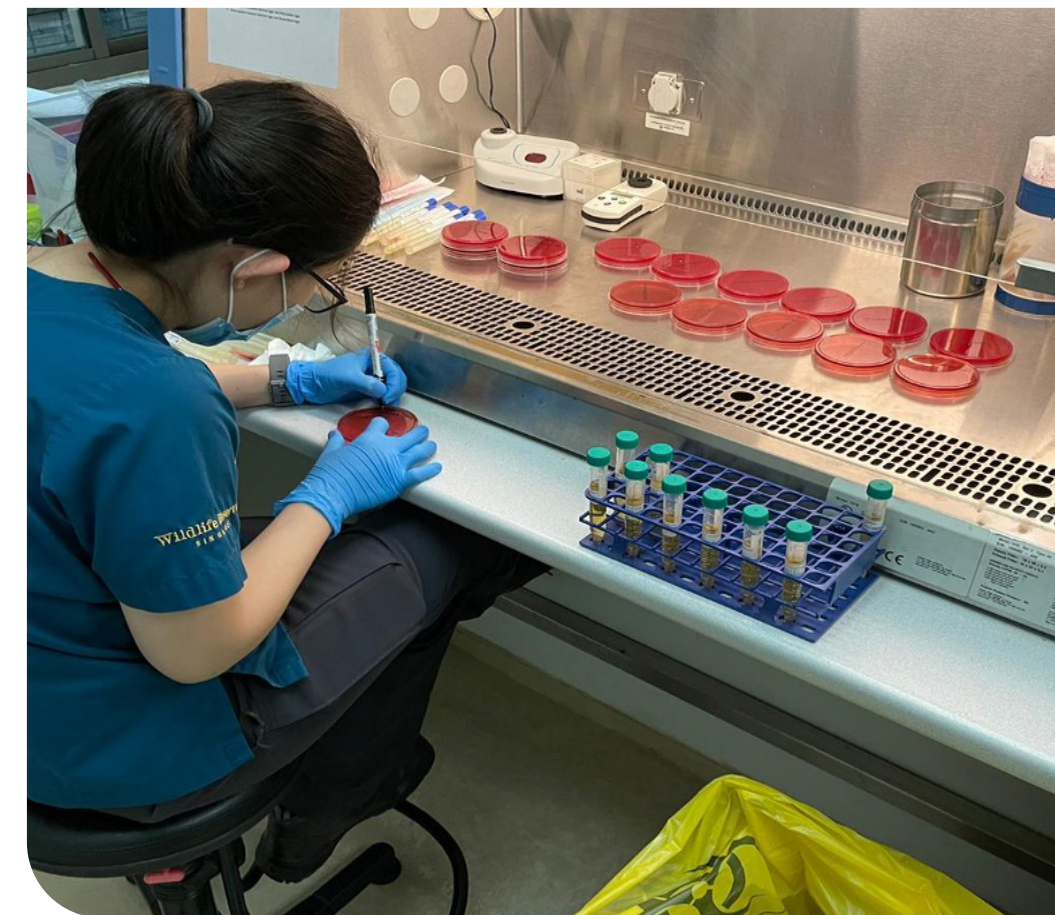
Atoxoplasma



Avian filaroid

Speeding Up Lab Work

The commissioning of a VITEK II Microbial Identification System allows for faster and more accurate identification of bacteria strains than conventional microbiological culture methods. The system also automates antibiotic susceptibility testing and resistance mechanism detection. With this enhancement in diagnostic methods, the Veterinary Team can identify, in a speedy manner, the type of bacteria causing disease in our animal patients and prescribe the right treatment for them.



PLAYING A LEADING ROLE IN CONSERVING BIODIVERSITY

Besides delivery the best possible animal care, we are also taking an action-driven, leadership role in support of initiatives to protect species and habitats locally and regionally. In December 2020, we celebrated another milestone with the establishment of Mandai Nature to build on our past efforts and deepen conservation impact.

In FY20/21, we

- Provided support for **16 local projects: \$600,000** invested by Wildlife Reserves Singapore Conservation Fund (WRSCF)
- Invested **\$1.2 million** in support of 45 regional conservation projects despite Covid-19 challenges. More than 95% of the projects funded impact the protection of threatened species, and almost half focus on critically endangered species in the region.
- Continued to **forge strong conservation partnerships** locally, regionally and internationally.
- Established **Mandai Nature**, a non-profit conservation organisation that will strengthen work for habitat protection, community engagement as well as drive nature-based solution projects to mitigate climate change in Singapore and Southeast Asia.



PROTECTING LOCAL WILDLIFE

From preserving endemic species found nowhere else on earth, to facilitating better understanding towards animals that share our spaces, our work to protect native wildlife has influenced local, even regional, conservation strategies. We achieved this by focusing on the following key areas:

- Supporting projects through the Wildlife Reserves Singapore Conservation Fund (WRSCF)
- Deepening partnership through various working groups with multiple stakeholders on the local conservation scenes
- Rehabilitating rescued wildlife
- Creating wildlife-friendly habitats for native species



WRSCF PROJECT HIGHLIGHTS

Despite the challenges posed by Covid-19, work on protecting local biodiversity continued to grow from strength to strength. WRSCF invested over \$600,000 to support 16 projects, up from six in the previous FY (*see Annex for full list*). Here, we highlight a few of the projects supported:

RAFFLES' BANDED LANGUR

SAVING THE LANGURS FROM EXTINCTION

The Raffles' banded langur is a leaf-eating monkey first reported in Singapore by Sir Stamford Raffles. It is also found in southern Peninsular Malaysia. Listed as critically endangered, there are fewer than 70 individuals left in Singapore. This species may well disappear in our country within our lifetime if nothing is done to save it and save it fast. WRSCF has been funding field studies on the Raffles banded langur by Andie Ang since 2010. Findings from the research are crucial to inform conservation actions in the fight to prevent extinction of the Raffles banded langur in Singapore. An action plan developed in 2016 (bit.ly/RBLstrategy) saw the consequential establishment of the Raffles Banded Langur Working Group chaired by Andie Ang, whose work is funded by WRSCF.

Implementation of the action plan by the Working Group and various stakeholders is beginning to bear fruit:

- i. One of the priorities of the action plan is to improve habitat quality and connectivity for the Raffles banded langur. Among other things, the construction of rope bridges to facilitate the langurs' safe crossing is a big step forward to conserving the langurs. Thanks to concerted efforts, numbers have increased slowly but surely. In the 1990s, there were barely 20 individuals. Today, the total population count stands at 67. New babies continue to be spotted.



PHOTO: SABRINA JABBAR

ABOVE: To cross, or not to cross

Rope bridges installed along Old Upper Thomson Road provide safe crossing for the langurs. But new structures take some getting used to. Thomson, the youngest in his group, decides to sit in the middle of the bridge. His troop took an hour to deliberate this important decision.



PHOTO: SABRINA JABBAR

- ii. The citizen science survey, which started in August 2016, allows members of the public to contribute to the conservation of the langur. Survey volunteers were among the first to observe langurs descending to the ground to cross between Thomson Nature Park and the adjacent Central Catchment Nature Reserve. Largely arboreal, langurs risk becoming roadkill while attempting to cross on the ground. These sightings prompted a concerted effort to collate data that proved instrumental in the construction of rope bridges to facilitate the langurs' safe crossing. Camera trap footage has confirmed that the langurs are using the bridges.
- iii. As the natural range of the langurs includes southern Peninsular Malaysia, research was established in two sites in Johor through partnerships with Malaysian Nature Society (MNS) and World Wildlife Fund (WWF). The habitats are severely threatened by deforestation and fragmented. To improve habitat connectivity for the langurs, three rope bridges have been installed in Johor. This connectivity is crucial in providing safe passages for the langurs to find food and mates.

ABOVE: Leap of faith

Coconut clings on tight while his mum does the canopy leap. Coconut is one of the new additions to the local population of Raffles' banded langurs recorded over the FY. He must eventually learn to take the leap himself and maybe even lead his own family to do so one day.

BAMBOO SHARK

STUDYING BAMBOO SHARK BIOLOGY

Bamboo sharks are among the most common species observed by anglers and divers, yet very little is known about them. Due to their popularity with fish collectors and exotic food diners, researchers fear their numbers may be declining. Since 2017, WRSCF has been funding a study to gather vital information on life history and ecology of bamboo sharks. This FY, the first male slender bamboo shark was tagged, allowing researchers to track the individual to gain insights into its behaviour and ecology. Data gathered will supplement an earlier data set obtained from the tracking of several tagged female slender bamboo sharks. Public engagement continued, including social media promotion of the project, a panel discussion at Asia Dive Expo virtual event, and online engagement with fishing stakeholder groups.



SUNDA PANGOLIN

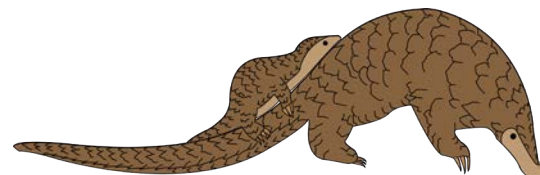
PANGOLIN CONSERVATION SCALES UP

The Sunda pangolin is the most heavily trafficked mammal in the illegal wildlife trade, and one of the most threatened species on this planet. But in Singapore, its main threat is another kind of traffic: the kind on roads. Over the years, WRSCF has funded research into topics ranging from its diet and genetics to how it navigates the urban landscape. Various tracking methods including GPS and the use of sniffer dogs were tested. The learnings culminated in the establishment of the Sunda Pangolin National Conservation Strategy and Action Plan in 2018. We chair the Singapore Pangolin Working Group (SPWG), which is tasked to implement the strategy.



With our support, an interim coordinator came on board to assist the SPWG in accomplishing several short-term goals under the action plan:

- i. Launch SPWG website to generate awareness for pangolins and their plight. Apart from interactive features that engage younger audiences, the website allows members of the public to submit pangolin sighting data through the feature 'Record A Pangolin'.
- ii. Established and managed a centralised database on all pangolin sightings, rescue, release and roadkill in Singapore. A total of 515 sightings were recorded. The consolidated data provide insights into pangolin population status in Singapore, road ecology and factors behind roadkill to help guide conservation solutions.



SINGAPORE PANGOLIN WORKING GROUP

Apart from WRSCF support, we continued with the work of rehabilitating rescued pangolins, attending to 20 cases on average in year (see 'Rehabilitating Rescued Wildlife' on page 54). Individuals that make a full recovery are released back to the wild.

SINGAPORE FRESHWATER CRAB

BIG HELP FOR TINY CRABS

The Singapore freshwater crab ranks among the world's 100 most threatened species. It is found only in a few hill streams in Singapore and nowhere else in the world. Despite its diminutive size, this tiny crab plays a key role in the stream ecosystem as an opportunistic predator of small animals. It also feeds on leaf litter and dead animals in the stream. If the freshwater crab disappears, the ecosystem will be adversely impacted.

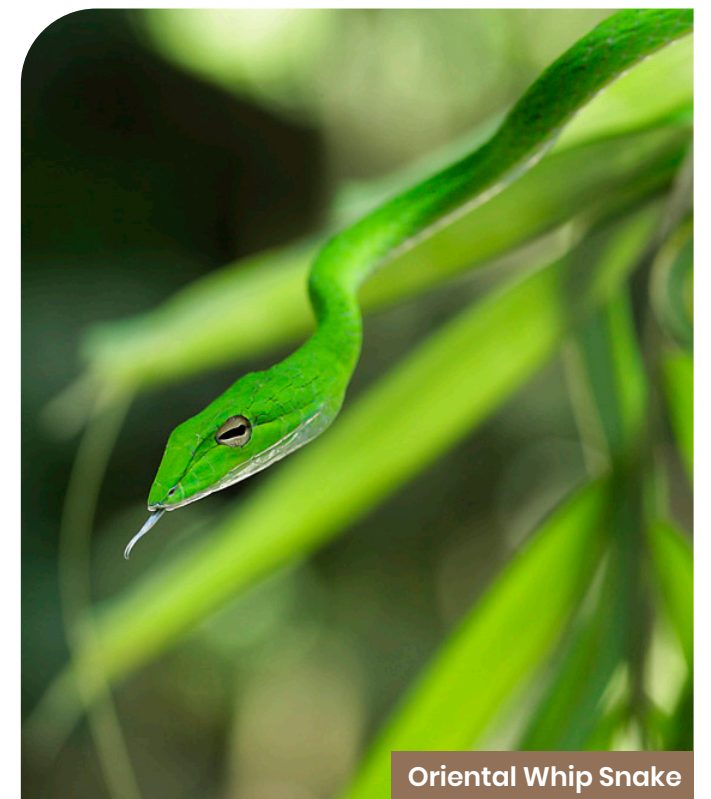
A fastidious creature that requires fast-flowing hill streams at the right pH level with a high amount of oxygen, it may not weather climate change well. WRSCF funds a study by NUS that investigates how this tiny crustacean may respond to weather fluctuations. Preliminary data indicate the crab is particularly susceptible to a shift from dry to moist or submerged conditions. Further trials are underway, and findings will inform measures to help the species counter drought and water acidification impacts, both of which are projected to intensify due to climate change.



EVERY SINGAPOREAN A NATURALIST

This is the first time WRSCF is funding a project involving school children. ESN is a programme by Nature Society (Singapore) (NSS) that equips young citizen scientists with the knowledge and skills to identify common species of fauna and flora in their schools. NSS experts and volunteers conduct training sessions for both students and teacher mentors. From just six schools in its first intake, ESN has expanded to 27 schools by its third year. The students are empowered to contribute to biodiversity science by uploading their observations to the iNaturalist website.

By the end of FY, 1,981 observations of 187 species had been uploaded. Observations on the site are shared with scientific data repositories and may be used by scientists in their research.



Oriental Whip Snake

REHABILITATING RESCUED WILDLIFE

We are a designated centre for rescued local wildlife in Singapore. In the FY, some 1,400 rescued animals were admitted to the Wildlife Healthcare and Research Centre and Bird Park Wildlife Rehabilitation Centre. The rehabilitation of rescued animals is one of the ways we contribute to the protection of native biodiversity.

There were some 1,000 wildlife admissions to the **Wildlife Healthcare and Research Centre**, of which over 70% were reptiles.

PYTHONS

Of the reptiles admitted, over 60% were pythons. Some of them sustained injuries inflicted by people out of fear and ignorance. Pythons are non-venomous. They feed on rats and play an important role in controlling pests.

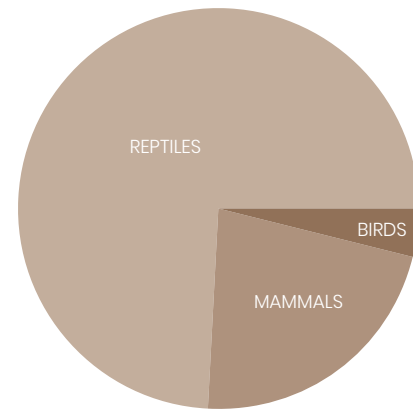


PALM CIVETS

Another animal commonly brought in for medical attention is the common palm civet. These creatures often venture into private estates to feast off fruit trees and to seek shelter. Irrate residents sometimes resort to trapping them. Trapped civets may sustain serious injuries while trying to escape. Civets made up a third of all mammal admissions.

ABOVE: Common palm civet pups 'Lima', 'Stevie' and 'Worm' were rescued from various locations. All were found alone, fearful and dehydrated. Too weak to survive on their own, they had to be handraised until ready for release.

To watch how the team got Stevie and the other pups ready for release, [click here](#).



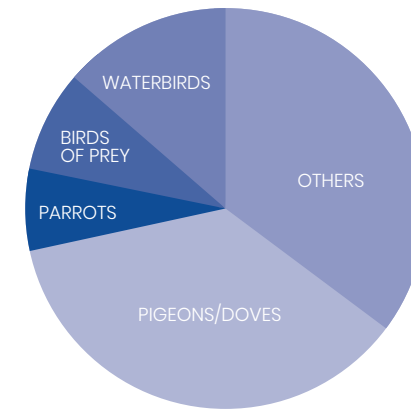
PANGOLINS

All reported cases of injured pangolins in Singapore are brought to us for treatment. These rescued pangolins often sustained injuries from road accidents or altercations with feral dogs. Over the last decade, we have cared for more than 120 pangolins. Those that make a full recovery are released into appropriate natural habitats.



ABOVE: Sunda pangolin 'Sudi' arrived with multiple infected wounds on body and tail from a suspected dog attack. The Animal Care Team gave him daily iodine baths to keep his wounds clean, and served his meals on a skateboard to encourage him to get walking again.

To watch Sudi's road to recovery, [click here](#).



WATERBIRDS

Waterbirds like herons and egrets are commonly admitted waterbirds. Some get injured flying into buildings or trapped in urban structures like railings.

BELOW: Shoes for a heron:

This grey heron arrived with severe bruising to the right wing and a clenched foot. The vets put a foam shoe on its feet so the digits could be straightened with traction.



BIRDS OF PREY

Birds of prey or raptors are another group of commonly rescued birds received by Jurong Bird Park. It is not uncommon for white bellied sea eagles, Singapore's largest raptors, to be entangled in fishing lines. Migratory birds of prey sometimes find our city skyline a challenge to navigate.



ABOVE: Black kite flies again

This migratory raptor arrived hunched with a bloody mouth, reluctant to move or fly. X-rays revealed multiple fractures. Bandages were applied to its wings to prevent movement and it was put on strict cage rest. It was then transferred to NParks' pre-release aviary where it could do longer flights regularly as part of stamina and strength training.



Over at the **Jurong Bird Park Wildlife Rehabilitation Centre**, some 400 rescued wild birds were admitted, and nearly half come in with various trauma-induced injuries, ranging from wounds to fractures.



CREATING HAVENS FOR NATIVE WILDLIFE

Our three wildlife parks in Mandai are located next to the Central Catchment Nature Reserve. When embarking on development work, we try our best to preserve trees of conservation value and at the same time create habitats for native wildlife by selecting suitable plant species as part of the landscaping. Water bodies are also enhanced to attract nature's own mosquito control brigade: frogs, dragonflies and damselflies. Since the initiation of the Pollinator Project in 2018 to enhance habitats for pollinators, native butterfly populations have gone up and we are now seeing species previously not recorded in our parks. Over the FY, the Project focused on stingless bees.



PHOTO: CHAM TUD YINN

STINGLESS BEE

New Hives For Stingless Bees

Bees are essential for the health of forests as many plants are dependent on their pollination services. Lesser known to most people are the stingless bees with greatly reduced stings that cannot pierce through human skin. Colonies of stingless bees have established their home in our parks and some guests are uncomfortable with their presence, even though they do not sting. To protect these bees and prevent human-bee conflict, our Invertebrate Care Team embarked on a plan to relocate the hives in high guest traffic areas. They studied hive activities to gain detailed knowledge of the biology of the bees.

In Sep 2020, the team successfully translocated the first batch of stingless bees to a permanent hive back-of-house. Stingless bees require nectar for energy, pollen for nutrition, water to cool their hive. They also need plant resin, twigs and sand particles for nest building. Creating a bee-friendly habitat around the hive was crucial to the success of the translocation.

LEFT: Busy bees

Stingless bees are one of the major pollinators of a wide array of plants. It has been estimated that a single species can collect floral rewards from up to 100 plant species annually!

RIGHT: Bee-friendly

This permanent hive was set up outside the Wildlife Healthcare and Research Centre to accommodate translocated bees. It is surrounded by 160 trees and shrubs of 10 species specially planted for the bees by the Horticulture team.



PROTECTING WILDLIFE BEYOND OUR SHORES

Southeast Asia's rich biodiversity is a double-edged sword that 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, we focus on:

- Safeguarding species and habitats by funding conservation projects
- Rescue, rehabilitation, and release of wildlife; translocations and repatriations; breeding and reintroductions to secured habitats
- Strategy planning and action for threatened species through global collaborations



SAVING THREATENED SOUTHEAST ASIAN SPECIES

Covid-19 has put tremendous pressure on our financial performance, but we are determined to stay true to our core mission of protecting wildlife. We continued to fund conservation efforts to save wildlife in the region. In the FY, we supported 45 projects and worked with partners, globally and on the ground, to safeguard biodiversity in the region (*see Annex for the full list*). Here we spotlight some of our priority species and the impact we have had. They include:

- Asian elephants
- Songbirds
- Turtles

“ The support from WRS was especially important for us, as our other source of funding was delayed due to cash flow problems. Support from WRS was used during a critical period of our project to keep important jobs. [...] [It] allowed us to keep these patrollers employed and patrol when conditions allowed.”

~ Roshan Guharajan,
Panthera Malaysia, Project Manager

ASIAN ELEPHANT

Safeguarding elephants

Asian elephant populations, especially those in Southeast Asia, have been spiralling downward. The challenge now is to protect these dwindling wild populations from ever-present threats of habitat loss, poaching and conflict with humans. We support conservationists at the forefront of these efforts across Indonesia, Malaysia and Cambodia.

CONSERVING ELEPHANTS IN MALAYSIA

In Malaysia, the expansion of agriculture has resulted in heightened human–elephant conflict, loss and fragmentation of elephant habitat, and greater accessibility for poachers.

Elephant conservation needs to be better incorporated into national development strategies, especially land use planning. The Management & Ecology of Malaysian Elephants (MEME) is a joint project between university researchers and government officers that aims to produce evidence-based knowledge on elephant ecology and to build a network of national experts for elephant conservation in Peninsular Malaysia. We have been working with MEME since 2012, funding various projects to study habitat utilisation, movement patterns and social behaviour of elephants.

The data gathered has helped map the distribution of elephants in human-occupied landscapes in

Peninsular Malaysia. Building on this knowledge, a pilot baseline study of an elephant population in Ulu Muda Forest Complex, Kedah is carried out. Research data collected will inform conservation efforts in enhancing connectivity of elephant habitats. If proven

successful, the study will be replicated in other sites all over Malaysia. Our contribution went directly toward salary for field and laboratory staff, sampling and laboratory costs, and sponsorship for conferences and presentations to extend MEME's outreach.



ABOVE: GPS coordinates of the elephant dung location are recorded.



1: The circumference of the dung is measured.
2: DNA extraction in progress in the laboratory.



© MEME/ALICIA SOLANA-MENA

Habitat Protection in Borneo

Located in the heart of Sabah, Deramakot Forest is part of the shrinking range of the Bornean elephant, the smallest of all elephants. Due to extensive habitat loss, many Bornean elephants now spend their time in plantations or moving through them to reach the next forest patch.

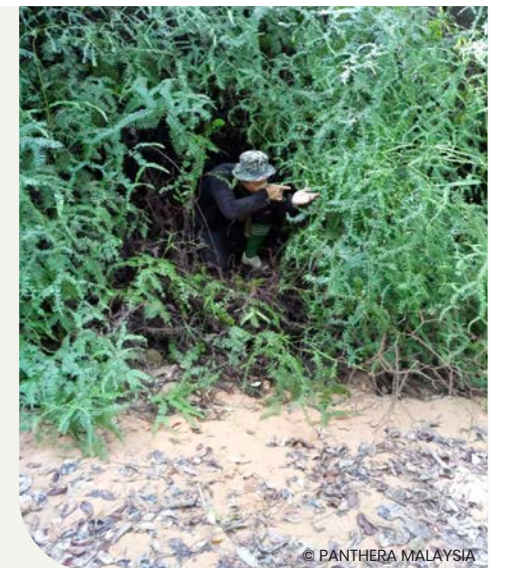
We funded Panthera in their work to form and train a group of Deramakot Forest Patrollers, supporting relevant government agencies in counter-poaching operations.

Working closely with the Sabah Forestry Department's Protect unit to collect intelligence on poachers, Panthera has also assisted the authorities in cases of elephant-related poaching and conflict management.

RIGHT: Panthera patrollers in Deramakot Forest together with the Sabah Forestry Department's Protect team before a forest patrol.



© PANTHERA MALAYSIA



© PANTHERA MALAYSIA

ABOVE: Ground hide, evidence of poaching activities, was discovered by a Panthera patroller. Our funding covers the salaries of three Panthera patrollers, ensuring presence on the ground to protect the Bornean elephants and the other animals in the habitat from poachers.

SAVING SUMATRAN ELEPHANTS

Sumatran elephants are critically endangered, threatened by deforestation, habitat loss and the illegal ivory trade. Their numbers have decimated to the point that they may become extinct in a matter of decades.

The depletion of resources in their natural habitat has caused elephants to wander beyond the forest and into human settlements. They help themselves to crops and occasionally damage property and endanger lives, inviting violent retaliation from locals.

Since 2009, we have been funding projects focused on mitigating human-elephant conflict in Sumatra's Way Kambas National Park. Here, Elephant Response Units (ERUs) use trained elephants from the park's Elephant Conservation Centre to patrol the forest, herding wild elephants away from farmland and back to the safety of protected areas. In addition, the ERU teams and trained community members patrol the area and keep vigil, even at night, to monitor elephant movements. This information is then collated into research data. The monitoring efforts also serve to deter illegal human activities in the park.

Over the last decade, occurrences of wild elephants reaching farmlands have been reduced by over 70% and loss of crops has reduced by more than 90%. Illegal activities within the park has fallen significantly in the areas with ERUs.



ABOVE 1: A trainer administers deworming medicine to an ERU elephant. The strong focus on the health and welfare of ERU elephants and the continued improvement in the knowledge and skills of their trainers serve to inspire good practice in elephant management in human care in Indonesia.

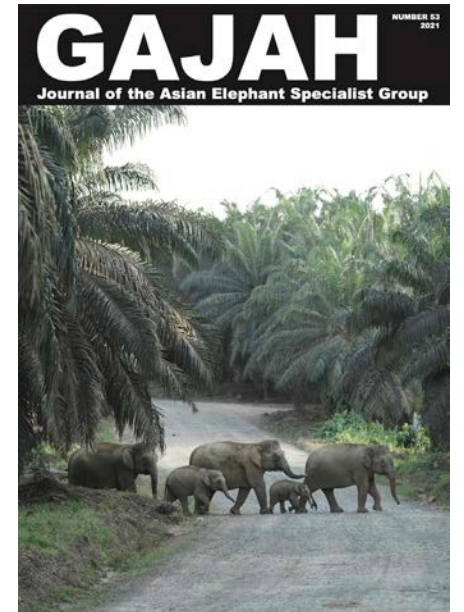
2: The ERU team conducts night-time crop guarding with the local community on the border of Way Kambas National Park. Supporting and training locals to conduct such guarding sessions empower them with a sense of ownership in dealing with conflict situations.

PROTECTING ELEPHANTS IN CAMBODIA

We have been supporting Wildlife Alliance (WA) in their work to protect the Cardamom Mountains since 2016. Home to Asian elephants, the Cardamoms are the best protected body of rainforest in Cambodia. WA has been very effective in deploying professional law enforcement rangers to counter poaching and other illegal activities. Since 2006, poaching of Asian elephants has been reduced to zero.

Our funding went towards comprehensive health and life insurance for 32 rangers from the Stung Proat and Sre Ambel stations. Besides new patrolling equipment to protect them from the challenging and dangerous conditions of the rainforest, we covered the purchase of digital cameras, GPS and handheld radios, crucial for reporting wildlife crime and building legal cases. We supported fees associated with judicial follow-up, including legal fees for filing of cases and prosecution support.

BELOW: A ranger with a confiscation of timber and handmade guns. In 2020, the rangers from 10 stations patrolled 193,651-km, seized 5,714 logs and 1,854 m³ of timber, destroyed 25,886 illegal hunting snares, rescued 562 live animals from illegal wildlife traders, and confiscated 1,720 chainsaws. The team worked with Judicial Police Officers to file 144 court cases against forest and wildlife criminals.



[Click to download the latest edition](#)

Publishing Gajah To Benefit Elephant Conservation

In comparison to African elephants, Asian elephants are poorly studied. The Gajah journal was started to provide the conservation community with insights into elephant conservation issues and to share learnings.

We first started funding the publication in 2008. Though available free for download, a significant portion of people who work with the Asian elephant in its range countries do not have good electronic access. Our contribution, specifically towards its printing and postage for those who require a hardcopy, allows them to benefit from this important journal.

SONGBIRD

Saving songbirds

Songbird-keeping is firmly entrenched in many Asian cultures. Increased wealth and the prestige of owning rare songbird species fuel demand, leading to population crashes of many once-abundant birds in a phenomenon known as the Asian Songbird Crisis.

The barriers to successful songbird conservation appeared insurmountable: a dearth of data on their status in the wild and in trade was compounded by weak legislation, lax enforcement, institutional and public indifference.

We tackle these head-on by leading collaborative action and doubling up on our support for an entire spectrum of work including trade monitoring, wildlife rescue and rehabilitation, genetic studies and breeding as well capacity building with our staff as advisors to teams on the ground.



[Click to read more](#)

Spearheading Action For Songbirds

In 2015, we hosted the inaugural Asian Songbird Crisis Summit at Jurong Bird Park, joining forces with TRAFFIC and Cikananga Wildlife Centre to convene over 35 experts in avian and wildlife-related fields. The goal: to identify severely threatened songbirds and prioritise actions to save them from extinction.

This unprecedented meeting led to the development of the much-needed Conservation Strategy for Southeast Asian Songbirds in Trade. Its implementation was discussed by some 60 experts at the second summit held in 2017, again hosted by us and co-organised with TRAFFIC. This was the start of a studied and coordinated multi-year approach to tackle the songbird crisis and we have not looked back since.

“ Swift action by the regional governments and conservation organisations is needed to save these beautiful songbirds from being silenced forever. ”

~ Dr Nigel Collar,
Leventis Fellow in conservation biology
with BirdLife International



BLACK-WINGED MYNA

Up to the early 1990s, black-winged mynas were still a common sight in Java and Bali. By 2007, populations had plummeted to the low hundreds as a result of its rising popularity in the bird trade.

Our contribution to saving the black-winged myna dates back to 2014 when we provided funding for Cikananga Conservation Breeding Centre (CCBC) to construct a new breeding facility block with security features to prevent recurring thefts of the mynas. Since then, we have continued to channel large amounts of financial assistance to cover husbandry, medical, wages and other administrative costs of the centre. As one of CCBC's four core partners, we work very closely with the team to build capacity and advise on husbandry and veterinary matters. We are the main funder for the medical team and clinic facilities, and have sent care packages of medicines and supplies to the centre.

BELOW: Partnering for the future of the mynas

CCBC's parent organisation, Yayasan Cikananga Konservasi Terpadu (YCKT) is now an official partner of Ciletuh-Pelabuhan Ratu UNESCO Global Geopark (CPUGGp). Its unusual topography, large variety of habitat types and small human presence relative to its size means it has high potential as a release site for the black-winged myna in the future. CCBC aims to identify suitable sites and work with local communities to maximise success of a reintroduction programme.

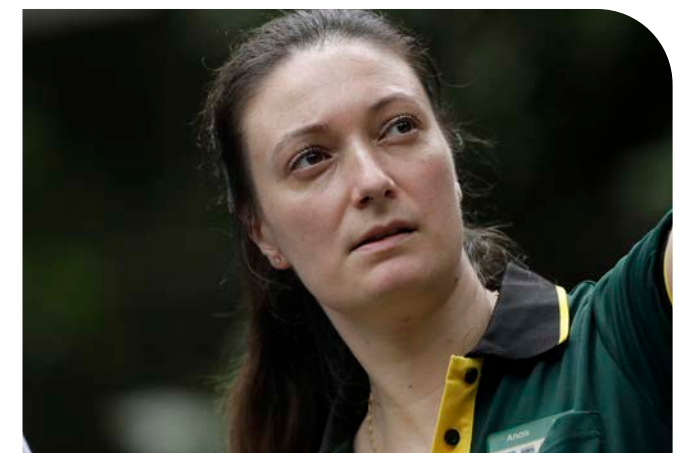


ABOVE: Precious new chicks

Breeding success at Cikananga Conservation Breeding Centre (CCBC) – the new chicks come from three pairs that were matched based on International Studbook recommendations. The objective is to get population numbers back to a healthy level so reintroduction efforts can be reinitiated.

BELOW: Staff Expert

Anais Tritto, Curator of Birds, Jurong Bird Park, is the species coordinator of the black-winged myna. She examines the genetic lineages of each individual in the populations under human care and plays 'matchmaker' to ensure the continuation of the healthiest bloodlines. This is to preserve genetic diversity for the future survival of the species.





© BEGAWAN FOUNDATION

“ I’ll like to see the Bali mynas flying around and especially when they come to my house! I don’t need to buy a bird myself to be put in a cage when I can see them fly. ”
~ Village resident,
Nyoman Sukadana

ABOVE & RIGHT: Resident sightings of Bali mynas. Released birds can be identified by their leg band.

BRINGING THE BALI MYNA BACK FROM THE BRINK
Found only in Bali, the silky white Bali myna became so coveted for its rarity that by 1990, rampant poaching had brought wild numbers down to just some 15 birds. Numbers hit an all-time low of 6 in 2001. Time and again, attempts to reverse its decline through reintroduction programmes were foiled by unfettered trapping. But with our support, conservationists have been able to persist in their vision of seeing flocks of this iconic bird fly free in Bali’s skies again.

Our involvement in saving the Bali myna from extinction spans over three decades, from 1989 to present. It began with caring for the Bali myna in Jurong Bird Park to subsequently partnering Begawan Foundation and expanding our conservation impact of the species in the wild.

We support Begawan Foundation by providing funding and expertise support for the following:

- Construction and maintenance of breeding facilities
- Costs of husbandry and veterinary care for the birds in the breeding centre
- Relocation of facilities from Siband to Payangan to centralise breeding efforts for better outcomes
- Breed and release efforts to repopulate the Bali myna
- Community outreach and education programmes
- Capacity building with our staff providing advice on husbandry practice and veterinary care



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ABOVE: Community release from a family compound.



© BEGAWAN FOUNDATION

ABOVE: Setting up a breeding pair in the community.

Here are some noteworthy project outcomes:

- Institution of a local law that prohibits trapping of Bali mynas and other protected wildlife. Offenders face stiff penalties including hefty fines.
- Breed and Release efforts through the “Madhusuara Breeders Association Melinggih Kelod”. The Association comprises several trained community breeders (village volunteers) who commit to breeding the Bali myna for release. 18 Bali myna chicks have successfully fledged under this community breeder programme. Villagers also participate in post release monitoring to evaluate success of the programme and to protect the released birds. Nest boxes were placed in a variety of locations to provide the released birds a conducive space to raise their chicks. Cameras installed in the nest boxes offer valuable insights into the breeding and nesting behaviour of the birds.
- Expansion of a 10-week education programme has reached out to over 2,000 students from six villages since it was started in 2015. Apart from generating awareness of ecosystem interdependence and wildlife conservation, the programme has also inspired high school students to volunteer and engage with younger children on protecting biodiversity.



© BEGAWAN FOUNDATION

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ABOVE 1: Nearly full-grown chick still begging to be fed

2: Gathering nesting material

BARUSAN SHAMA

Emergency rescue and breeding of the Barusan shama

The Barusan shama looks slightly different from the better known white-rumped shama. This species from the Barusan or West Sumatran island chain is recognised as one of the most threatened Asian songbirds. A recent range-wide inventory found only one surviving individual on Siberut island, foreshadowing its imminent extinction in the wild.

We responded to the urgent need to save the Barusan shama by supporting EcosystemImpact (EI) in establishing a songbird breeding facility and programme based on Simeulue Island.

With our support, EI has constructed eight CCTV-enhanced aviaries and acquired six breeding pairs. Funding also went to supporting staff and procuring food supplies. Barusan shamas are mainly insectivorous but with Simeulue island being such a remote location, the purchase of live insects is not possible. Part of our contribution went towards the setup of cockroach, grasshopper and maggot breeding stations to ensure a constant supply of food for the birds.

We conducted virtual training sessions for their staff. Our funds have also enabled the beginning of a training 'cadetship'; for participants from the surrounding community to be able to look after the birds.



© PLANET INDONESIA

SAVING SHAMAS AND OTHER SONGBIRDS OF SUMATRA

We support FLIGHT in their work to combat wildlife trafficking by mapping trade routes and gathering intelligence on illegal bird shipments. Our contribution went towards operational support for law enforcement – surveillance, investigations and confiscations; personnel as well as travel expenses. Over 42,000 Sumatran songbirds, including the white-rumped shama, were rescued in 62 confiscation cases during the FY. 10 smugglers have been arrested and sentenced, and many others involved in the trade have ceased operations.



© FLIGHT PROTECTING BIRDS



© ECOSYSTEMIMPACT FOUNDATION

ABOVE: The first chicks have fledged! The survival of Barusan shamas now rests firmly in the hands of conservation breeders and this young fledging represents hope for their continued survival.

WHITE-RUMPED SHAMA

Its extraordinary song has long made the white-rumped shama one of the most popular and prestigious songbirds in the trade. Relentless trapping wiped out the populations of this bird in western Indonesia. Populations in Sumatra and West Kalimantan have also plummeted.

Since 2016, we have been supporting Planet Indonesia in their work with local communities to protect the white rumped shama and other wildlife found in Gunung Niut Nature Reserve. Community-based patrols empowered the locals to act as forest guardians and support government efforts in preserving the protected area. Since then, land violations and hunting has significantly decreased.

ABOVE: SMART patrol members of the Tauk village recording an illegal logging activity inside Gunung Niut Nature Reserve. Over the course of the FY, community members from six villages completed 126 days of patrol across 723km of forests. They disarmed 98 traps, and provided up to 18 reports to the local government for their follow up. Our contribution goes directly to the implementation costs of the community SMART patrol teams.

BELOW: The near completed Clinic Building of Wak Gatak Songbird Rescue Centre. The first of its kind in Kalimantan, the Centre will provide much needed facility for the rehabilitation of confiscated songbirds before release or repatriation. We funded the construction of an aviary block and clinic sanitation system.



© PLANET INDONESIA

ABOVE: Songbirds crammed in a box enroute to Bakauheni seaport in South Lampung. Based on the information gathered on the activities of wildlife traders, many illegal bird shipments were stopped before they reached exit points at sea ports. Intervening before the birds get too far from their original habitat increases the chances of successful release back into the wild.

RESEARCH TO ADVOCATE FOR TIGHTENED TRADE OF SHAMAS

Though domestic trade is regulated in six out of its nine Southeast Asian range states, demand continues to put a heavy strain on the region's white-rumped shama populations. The lack of international regulation also allows for unsustainable trade in the species. We funded research by TRAFFIC to assess domestic and international trade dynamics using data gathered from seizure records, market surveys and online surveys. The resultant report was used to advocate for a CITES* Appendix II-listing for the white-rumped shama to protect the species through trade regulation.

* Convention on International Trade in Endangered Species of Wild Fauna and Flora

SOUTHERN RIVER TERRAPIN

The southern river terrapin is Cambodia's national reptile. In Cambodia, it is now only found in the Sre Ambel River system. Its population is perilously low because of hunting and incidental capture in fishing gear. Destruction of its nesting habitat through sand extraction is another threat.

Since 2012, we have been working in partnership with Wildlife Conservation Society (WCS) Cambodia and the Cambodia Fisheries Administration to bring this species back from the brink. Our contribution funds field monitoring and nest protection work; the construction of the Koh Kong Reptile Conservation Centre; education and outreach events; and the salaries of key personnel in the project.



©WCS CAMBODIA

ROTI SNAKE-NECKED TURTLE

The Roti snake-necked turtle may be extinct in the wild. Severely impacted by overharvesting and habitat destruction, this species has not been sighted on Roti Island since 2010.

The assurance colony we care for in Singapore Zoo is the only one for the species in Asia and it exists for exactly this eventuality. Since 2016, we have been working with Wildlife Conservation Society Indonesia on a plan to reintroduce the species on Roti Island. Over the years, our keepers and vets have visited the site to share best practices and medical protocols with the team. Our FY20/21 grant went towards continuing habitat protection, construction and maintenance of a turtle facility, remuneration of key personnel as well as other operations costs. Detailed plans made for repatriation of individuals from our assurance colony have been delayed due to the pandemic.



PHOTO: JOSE PEDRO

Rote Essential Ecosystem Area

The three candidate lakes for reintroduction (Lendoen, Ledulu and Peto) were granted an Essential Ecosystem Area protection status by the Government of East Nusa Tenggara province, based on their importance as habitat for the Roti Island snake-necked turtle.

“The establishment of the Rote Essential Ecosystem Area is an extremely important milestone for protecting the the habitat of the Roti snake-necked turtle and helps to ensure that this species will once again have a place to live freely in nature.”

~ **Cris Hagen,**
Director of Animal Management,
Turtle Survival Alliance

Protected By Papadak

The community of Daeurendale village, which covers Lendoen Lake, has agreed to inaugurate *papadak*, a local customary law. The law prohibits removal of turtles from the lake and requires that the lake be maintained in good condition.



Community Patrols

A community group 'Lutu Koko' was formed, including representatives from traditional and religious leaders, various government agencies, and the local army and police. The community is now being trained to conduct habitat protection patrols.



“We are very proud to get this great result [...] and we hope this species will survive for our next generation.”

~ **Mr Ouk Vibol,**
Director of Department of
Fisheries Conservation, Cambodia
Fisheries Administration

Bumper Year For The Royals

23 turtles hatched from nests that were discovered and protected during the breeding season. This is more than the total number hatched in the past 3 years combined. The nests were found on two beaches – one is used yearly by the turtles but the other had not been used as a nesting beach since 2007. That it is now being used again is a sign that efforts to patrol and protect habitats are paying off.

**A First In Cambodia:
Turtles Lay Eggs In Human Care**

Five females at Koh Kong Reptile Conservation Centre - Cambodia's only dedicated turtle conservation facility - had nested on an artificial sand bank specially constructed for the breeding season. It is the first time egg-laying has been observed under human care in Cambodia and this bodes well for a breed-and-release programme in the future.

Nearly 100 Back In The Wild

10 individuals were released in Jan 2021. The release ceremony was conducted with senior officers from Fisheries Administration and Department of Environment from Koh Kong and Sihanouk provinces, Provincial Departments of Mine and Energy, WCS staff, and a Buddhist monk, who blessed the turtles. A total of 96 turtles have been released to the wild since 2015.



©WCS CAMBODIA



©WCS CAMBODIA

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CONSERVATION LEADERSHIP AND PARTNERSHIP



The IUCN SSC Asian Species Action Partnership (ASAP) is a partnership platform which focuses on saving some of the most threatened species in Southeast Asia.

We have been hosting ASAP since 2016. We support its secretariat and contribute to other operational and manpower costs.

Our continued support has enabled ASAP to:

- Grow its network to over 170 Partners (almost a 100% increase over last FY).
- Launch its first small grant programme, aimed at conservation projects neglected by mainstream funders. Add a new Capacity Development Lead position to ramp up fund sourcing.



Hornbill Specialist Group



Helmeted Hornbill Working Group

We are the host institution of the Asian arm of the **Hornbill Specialist Group (HSG)** and we support its secretariat.

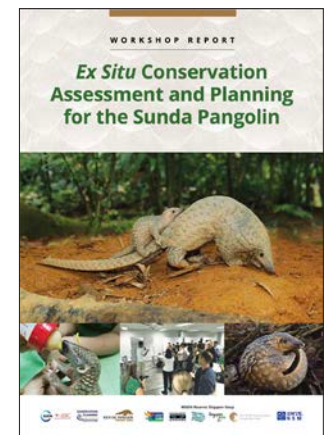
Our funds went towards maintaining operations, particularly in the communications arena. We also supported a trip to Bhutan by the Programme Officer to plan the organisation of the International Hornbill Conference in May 2022.

- The helmeted hornbill is critically endangered because poaching for its ivory casque. We contribute to protecting this species by committing the time of one senior staff member to take on the role of coordinator for the Helmeted Hornbill Working Group (HHWG) Conservation activities of this subgroup include a field survey, community engagement, prevention of poaching and reduction in demand for products made from the casque ivory.



The IUCN SSC Conservation Planning Specialist Group (CPSG) provides species conservation planning expertise to governments, zoos and other wildlife organisations. Regional Resource Centres (RRC) applies CPSG's tools and principles in local context to meet the unique conservation needs of a specific region or country. The Southeast Asia Regional Resource Centre (SEA RRC) is responsible for this role across 12 countries in the region. We support SEA RRC by committing the time of two senior staff members in conservation capacity building, which include:

- Publishing the report from the Regional Sunda Pangolin Ex-Situ Conservation Assessment and Planning Workshop 2019, which specifies priority actions to protect the Sunda pangolin.
- Facilitating a conservation planning workshop for the Cao Vit gibbon in March 2021.
- Developing a plan to manage Bornean elephants in Sabah, Malaysia under human care.



[Click to read](#)



We played an instrumental role in the formation of the **Asian Songbird Trade Specialist Group (ASTSG)**. Since its inception in 2017, the ASTSG has achieved significant milestones in understanding the Asian songbird trade, guiding related conservation efforts, informing national and international regulations, raising awareness and reducing demand.

Two of our staff members serve on the ASTSG Core Team and we also co-support the secretariat office.

This FY, we funded the salary of a Communications Officer, a newly created role to raise awareness and garner support for songbird conservation.



[Click here for details](#)

MANDAI NATURE

In Dec 2020, Temasek and Mandai Park Holdings jointly announced the establishment of Mandai Nature, a non-profit organisation and Institution of Public Character based in Singapore. Mandai Nature builds on WRS' species conservation efforts in Singapore and Southeast Asia over the last decade, with an expanded mandate to strengthen work for habitat protection, community engagement as well as drive nature-based solution projects to mitigate climate change in Singapore and Southeast Asia.

It continues the long-term support for local and regional conservation partners, with the objective of protecting threatened species from extinction, especially those endemic to Southeast Asia and often overlooked, as well as address issues of wildlife trade and habitat fragmentation.

Mandai Nature aims to be a catalyst for action on climate change, focusing on green and blue carbon including protecting and restoring tropical forests, mangroves and peatlands, while working closely with local communities and organisations to create economic opportunities and invest in building skills and conservation capacity on the ground.

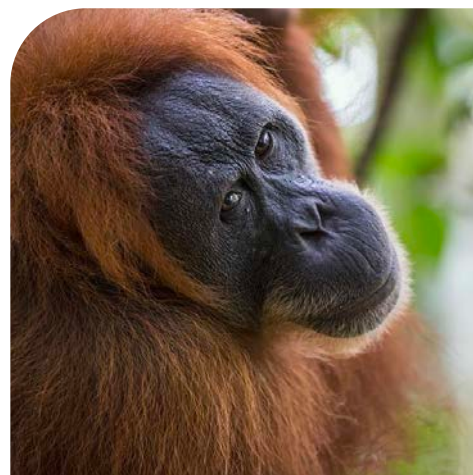
Ms Kavita Prakash-Mani has been appointed CEO of Mandai Nature to spearhead and deliver on its new strategic objectives. She reports to the Board of Mandai Nature, which is chaired by Mr Robin Hu, Head of International Policy and Governance Group in Temasek.

Mandai Nature will also host the IUCN SSC Asian Species Action Partnership (ASAP) secretariat as well as the Conservation Planning Specialist Group (CPSG) Southeast Asia Resource Centre, and continue to work in close partnership with the IUCN Species Survival Commission to avert species extinctions in the region.



© ZAHARIL DZUKAFLY

Mandai
N A T U R E



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ENVIRONMENTAL SUSTAINABILITY

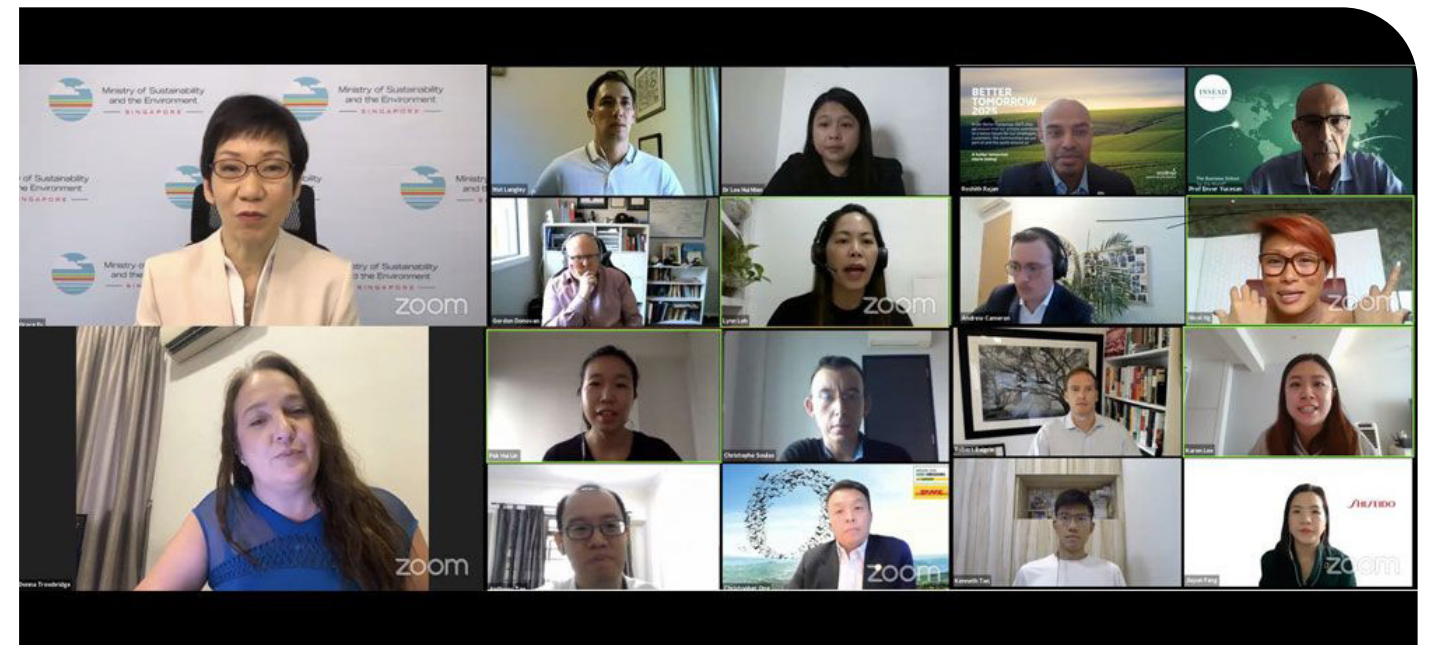
Besides working to protect biodiversity and enhance habitats for the long term, we also pushed forth initiatives to optimise resources and increase operational efficiencies so as to achieve our carbon neutral target by 2024. We adopt building design that integrates with the environment, with certifications like Green Mark (Super Low Energy) and Sustainable SITES underway. Through partnerships with like-minded organisations, we hope to inspire others to follow our lead by championing sustainability best practices beyond Mandai.

During the FY, we

- Awarded the tender for **solar panel** installation at Animal Quarantine Building, Multi-Storey Car Park, West Node and the new Bird Park
- Switched from printed to **digital park maps**, saving more than 149,000 park maps a month
- Developed detailed roadmaps for the procurement of **sustainable meat and wood pulp**

PARTNERSHIPS FOR A GREENER FUTURE

In November 2020, Dr Lee Hui Mien, Vice President, Sustainable Solutions, moderated a plenary session at the inaugural SG Sustainable Procurement Forum hosted by National Sustainable Procurement Roundtable (NSPR). Delivering relevant insights and practical ideas to procurement practitioners, the event aimed to inspire them to embrace green procurement and to help shape the supply chain towards this objective.



“ It was a great pleasure to be a panel moderator at this event which has been insightful and encouraging. Looking forward to these exciting opportunities translating into progress to the movement of sustainability in Singapore. ”

~ Dr Lee Hui Mien,
Vice President and Lead, Sustainable Solutions,
Mandai Park Holdings



JOURNEY TO CARBON NEUTRALITY

We continued to focus on lowering our energy consumption and sustainable sourcing to reduce the carbon generated in our supply chain, while tackling the problem of waste through thoughtful packaging, recycling, and upcycling. We are also looking to tap on renewable energy sources and carbon offsets offered by relevant field conservation projects. Our carbon inventory is monitored closely and reported quarterly. Total emissions during FY20/21 stands at 16,000 tonnes. (see Annex for details).

LOWER WATER AND ENERGY USAGE

Park-wide water and energy meters help us monitor usage. Besides leak detection and rectification, time-based operations and overflow sensors have also been instrumental in reducing water consumption. Plans are underway for the implementation of a backwash water recovery system for the manatee exhibit at River Safari. Infrastructural improvements have helped reap energy savings of 712,492 kWh/year – enough to power 165 four-room HDB flats annually. We also undertake energy projections and modelling for our future parks to optimise energy usage.

Solar And Other Alternatives

Plans to tap renewable solar energy are well underway with the tender award for solar panel installation in our new developments – Animal Quarantine Building, Multi-Storey Car Park, West Node and the new Bird Park. A study on solar-powered pumps for moats and streams in our existing parks is ongoing.

Electric Vehicles

In line with the government’s goal for 100% non-internal combustion engine vehicle ownership by 2040, we have installed 10 electric vehicle (EV) charging points in our multi-storey carpark – one of the largest numbers of EV lots in a single carpark in Singapore. Another 28 EV lots will be made available in the new Mandai development in East Node, and provisions for more in West Node are being planned.

SUSTAINABLE PROCUREMENT

Our robust sustainable procurement roadmap guides us to prioritise 21 product categories for sustainable sourcing, and to measure our progress against established targets. We have achieved 100% sustainable sourcing for palm oil, and seafood served at our F&B outlets while working hard on others including animal feed, soy, uniforms and IT.

Leading Plastic Action

We are one of 22 WWF-PACT (Plastic ACTION) Champions who set targets aimed at creating a circular economy for plastics. As part of our commitment under PACT to reduce 80% of unrecyclable single-use plastics by 2020, we have eliminated or replaced 80% of plastic items like food containers and cups used in our F&B front-of-house operations with reusables or alternative materials. Collectively with other PACT Champions, we saved 2.6 million straws, 1.7 million takeaway bags and 1.4 million water bottles in a year.

Introducing Green Product Lines

To encourage guests to make sustainable choices, we expanded our retail merchandise that meet sustainable standards to 28%. We also partnered WWF-Singapore to develop a range of certified sustainable merchandise. A part of the proceeds went to supporting conservation causes.

Greener Menus And Venues

Apart from serving sustainably-sourced seafood and using certified sustainable palm oil in our kitchens, we are also offering more plant-based menu options. As of end-FY, 80% of beef and 23% of chicken served and used in animal feed are sustainably sourced. Only reusable cutlery is used at our meeting venues to reduce the impact to the environment. Plans to offer sustainability-themed MICE or corporate events and customised tours are underway.



TOWARDS ZERO WASTE

In FY2020/21, we achieved a recycling rate of around 38% for our existing parks, exceeding our target of 35%. By facilitating the download of digital park maps, we saved more than 149,000 printed park maps a month.

Horticultural Waste

Horticultural waste is recycled into mulch for planter beds and substrate for animal bedding at some 30 back-of-house animal care areas. The use of natural substrate for animal bedding eliminates the need to hose down concrete flooring of these areas daily, resulting in water savings. Natural substrate also encourages the animals to explore their environment, improving animal welfare.

Food Waste

A project to assess the possibility and efficacy of using black soldier flies in managing carnivore, herbivore and animal food waste was concluded. The findings would inform the development of a sustainable and closed loop waste management system solution for both existing and upcoming wildlife parks.

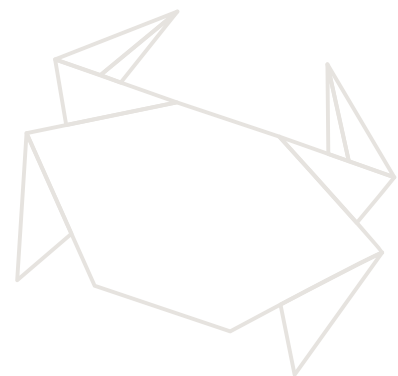


SPREADING THE MESSAGE

With the onset of Covid-19, we have had to reimagine how we engage with people on conservation education. Despite the restrictions, we have gained significant strides, with many great engagement efforts helping to raise awareness of our conservation efforts and world class standard care for our animals. We had to adapt quickly with the Circuit Breaker bringing all visits to a halt. By pivoting swiftly to develop online resources for parents and educators, virtual school programmes, teacher training, even bespoke programmes beyond our parks and indeed beyond our shores, we ensured our education mandate continued to flourish even as we navigate through these challenging times.

Over the FY, we

- Engaged over **120,000 students**, park guests and members of the public with conservation and sustainability messaging through virtual and blended programming
- Connected with **370 teachers** through virtual teachers' training
- Launched My Animal Buddy programme and garnered over **25,000 subscribers**
- Had **191 volunteers** contribute 3,749 hours to connect our guests to nature and wildlife



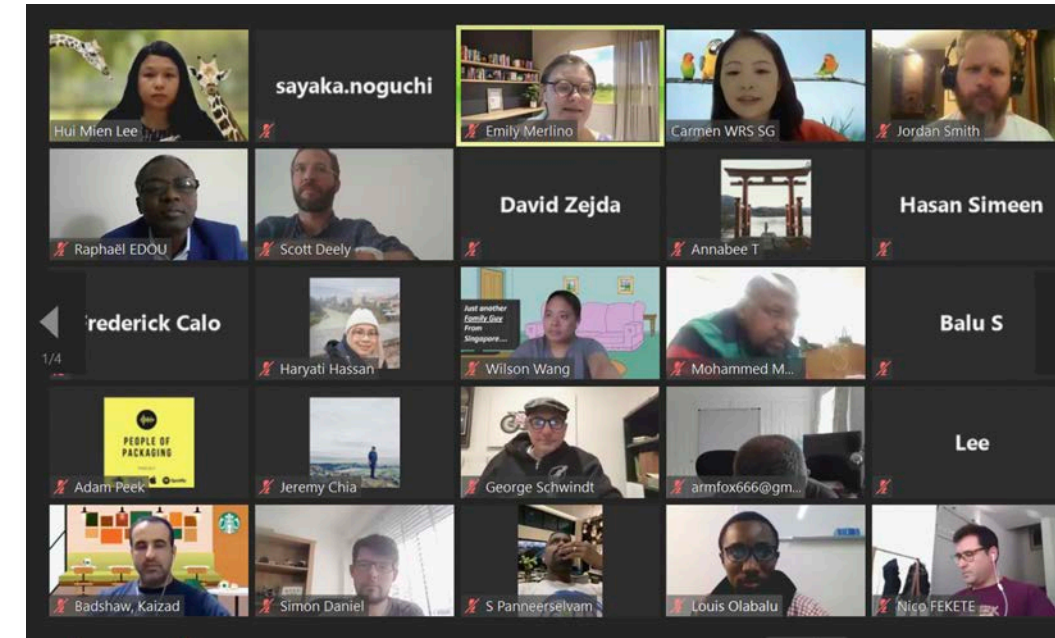
INSTILLING A LOVE FOR WILDLIFE

LEARNING GONE VIRTUAL

Virtual and Blended Programmes

For the most part of the year, school groups were unable to visit us because of Covid-19 restrictions but learning continued as we brought virtual wildlife experiences into the classrooms. Through animal ambassadors and unique stories, Virtual Programmes From The Wild are curated to facilitate 'See, Think, Wonder' thinking routine and hone problem-solving skills. These programmes received tremendous response with close to 9,000 student participants.

In Jan 2021, we were finally able to welcome schools back to our parks. We had to redesign our activities to adhere to Safe Management Measures, and launched blended programme offerings, with 'Day Camps' that comprise a virtual programme in the morning and an on-site, curated programme in the afternoon.



Sharing Sustainability Solutions

Beyond wildlife-centric programmes, we expanded our virtual offerings to feature sustainability solutions. The Sustainable Solutions Team shared our journey in embracing sustainability best practices and engaged members of The Executive Centre and postgraduate students of the US-based Quantic School of Business & Technology. We hope to inspire the audiences - all movers and shakers in their own industries - to undertake similar initiatives.

Virtual Camp For Children In China

We partnered with Singapore Tourism Board, MaFengWo (Chinese equivalent of TripAdvisor) and QiXing (a major Chinese EdTech platform) to provide online education content to Chinese families with young children. Specially curated with learning outcomes that resonate with the China market, the three episodes have attracted around 225,000 views.



BRINGING THE ZOO TO YOU

#TheGreatIndoorsWRS

During the Circuit Breaker period, we stayed in touch with our community with content tagged #TheGreatIndoorsWRS.

'A Day In The Life' & Keeper Takeovers

Though our parks had to remain shuttered during the Circuit Breaker, essential services teams continued to beaver behind the scenes. The 'Day in The Life' series featured exciting vlogs of the on-ground team that took viewers through a typical day in their work.

Our Animal Care Team also took over the WRS Instagram page with fun and informative Instagram stories. Feedback on these posts were very positive as members of the public welcomed our uplifting stories as a refreshing change from the gloomy news of the Covid-19 pandemic.



A Day in the Life of A Zookeeper | #TheGreatIndoorsWRS

Animals We Love

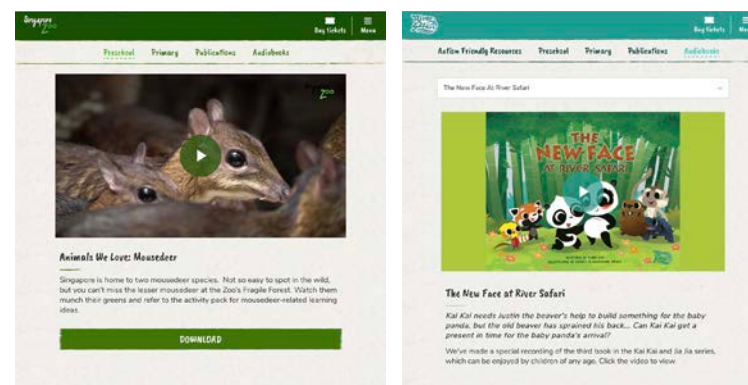
The Animals We Love series provided parents and children at home with invaluable online educational resources. They featured STEAM-centric activities that encouraged the practice of the 'See, Think, Wonder' thinking routine as well as teamwork. We also converted some of our hardcopy publications into an online format and made special audio recordings of a set of storybooks on native wildlife and on our beloved giant pandas Kai Kai and Jia Jia.



On the Red Dot: Inside the Zoo

The 4-part documentary series highlights the valuable work of the Animal Care Team and the challenges faced in operating a "good zoo".

Various staff featured in the documentary series were also interviewed on CNA938 to share about their work with the organisation. This provided us the opportunity to further extend our messaging on how we provide world-class care for our animals.



My Animal Buddy (MAB)

MAB is a free-to-subscribe programme that provides a platform for children to befriend our animals and explore our parks virtually through digital content. By forging these personal connections, the programme hopes to inspire the younger generation to take action to protect wildlife. With over 25,000 subscribers, MAB has reached approximately 10% of our local families with young kids.



ABOVE: MAB Launch

Mr Tan Chuan-Jin, Deputy Chairman of Mandai Park Holdings, chats with guests at the launch event on 8 Oct 2020. MAB allows children to befriend and virtually connect with Animal Buddies like Bornean orangutan Khansa, who was unveiled as a new Buddy at the launch.

Mandai x Shangri-La Collaboration

This bespoke programme was offered to families who purchased a hotel stay bundled with WRS park tickets. The staycation experience was unlocked when they joined Ranger Ooz on a Nocturnal Edu-venture to discover how creatures of the night use their senses to thrive in the dark. The children were also invited to befriend an Animal Buddy and connect with it remotely via live cam. Additionally, they could tune in to the hotel's in-room channel to take part in activities curated by My Animal Buddy host. The itinerary included a private guided tour of the Zoo. Finally, the children took home a customised Play Kit to continue their fun learning beyond their staycation.

“ Thank you so much for creating this interactive application so I may share with my kids more close-up animal interaction that we may not have even be able to do so when visiting the zoo.

Ingenious idea, creativity and innovation. Kudos to all and thank you once again for the hard work coming out with the resources.

*~ Ms Katherine Ho
Parent of an MAB subscriber*



ABOVE: Bringing our parks into the home of every child

MAB allows children to to enjoy and explore our wildlife parks from home. They can watch their animal buddies going about their daily activities on live cams and celebrate their buddies' birthdays in virtual parties. Live shows, live chats with keepers and early childhood specialists are also available to deepen engagement with the children.

LOVING OUR LOCALS

Wilderful Singaporeans

Tying in with our nation's birthday in August, we celebrated native wildlife with a range of virtual and in-park engagements. The WILDerful Singaporeans Explorer Trail at Singapore Zoo attracted slightly over 4,700 participants while the MAB Junior Ranger Mission online game attracted 510 participants. An exclusive virtual session was offered as a gesture of appreciation to Wildlife Partners who supported our micro sponsorship and Adopt An Animal programmes. A five-episode series themed WILDerful Singaporeans was also rolled as part of MAB offerings. Through the activities, participants learnt about the adaptations of uniquely Singaporean wildlife and how we can be good neighbours to them.

“ I just wanted to express how impressed I was by the premiere of 'Wondering about WILDerful Singaporeans' virtual session [...] Really kudos to the team for taking these engagements online and reinventing the zoo and the engagement. That is fantastic. ”

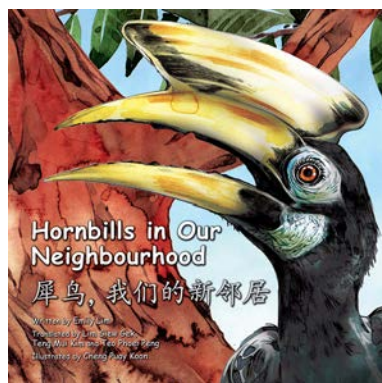
~ Jeshier Loi
Wildlife Partner



Hornbills In Our Neighbourhood

This bilingual storybook was published with support from the Lee Kuan Yew Fund for Bilingualism and distributed to all preschools in Singapore. It is the fifth in a series of storybooks that aim to increase awareness of and build affinity for native wildlife while imparting knowledge on conservation and sustainability issues.

In conjunction with the release of the storybook 'Hornbills in our Neighbourhood', we made available a live virtual show on native hornbills to preschools. Over 10,000 children from some 230 preschools tuned in to 'MAB Goes To School' LIVE! Show to learn about Sally the Oriental pied hornbill. They could also befriend Sally as their Animal Buddy and continue the learning at home.



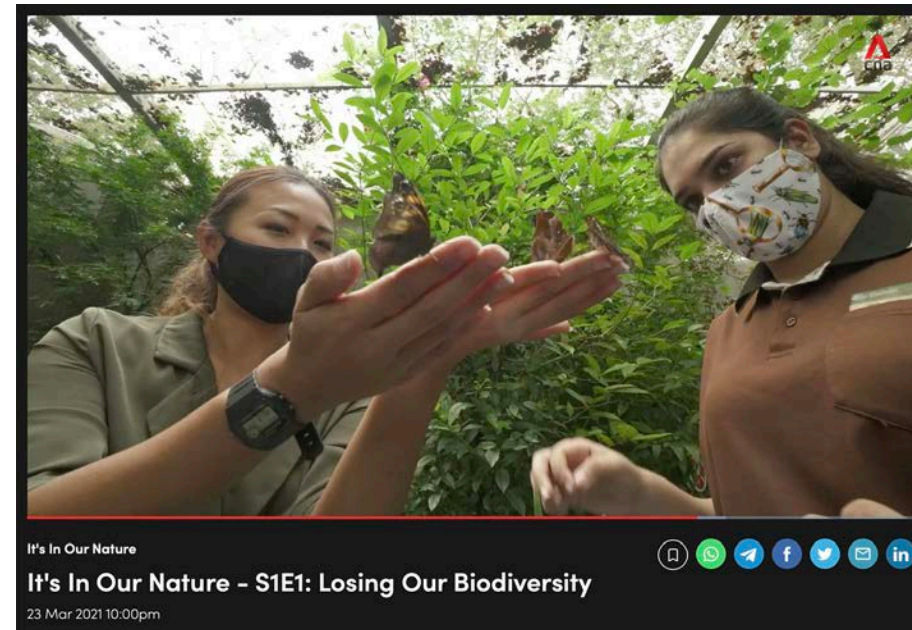
Taking Sally To The Heartlands

We took MAB to various CapitalLand malls, driving awareness at more than 80 touchpoints across five malls. Families could befriend a virtual version of Sally the Oriental pied hornbill and set off on a trail adventure in the malls to find her animal friends.



“ The children were excited to view the videos on Sally instead of imagining how the hornbill looks like with reference to the puppet. ”

~ Devaki
M.Y World @ Canberra

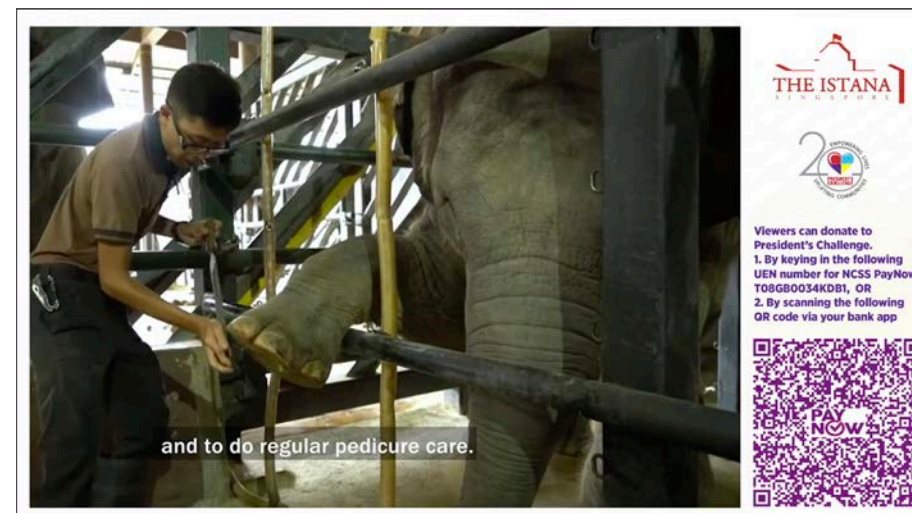


It's In Our Nature

This documentary by Channel News Asia (CNA) explores why nature and wildlife matter to Singapore. The programme showcased the work of our Veterinary Team and Animal Care colleagues, Delvin and Manoj, who inspired the audience through their passion for invertebrates, and in protecting the critically endangered straw-headed bulbul.

Istana Virtual Open House

We were honoured to be the only nature-related organisation invited to participate in Istana's first Virtual Deepavali Istana Open House, hosted on President Halimah Yacob's Facebook. We shared a video highlighting our efforts to provide world-class care for the animals. The video has been viewed more than 19,000 times, and garnered encouraging response.



ADVOCATING FOR MORE SUSTAINABLE CHOICES

Contributed Case Study To WAZA Forestry Guide

The guide seeks to help members support the World Association of Zoos and Aquariums (WAZA) / Forest Stewardship Council (FSC) Memorandum of Understanding (MoU) regarding sourcing paper and wooden products. We contributed a case study to share about our journey and plans towards achieving 100% sustainable paper and timber sourcing by 2025.



Click to read more

COLLABORATING IN ENVIRONMENTAL EDUCATION

TEACHERS' TRAINING WORKSHOPS



LEFT: Smaller group sizes, immersive videos, breakout rooms and other modalities of learning including alphabet yoga and live polls were some of the ingredients that made our virtual IGP training sessions a rousing success.

“ I'm very impressed with how the Zoo team managed to condense all their information to online learning and I would like to say thank you! ”
~ IGP training participant



Inspiring discovery in the preschool classroom
The Innovation Guidance Project (IGP) is an initiative by the Early Childhood Development Agency (ECDA) to foster a culture of innovation, collaboration and reflective teaching practice.

WRS supports IGP as a long time community partner. This FY, the IGP teacher training sessions coincided with the Circuit Breaker period and we had to pivot to virtual sessions. The feedback was extremely encouraging – over 95% of the 100 participants found the e-training effective and boosted their confidence in planning meaningful learning activities.

Post-IGP training, the teachers applied the strategy and techniques they learned to create innovative learning activities for their students in the classrooms as they could not visit our parks. We are heartened to have empowered preschool educators to come up with such innovative ways to spark their students' curiosity in the world around them.

ABOVE: This young artist did not just learn about orangutans: the IGP experience also led to an opportunity for her to contribute to society. The cushion cover she painted was one of the items put up for auction at a fundraising event organised by her school.

ABOVE: A teacher recounts the activities implemented at the centre post-IGP training – besides constructing their own giraffes, the children also had fun 'visiting' them on a make-belief trip to the Zoo around their centre compound.

WRS x PCF

A bespoke training programme 'Creative Facilitation of Outdoor Learning for Preschoolers' was specially designed for the PAP Community Foundation (PCF). The programme utilises a unique 'Minds-on, Hands-on, Hearts-on' approach to help centre leaders and their teachers incorporate outdoor learning, conservation, sustainability and literacy elements as part of their school curriculum. 870 educators are enrolled and as of end-FY, 270 teachers have been trained.



MOTHER TONGUE LANGUAGES SYMPOSIUM (MTLS)

This annual event aims to strengthen the nexus between families, schools and community to promote the learning of mother tongue languages. We have been a part of this supportive ecosystem since 2016. Due to the COVID-19 situation, the event was moved online. We created an 'Animal Wonderland' for our first online exhibition, with featured animals, a virtual workshop, e-resources and trails that MTL educators and parents could use to complement home-based learning.



ABOVE: Mr Haniman Boniran, Manager (Education), shares insights on creative ways to inspire children to learn the Malay language during the 9th MTLS held online on 29 Aug 2020.

ENGAGING VOLUNTEERS

NATIVE WILDLIFE GUIDING

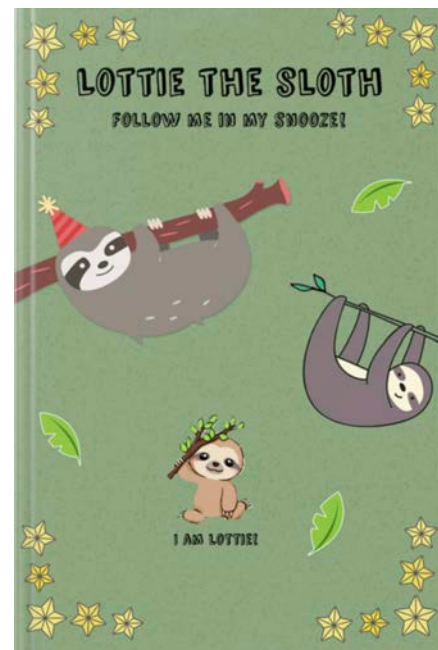
Wild macaques in our parks have learnt to associate humans with sustenance, which leads to conflict when they approach guests in search of food. The native wildlife guiding programme was developed to train volunteers to engage with our guests on the importance of co-existing with local wildlife, especially macaques. Since the launch of the initiative in Dec 2020, we have seen 44 Wildlife Ranger Volunteers come on board.



ABOVE: **Sharing the space with native wildlife:** WRS Docent Ms Sharon Gray (right, in blue) uses a stick to put distance between herself and a macaque while guiding it away from an area with heavy human traffic. Conservation & Research Officer Ms Cheo Zi Han looks on, ready to lend a hand if necessary. Volunteers are trained by staff to mitigate human-wildlife conflict situations.

VIRTUAL WILDLIFE BUDDY

In place of the Wildlife Buddy programme held in-park during pre-Covid times, a virtual version of the programme was launched to encourage students to continue volunteering virtually. As part of the programme, students are given a resource kit containing various assets to help them get started on creating their own e-book, inspired by our park animals. By collaborating with their teammates on this project, students hone their storytelling and digital literacy skills while helping to spread awareness of the animals they write about.



Click to access 'Lottie The Sloth' and other books created by our Wildlife Buddies

ONLINE VOLUNTEER APPRECIATION

On 21 November 2020, we gathered, virtually for the first time, to show our appreciation for our volunteers. We took the chance to acknowledge the invaluable contribution of four Docents who have been with us for 20 years! They are Ms Dawn Goh, Mr Edwin Lim, Mr Desmond Koh and Mr Johnson Long – our heartfelt appreciation to them for their dedication and commitment. We would like to thank all our volunteers for their generosity and deep sense of commitment in helping us connect people to wildlife.



- 1: DAWN GOH, African Adventure
- 2: DESMOND KOH, Night Safari
- 3: EDWIN LIM, African Adventure
- 4: JOHNSON LONG, Primarily Primates



Building a People-focused Culture

With the onset of the pandemic, we made it our top priority to protect jobs. This went hand-in-hand with efforts to listen to staff concerns and to protect those who were more vulnerable. Despite mounting challenges, we continued to upskill and reskill our workforce to get them future-ready while deepening engagement with those in our community from disadvantaged backgrounds.

FY20/21 HIGHLIGHTS

99% of staff members completed at least three learning activities, up from 88% in the previous FY

Inaugural cohort of **Life Sciences Associates (LSA)** graduated after 2-year programme

Participated in the **HR Technology Transformation Programme (HRTTP)** organised by Workforce Singapore (WSG)

Set up **MandaiCares Hardship Fund** to assist colleagues in need

Engaged **2,333** beneficiaries from various social service agencies through complementary park admission, and in-park and virtual programming.

STAYING AGILE, BUILDING RESILIENCE

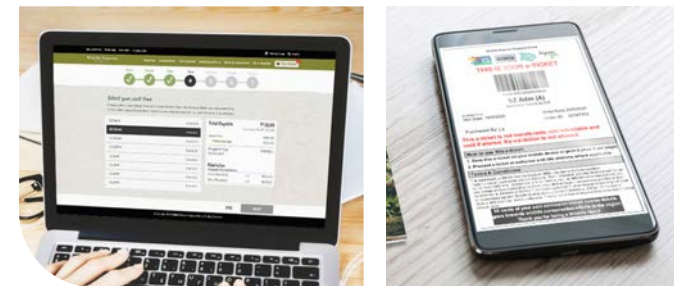
This FY, we faced unprecedented challenges brought about by the ever-evolving Covid-19 situation. Our team rose to the occasion by staying nimble and pushing the boundaries to continue to deliver exceptional wildlife experiences to our guests and provide world-class animal care. Through adversity, we experienced the resilience of our people and our tenacity to achieve.



GOING ONLINE

The Circuit Breaker triggered the historical closure of our parks for three months, beginning 7 April 2020. Staff on non-essential teams had to plug in from their home and adapt almost overnight to new working methods and platforms. With the Covid-19 situation showing no sign of abating anytime, working from home (WFH) for staff on non-essential teams is here to stay for the foreseeable future, and this means having to reimagine new approaches to connect with and motivate each and every staff member.

When we were able to welcome our guests back to the parks after the Circuit Breaker, we had to pivot to time-based admission to manage the reduced capacity. With a tremendous amount of work and superb teamwork, we put in place a robust system within an extremely tight timeline to process the volume of online bookings. For a long time, we have been encouraging guests to embrace online booking to reduce queuing time, but without great success. The Covid-19 situation changed guest behaviour and the new norm offered us the opportunity to leverage on digitalised processes for an improved guest experience. It also stands us in good stead when the new parks open with increased attendance and offerings.



MOVEMENT CONTROL ORDER (MCO)

More than 10% of our workforce commuted daily between Malaysia and Singapore. The implementation of Malaysia's MCO in mid March 2020 meant that they had to make a quick decision, whether to remain in Singapore to work, or to return home till the MCO was lifted. Those who chose to stay on for work had 24 hours to bid farewell to their loved ones, gather their belongings and return.

The HR Team worked through the night to arrange for temporary accommodations for these colleagues, cleaning and prepping the staff quarters and also preparing basic amenity packs. Staff from other departments pitched in as well.

STAFF DEPLOYMENT

During the Circuit Breaker, staff members in F&B, Retail and Park Operations who make up around 30% of our workforce, were deployed to other sectors and government agency on a temporary term basis.

Essential staff beavered away back in Mandai to provide the best of care for our animals and to keep our park infrastructure functional and safe, Staff on non-essential teams were rotated to essential teams on a voluntary basis to ease the manpower crunch caused by the MCO and split-team schedules. Apart from lending a helping hand to their colleagues, rotated staff also picked up new skills.

Due to the need to adhere to Safe Management Measures, we have not been able to resume some services like boat rides. Our boat captains have been successfully redeployed in other operational positions. As the situation evolved, our F&B colleagues responded swiftly to adapt to the ever-changing dine-in restrictions. F&B crew have been rotated to assist at other departments.

In the fight against the Covid-19 situation, we have stood in solidarity with the nation. To help combat the mounting spread of the virus among migrant workers, a group of staff volunteered to assist with the national effort to construct and equip several Community Care/Recovery Facilities across Singapore.



MANDAICARES HARDSHIP FUND

In a heart-warming moment, one of our staff stepped forth to contribute part of his salary to help colleagues who needed it more. This led to the establishment of the MandaiCares Hardship Fund. Made up entirely of staff and board member donations, the fund was set up to support our colleagues facing financial difficulties. Three senior management team members were appointed to the Grant Management Committee supported by HR.



TOOLS FOR INNOVATION

Though all in-person training courses had to be put on hold in the months of park closure, the Strategy and Innovation Team pivoted quickly to push out the Innovation Tools Workshop virtually. Facilitated in English and Mandarin, the training focused on Design Thinking. By getting our colleagues to look at a park-specific challenge, they were taught to turn user-centric insights into solutions that uplift guest experience. Nearly 100% of some 90 attendees reported being excited and motivated to contribute fresh ideas to their departments after the training.

UPSKILLING FOR THE NEW NORM

To better equip staff for new realities ahead, we also leveraged on NTUC LearningHub to offer around 350 training seats to more than 100 facilitated online courses on topics ranging from working remotely and effectively using video conferencing technology to stress management. The HR Team worked closely with our colleagues to curate learning modules relevant to their areas of work and responsibility. Some 200 staff also tapped on the myGo! e-learning platform, where they could choose bite-sized modules and complete their learning at their own pace. These new learning and engagement opportunities kept staff connected while learning new skills.

TRAINING AND DEVELOPMENT

Over the course of the FY, 99% of our staff took part in at least three learning activities, a marked increase from 88% in the previous FY. To better equip coaches for the Zookeepers Development Framework (ZDP) and the Animal Presenters Development Framework (APDP), a new On-the-Job Coaching Programme was launched. We also remained committed to staff development through the Continuing Education Scheme (CES) and approved nine applications for studies ranging from specialist diplomas to degree programmes.

LIFE SCIENCES ASSOCIATE PROGRAMME (LSAP)

The LSAP is designed to identify young, promising staff members who are passionate to pursue a career in Life Sciences. Through a stringent selection process, six staff members were placed on the programme. To allow them to appreciate varied job challenges, the two-year programme involved rotations to different Life Sciences departments including Animal Presentation, Conservation, Research and Vets, Education and Zoology. With each rotation, the Associates were required to work on projects relating to various challenges faced by the respective department. The inaugural cohort graduated in Sep 2020.



ABOVE: Our inaugural batch of Life Sciences Associates.
Back row (from left): Mr Ade Kurniawan, Ms Delvinder Kaur, Mr Stefan Ng
Front row (from left): Mr Abdussalam Marikan, Ms Claudia Tay, Ms Kelly Chew



SUSTAINABILITY TRAINING

Following organisation-wide sustainability workshops, working groups were set up to lead cross-functional operations and advocacy efforts. An overarching framework for conservation and sustainability advocacy was developed to drive increased staff awareness on issues like deforestation, plastic pollution and overfishing. A survey on staff attitudes towards conservation and sustainability has been completed. The insights gained will inform upcoming engagements to effect behaviour change among internal stakeholders.

COLLABORATIONS FOR A FUTURE-READY WORKFORCE

HR Technology Transformation Programme (HRTTP)

As part of this programme by Workforce Singapore (WSG), a process mapping of a core HR process was conducted to identify opportunities where Robotic Process Automation (RPA) technology may be applied. This sets the stage for adopting technology (including the use of Chatbot) to drive productivity and create higher value-added jobs for our staff.

In tandem with HRTTP, two HR team members, Chiew Bee Lian and Kelly Lim, participated in a Digital Operations Job Redesign Reskilling Professional Conversion Programme. The programme aims to help employees to futureproof their careers and uplift digital ops capabilities. These two team members will form a core team within HR to leverage on RPA and Chatbot technology to improve processes and drive productivity.

SGUnited Traineeships

The SGUnited Traineeships Programme, also under WSG, aims to support recent graduates to develop professional skills despite the current economic climate. We had three SGUnited trainees join us during the FY. We hope the experience has given them good exposure to the industry.

Internship Programmes

Undaunted by the Covid-19 constraints, we continued our engagement with Institutes of Higher Learning (IHL) through internship programmes. We welcomed 65 interns who were deployed in various departments across our organisation.

It's no more a slog with robotic process automation

A training course last year helped senior payroll executive Kelly Lim transform a tedious manual task into one that can be done in seconds thanks to technology.

The old way was a slog: Ms Lim had to log on to Wildlife Reserves Singapore's (WRS) internal system to search for an employee's birth date, use an application to encrypt the file and then e-mail the document to the person.

That all ended after she attended a four-month course in robotic process automation last October under a career conversion programme by Workforce Singapore.

"It can streamline our processes and free up time so we can look at how other processes can be improved and automated," said Ms Lim.

"Robotic process automation is also quite accurate. It will not make mistakes. So it really improved our efficiency."

She joined WRS in 2009 and now oversees the payroll spectrum and approves, checks and supports compensation modules, among other duties.

WRS assistant human resource manager Chiew Bee Lian, 34, who attended the same course, applied the knowledge in the dissemination of holiday e-mail.

Instead of manually personalising and sending e-mails to employees, she used robotic process automation to automate the work.

"The robot will retrieve information before sending out the e-mail. The recipient will get a personalised e-mail."

"It's not just about saving time but also doing more to engage our staff. Before using this automation, it was really unproductive to send a personalised e-mail."

Ms Chiew Bee Lian (left) and Ms Kelly Lim, who both work at Wildlife Reserves Singapore, attended a course in robotic process automation last October under a career conversion programme by Workforce Singapore. PHOTO: LIAM KEE ZHANG

They said they had no prior background in coding and were nervous about undertaking the course but help from the trainer and use of Google search made it relatively easy to pick up the skills.

"If someone is thinking of taking up such a course, I would tell them it is fun and quite rewarding. You don't need to have a background in coding," said Ms Chiew.

The course also taught them to train a chatbot that can answer questions related to staff overtime claims and more. For example, it can provide formulas for employees to calculate their overtime compensation.

"We also learnt how to make the chatbot sound more cheerful and human-like, to entice staff to use it," Ms Lim said, adding that the chatbot will be launched for WRS use next year.

Ms Chiew noted: "We are desk-bound staff and we have administrative work to do. Some of the work is repetitive and manual, so these automative processing skills will come in handy."

Ms Lim and Ms Chiew are now part of a WRS human resource team examining various work processes to devise digital solutions to streamline them.

Jane Ang

IMPROVING EFFICIENCY

The robot will retrieve information before sending out the e-mail. The recipient will get a personalised e-mail. It's not just about saving time but also doing more to engage our staff. Before using this automation, it was really unproductive to send a personalised e-mail.

MS CHIEW BEE LIAN, assistant human resource manager at Wildlife Reserves Singapore.

INSTITUTE OF HIGHER LEARNING	NUMBER OF INTERNS
<ul style="list-style-type: none"> INSTITUTE OF TECHNICAL EDUCATION (ITE) College Central, College West 	13
<ul style="list-style-type: none"> POLYTECHNIC Nanyang Polytechnic, Republic Polytechnic, Temasek Polytechnic 	37
<ul style="list-style-type: none"> UNIVERSITY Imperial College London, Nanyang Technological University, National University of Singapore, Singapore Management University 	15

SOCIAL SUSTAINABILITY

To ensure that our parks remain accessible to every segment of our community, we work closely with Social Service Agencies (SSAs) to reach out to 2,333 beneficiaries by offering them complimentary admission to our parks or virtual programme ‘Hello From The Wild Side’. In addition, we continued to curate meaningful wildlife experiences tailored to specific groups with special needs.

WILD ADVENTURES WITH SALVATION ARMY

Co-created with the Salvation Army to bring families affected by incarceration on outings to our parks, ‘Wild Adventures’ is into its third year. Despite Covid-19 restrictions, the Education Team managed to organise three events during the reporting period, and delivered memorable virtual and in-park engagements to promote family bonding.

Virtual Family Day

In the first-ever family day held virtually, the families learnt about the archerfish through a game using household items, about otters and their holts by using loose parts from their house to create a shelter. They also learnt about the capybara from our Animal Care Team and staged a ‘Capybara Cookoff’ by sharing their own family recipes.



In-Person And Blended Experiences

In Dec 2020, the families finally had the chance to visit Singapore Zoo in-person and participate in Disney Explorer in-park activities. The final engagement for the reporting period brought the families to Jurong Bird Park for a Birthday Bonanza in celebration of the park's 50th anniversary as well as the birthday of Sally the Oriental pied hornbill. The team explored a blended version this time, providing a virtual experience to create a sense of anticipation prior to the park visit.



AUTISM AWARENESS WEEKEND

To mark World Autism Month, the second Autism Awareness Weekend was held at River Safari on 4 & 5 Apr 2020. The park was opened an hour earlier at 9am, allowing participating families to enjoy quiet moments and bonding time. Besides specially designed activities, a calming room was also made available for children who need a break from sensory overload. Autism-friendly resources like social script and sensory map were shared with families to help them plan for a stress-free experience in River Safari.





Sustaining our Business Performance

To do good, we need to do well. To provide the best possible care for our animals, support field conservation work and offer innovative, immersive experiences that inspire people to take actions to protect wildlife, we are constantly seeking to grow and diversify revenue streams. With the Covid-19 situation, tourism has all but dried up and we have to stay nimble in reinventing our business model to thrive in the new norm.

FY20/21 HIGHLIGHTS

Paradigm shift to **digital guests**: with successful pivot to virtual offerings, the world is now our oyster

Micro sponsorship and **Adopt-An-Animal programme** made it accessible for the community to support us

WRS captured about **18%** of SingapoRediscover Vouchers (SRVs) expenditure at local attractions

Singapore Zoo topped the **Customer Satisfaction Index (CSISG) 2020**

Established **Mandai Global**, our commercial accelerator to drive new lines of business anchored in creating positive outcomes for nature and wildlife.

BEST CUSTOMER SATISFACTION SCORE



Singapore Zoo topped the Customer Satisfaction Index (CSiSG) 2020 for attractions at 78.9 points with Jurong Bird Park, Night Safari and River Safari scoring an average of 77.7 points (higher than the national average score of 76.1% for attractions). Due to the lack of overseas tourists, the CSiSG index was calculated by interviewing locals. We are deeply honoured by Singaporeans' affirmation of our unrelenting efforts to provide outstanding guest experience.



WILDLIFE EXPERIENCES REIMAGINED

Our goal is to connect guests to nature through immersive experiences, and empower each person who enters our parks to leave as a champion for wildlife. The barriers to this seemed insurmountable within the new norm. Activities that would result in crowds have had to be suspended or operated with much-reduced capacity. Our signature virtual programme 'Hello From The Wild Side', born out of the Circuit Breaker, not only allowed us to continue to connect people to wildlife but also helped to generate the much needed revenue. Even after the Circuit Breaker was lifted, this immensely popular virtual engagement continued to reach out to those who chose to enjoy wildlife experiences in the comfort of their home. Encouraged by the good response, we launched 'Hello From The Wild Side' Season 2, which was equally well-received. Virtual offerings are here to stay, and we will continue to curate more of such programmes to complement our in-park experiences.

Immediately after we were allowed to reopen our parks, we swung into action to deliver exclusive in-park wildlife and dining experiences targeted at specific groups in small numbers to adhere to Safe Management Measures.

With the push for domestic tourism, Night Safari welcomes almost entirely local guests. We saw this as an opportunity to encourage them to extend their stay at the park since they are not constrained by packed travel itineraries. We actively promoted the revamped walking trails, which serve us well in motivating guests to explore Night Safari on foot. We also curated a year-end campaign that featured heavily on digital elements to attract local guests, specifically young adults.

HELLO FROM THE WILD SIDE (HFTWS)

HFTWS aimed to bring joy to our guests in their homes via video calls with our animal family. We are among the very first zoos in the world to start these paid virtual interactions. Since the programme launch in May 2020, our animals have 'entered' board rooms, living rooms, and hotel rooms. As of end-FY, HFTWS had reached a virtual audience of over 93,000 residents. We have also expanded our product line to include group sessions, personalised messages and a backstage pass at Elephants of Asia.





GLAMPING WITH THE MANATEES

Building on popularity of our overnight family camp programme Sleep With Manatees, we upgraded the programme to Glamping With The Manatees. Families enjoyed a premium sleepover experience in well-furnished tents, in the company of a herd of manatees. They also get to enjoy engaging encounters with other River Safari animals and their care teams. The event was sold out within five hours of its launch and a second instalment in March was arranged to cater to the overwhelming response. Plans to offer glamping experience in Singapore Zoo are underway.

WINE AND DINE

We resumed our signature Evening in the Wild dining experience almost immediately after dining events were allowed under strict Safe Management Measures. Partnering premium brands, we enhanced the experience with wine or cocktail pairing and offerings of gourmet products. Evening in the Wild also gained popularity as a unique platform for product launches.

During the Chinese New Year festive season, we launched Lunch With Pandas, which offered guests an exclusive dining experience in Giant Panda Forest while watching Jia Jia lounged in her home. Very encouraging feedback was received from the diners but the programme had to be suspended soon after as Jia Jia entered her breeding season.



SUPPORT FROM THE COMMUNITY

Micro Sponsorship

During the Circuit Breaker, we launched the Support Us Campaign as a channel for members of the public to support our cause in providing world-class care for our animals. They could contribute through micro sponsorships starting from just \$10, purchase of discounted tickets for future visits, or memberships with an exceptional 18 months of validity. The campaign was very well received, with many contributors sending well wishes and words of encouragement to our Animal Care Team.



Adopt An Animal (AAA)

To give the public an opportunity to adopt our animals and contribute to our animal care and conservation projects, we initiated the AAA programme in June 2020. Adopters can select from ten featured species, including Ah Meng, the Sumatran orangutan; Bunny, the two-toed sloth; and Matahari, the Malayan sun bear. The programme made adoption accessible to the wider community, inviting like-minded individuals to contribute to our mission with an adoption fee of as little as \$200.

TARGETING THE LOYALTY SEGMENTS

With the tourist segments taking a hard hit, we piloted various programmes to increase the yield per guest. We partnered ACCOR hotel group to offer a premium guided tour to VIP members of their loyalty programme. Working with Singapore Airlines, we also rolled out Enriching Encounters for KrisFlyer members to redeem their Kris Flyer Miles which they could not utilise for overseas trips. The programmes offered participants an opportunity to meet our animal ambassadors up close and learn more about them through their care team.



REJUVENATING IN-PARK EXPERIENCES

AT JURONG BIRD PARK

African Treetops

To improve guest experience and better utilise the spacious aviary, the former Lory Loft underwent a facelift to become African Treetops. It is now home to more than 300 birds of 41 species. The feeding sessions enhance guest interaction with the birds and are immensely popular.



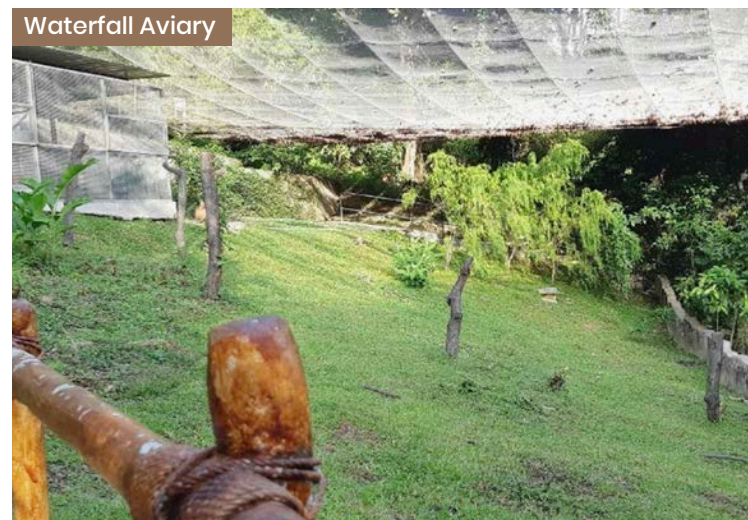
New Lory Loft

Our former Jungle Jewels is now the new Lory Loft, featuring over 100 colourful Australasian lorries, with a supporting cast of king parrots and palm cockatoos. Feeding experiences are available as well for guests to get up close to the gregarious birds.



Re-landscaping of Waterfall Aviary

The tropical rainforest landscape was transformed into a woodland theme to accommodate larger birds like hornbills and storks, and create unobstructed flight paths. The revamp also allows for easier monitoring of the birds' health. Feeding stations were added to encourage natural feeding behaviour of the birds.



AT NIGHT SAFARI

The motivation to revamp the walking trails stemmed in part from our desire to encourage guests to explore the park on foot and take time to discover the magic of a rainforest at night. It would also be an added opportunity for us to deepen guests' connection with wildlife. Since the completion of the revamp, we saw an 80% increase in the number of guests opting for the walking trails.

A spacious and well-landscaped Indian rhino exhibit was added to enhance the tram experience. With this addition, we were able to strengthen our narrative and conservation messaging on the severely threatened Indian rhino.

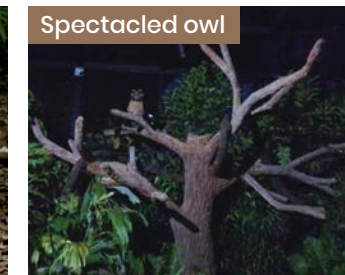
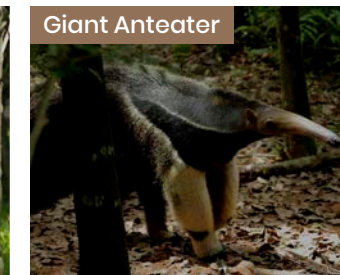
East Lodge Trail

The display of armadillo 'Alika' is a first for WRS and it was no easy task given the complexity of exhibit design to accommodate its ground-digging behaviours. Since her debut, Alika has been a hit with Night Safari guests.



Fishing Cat Trail

The maned wolf and giant anteater are featured highlights of the revamped Fishing Cat Trail. Their unique adaptations and oddball appearance have made them instant hits with guests walking the trail. A new exhibit for the spectacled owls was also added to further enhance the trail experience.



Leopard Trail

Recently established mixed species exhibits, such as the leopard cat cum small-toothed civet and armadillo-kinkajou exhibits not only improved the visibility of the animals for guests, but also offered some form of social enrichment and stimulation for the animals, through the creation of interspecies interaction opportunities.



RIGHT: The new Indian rhino exhibit, as viewed from the tram road.

AT RIVER SAFARI

As part of our continued effort to strengthen conservation messaging on threatened freshwater ecosystems, we embarked on a journey to refocus the narrative for River Safari to highlight species from the tropics, and those with strong link to field conservation projects which we support. As a result, the snapping turtles of North America gave way to the elephantfishes of Africa. At Mekong River, we added a new exhibit for the critically endangered Vietnamese pond turtles and refresh the jewel tanks to feature threatened fishes of Asia.

Vietnamese Pond Turtle Exhibit

The new Vietnamese pond turtle exhibit presents an opportunity for us to engage guests on our conservation efforts for this critically endangered species. We maintain an assurance colony of the turtles as part of globally coordinated efforts to ensure the species' future survival.



Jewel tanks at Mekong Hut

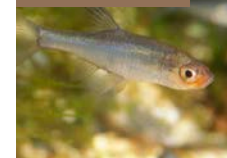
Many freshwater fishes in Asia are among the most severely threatened aquatic wildlife. By featuring some of these species at River Safari, we strive to generate greater awareness of the plight of freshwater ecosystems and their inhabitants.



Dwarf Botia



Emerald Dwarf Danio



Sawbwa Barb



Elephantfish Exhibit

The elephantfishes are so named for their trunk-like snouts, used to locate prey. To sense their environment, they emit weak electric currents. The new display has seen positive response from guests fascinated by the unique appearance and behaviours of these fish.



AT SINGAPORE ZOO

While preparations are underway to activate our master plan, we embarked on various enhancements to ensure that guests can always look forward to refreshed experiences when they visit the Zoo. We are also more intentional in highlighting our back stories and conservation messages with the enhancements.

Anoa additions

When the Malayan tapirs were relocated to Night Safari to optimise breeding efforts, the vacated exhibit was upgraded to accommodate the lowland anoas, the smallest of all wild cattle species, and endemic to Sulawesi. We fund conservation work to protect their habitat in the wild and the location of the exhibit next to the babirusa, another threatened species from Sulawesi, creates an opportunity for us to increase awareness of the threats they face in the wild.



Nyalas back at Wild Africa

A herd of nyalas was integrated with the giraffes to provide interspecies interaction as environmental enrichment. Both species have been observed to be doing extremely well in the shared space, much to the delight of guests.



DRIVING FOOTFALL

The ever-evolving Covid-19 situation required us to stay nimble with timely tactical solutions and campaigns to capture opportunities to meet market demand as they presented themselves. We swiftly adapted our operations to handle the tremendous surge in traffic to our website for online purchases, timed admissions and paid experiences. There was also urgency to push ahead for in-park cashless transactions. We are glad to have initiated Transformation 2.0 months ahead, upgrading existing platforms and embracing new technologies to add value to our triple bottomline – planet, people and performance. Transformation 2.0 will stand us in good stead when we welcome even more guests to Mandai precinct as the new attractions open progressively.

MEMBERS' SUPPORT

We continued to enjoy tremendous support from the community through membership sign-ups. In the FY, we welcomed 118,000 members through the Friends of Wildlife (FOW) membership programme, and saw revenue increase by 23%. We achieved a record for member acquisition in July 2020, the first month of reopening our day parks after Circuit Breaker. Overall park attendance by members increased by 29%, with Night Safari enjoying the highest increase in member attendance at 45%.



SINGAPOREDISCOVERS DEALS

To encourage domestic tourism, every Singapore citizen was given \$100 worth of SingapoRediscovers Vouchers (SRV) to spend at local attractions. In support, we launched our SingapoRediscovers Deals, including 50% off Night Safari admission to coincide with its reopening on 30 Jul 2020 – some 14,000 tickets were snapped up. As of end-FY, the campaign attracted 317,000 locals to Night Safari. Overall, WRS parks has captured about 18% of total national SRV expenditure at local attractions.



Singapoliday Staycation Packages With Hotel Partners

We leveraged on the nation's push for residents to go for a 'Singapoliday', to generate demand for our products through tie-ups with hotel chains. Products bundled to include park admission, wildlife experiences as well as retail merchandise and F&B vouchers. Working with various hotels, we reached out to new guest segments including working adults and young couples.



WILD ABOUT YOU

Launched after the Circuit Breaker was lifted in Singapore, the Wild About You campaign featured a dedicated platform with rediscovery content and deals to encourage locals to visit our parks. The platform saw good traffic and attracted 174,000 page views and 47,000 checklist downloads. The catchy messaging lent itself to other campaign spinoffs, including the first ever local programming activation at Night Safari – Wild About Twilight – and Wild About Niu to usher in The Year of the Ox.

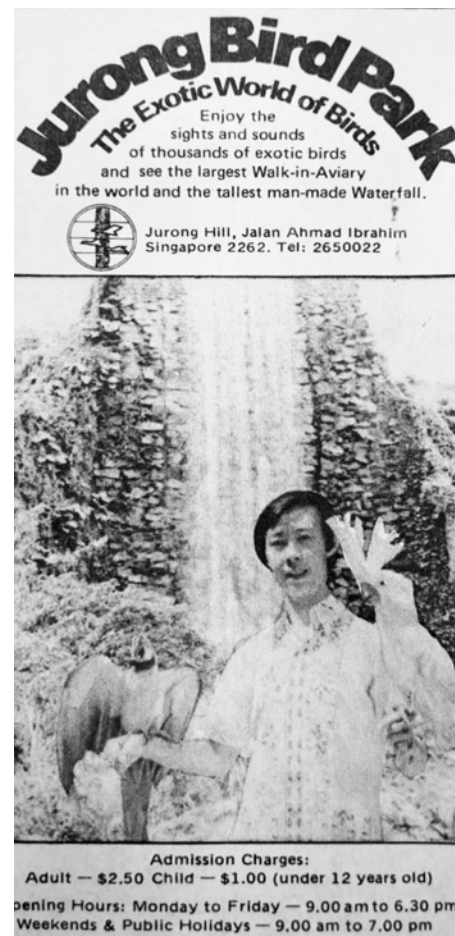


JBP50

In celebration of its 50th anniversary in Jan 2021, Jurong Bird Park offered a very special rate of \$2.50 to all Singapore residents, in a throwback to its first entry price. As part of the Golden Jubilee celebrations, guests were invited to go on a GPS-enabled excursion via Wildlife Quest with Detective Blue, a blue-throated macaw cartoon character.

BELOW (LEFT): **Throwback:**
Admission price to Jurong Bird Park at \$2.50 when the park first opened in 1971.

BELOW: Jurong Bird Park's first digital GPS game trail – Wildlife Quest with Detective Blue.



DISNEY OUTDOOR EXPLORERS

During the year-end school holidays, guests at Singapore Zoo and River Safari donned their Explorer outfits and embarked on a Disney-themed adventure. Through the adventure, the Explorers learnt more about what makes a healthy animal habitat and were encouraged to make a pledge to save rainforest and aquatic animals in conclusion of their missions.

STAYING TOP OF MIND

International Markets

With the Covid-19 situation, tourist arrival came to a halt but we continued our virtual engagement with trade partners and in-market travel agents to keep our parks top of mind. The International Sales Team took part in over 30 online seminars organised by Singapore Tourism Board (STB) and trade partners, reaching out to 7,000 people from over 15 countries.

In Nov 2020, we participated as an exhibitor at Travel Revive, the first pilot tradeshow to trial the prototype for safe business events, safe itineraries and digital enablers in Singapore. The event brought some 1,000 delegates and businesses together, and was an excellent platform for us to showcase our offerings and keep a close connection with trade partners.

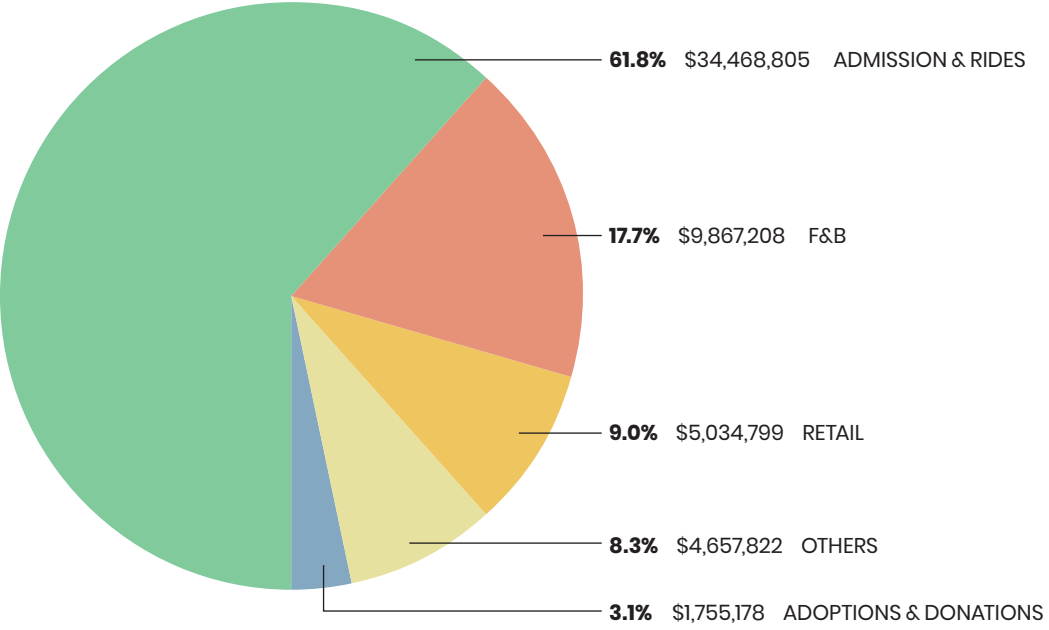
Digital and social platforms

Our engagement continues to be strong in the social media space. We have also launched our TikTok and Douyin social media accounts to engage with the younger and more diverse communities. As of end-FY, our TikTok and Douyin videos have had over a million combined views.

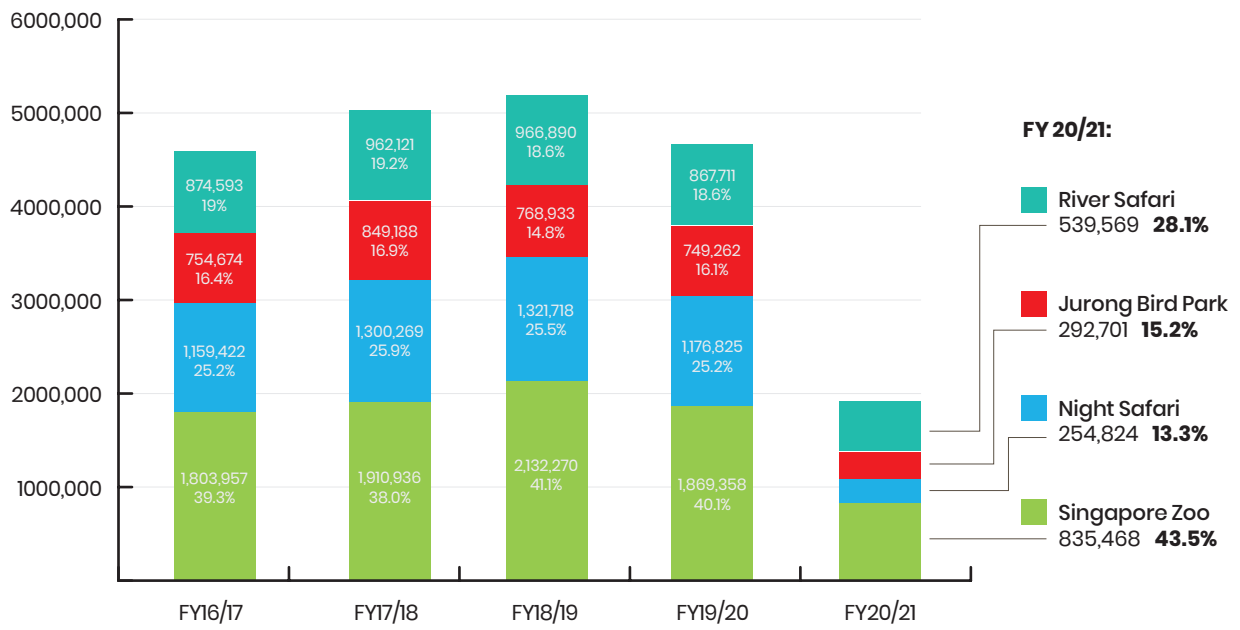


FINANCIAL & ATTENDANCE HIGHLIGHTS

REVENUE FOR FY20/21 **\$55,783,812**



TOTAL GUESTS **1,922,562**





THE YEAR AHEAD

The uneven recovery from the Covid-19 outbreak presents both challenges and opportunities for us. By accelerating digital transformation across the organisation and maximising opportunities in the market, we shall persist in our commitment to improve productivity, deliver exceptional guest experience, uphold world-class animal care and stay true to our conservation cause.

DELIVERING ON THE PLAN

Physical rejuvenation of the Mandai precinct will help us grow our impact as world-leading centres of wildlife conservation, education, and research. We will commence construction of Rainforest Park South – our fifth attraction in the precinct. Works around the Zoo entrance and construction of a new amphitheatre at Night Safari are taking shape and we will proceed with the plans of other key enhancement projects, albeit at a slower speed, to continue to refresh our existing parks. We will also roll out the Technology Master Plan focused on delivering personalised experiences across ticketing, payment and feedback platforms in anticipation of the opening of our new attractions. These infrastructural and systemic investments are crucial in our bid to be an outstanding integrated nature and wildlife hub at Mandai.

LONG TERM VIABILITY AND SUSTAINABILITY

The very shape of tourism has been changed by the pandemic. Singapore is perceived as a safe destination but travel restrictions mean that tourists will not be back in force in the near future. Fortunately, we remained a top-of-mind destination for many residents and we intend to intensify focus on driving affinity amongst Singaporeans. We will enhance our product offerings by prototyping and piloting new features, experimenting on monetisation opportunities and enhancing tech platforms. To do so, we will continue to empower our staff to become agile brand ambassadors. By deepening a culture of innovation and 3D-readiness in our workforce, we hope to build affinity and engagement beyond our parks through digital and virtual offerings.

SCALE CONSERVATION WORK, AMPLIFY ‘VOICE FOR GOOD’

With the establishment of Mandai Nature, we look forward to expanding as well as deepening our conservation footprint locally and in the region. Besides championing nature-based solutions to address climate change, we also aspire to play a pivotal role in capacity building in conservation and sustainability by deepening our engagement with various institutes of higher learning.

ANNEX WRSCF Support For Local Wildlife

WRSCF has been a staunch supporter of conservation work for the Raffles' banded langurs and Sunda pangolins since its inauguration in 2010. Funding of efforts to conserve the critically endangered Singapore freshwater crab commenced in 2014 and studies of local bats have been supported since 2013. Longitudinal in-park biodiversity surveys have also been a mainstay focus.

For more info on local conservation projects and how you can be involved, [click here](#).

PROJECTS FUNDED IN FY20/21

1. Species action plan for the conservation of Raffles' banded langurs in Singapore – Phase II
2. Scaling up implementation of the Sunda Pangolin National Conservation Strategy and Action Plan
3. Conservation biology of the Singapore freshwater crab: understanding drought and acidification impacts
4. Novel techniques for the conservation of the cave nectar bat in Singapore
5. Local biodiversity surveys in WRS parks
- [Since 2016] 6. Biology and distribution patterns of "near threatened" sharks in Singapore
- [Since 2017] 7. Continued investigation into sharks and rays imported to Singapore ports to uncover characteristics of this fishery and understand shark and ray biodiversity in the region
- [Since 2018] 8. A multi-ecosystem examination of Singapore's marine fungal biodiversity and community structure to enhance conservation measures
- [Since 2019] 9. Elucidating global population genetic structure and connectivity of turtle seagrass
- [NEW] 10. Every Singaporean a Naturalist
- [NEW] 11. Understanding the mechanisms underlying diversity patterns in rocky intertidal systems for sustainable coastal eco-engineering solutions
- [NEW] 12. Preserving the moonlight orchestra of Singapore: Building bioacoustics database and investigating communication personality
- [NEW] 13. Phenology of Singapore's resident avifauna
- [NEW] 14. Integrating genetic data to construct dung beetle-mammal trophic networks in Southeast Asian forest canopies
- [NEW] 15. Using genomic data to elucidate transmission dynamics of blood parasites across bird hosts, mosquito vectors and endosymbionts in Singapore
- [NEW] 16. Genome sequencing and population genetic studies of the hawksbill turtles nesting in Singapore

ANNEX Carbon Emissions FY 20-21

SCOPE	CATERGORIES	EMISSIONS
1	LPG Fuel (In-Park Vehicles) Refrigerant Gas	469,530.27 kg
2	Grid Electricity	9,663,210.44 kg
3	Animal Food and Freight Business Travel (Flights) Mandai Shuttle and Express Paper Consumption Waste Disposal, including transport Water Consumption	5,871,251.99 kg
Total		16,003,992.69 kg

ANNEX Conservation projects supported in FY20-21

PROJECT NAME	COUNTRY	TAXON
1 Determining focal areas for hornbill survey in Brunei Darussalam	BRU	Bird
2 Restoring a viable population of Siamese Crocodile within the Sre Ambel River system, Cambodia	CAM	Reptile
3 Conservation of the globally threatened Southern River Terrapin <i>Batagur affinis</i> in Sre Ambel River System in Cambodia	CAM	Reptile
4 Critical law enforcement support for Cambodia's Cardamom Rainforest	CAM	Multi-Taxa
5 Vulture conservation in Cambodia and Myanmar	CAM	Bird
6 Establishment of ex situ conservation facilities for the critically endangered Southeast Asian Bengal Florican (<i>Houbaropsis bengalensis blandini</i>) at the Angkor Centre for Conservation of Biodiversity and capacity building to improve the husbandry – Phase I	CAM	Bird
7 Coffee and Primate Conservation Project	INDO	Mammal
8 Wildlife Trade Mitigation Strategy and Yaki Pride Campaign to reduce threats to the Critically Endangered Sulawesi crested black macaques	INDO	Mammal
9 Conservation of Rote Island Snake Necked Turtle	INDO	Reptile
10 Conservation of the Nantu Forest in Sulawesi, Indonesia	INDO	Multi-Taxa
11 Preventing and mitigating Human-Orangutan Conflict in Agricultural Landscapes in the Leuser and Batang Toru Ecosystem, Northern Sumatra, Indonesia	INDO	Mammal
12 Sustainable Operation Of The ERU as part of the Way Kambas National Park ERU Program for Habitat Protection and HEC Mitigation	INDO	Mammal
13 EAZA Komodo EEP conservation programme: Wae Wuul Reserve Protection Programme	INDO	Reptile
14 Tasikoki Emergency Funds: Housing the confiscated wildlife repatriated from the Philippines	INDO	Bird
15 Protect Sumatran wild birds from the threat of illegal trade	INDO	Bird
16 PRS – Kembali Bebas Avian Rescue, Rehabilitation and Release Centre	INDO	Bird
17 Emergency Action Plan for Asian Songbird Crisis – Temporary Holding, Simeulue	INDO	Bird
18 Bali Starling Community Breeding Project in Melinggih Kelod, Bali, Indonesia	INDO	Bird
19 Maintaining a high standard of husbandry and health management at YCKT during global COVID crisis	INDO	Multi-Taxa
20 Conserving ASAP and priority species through an integrated approach in West Kalimantan	INDO	Multi-Taxa
21 Proboscis monkeys in Balikpapan Bay: population monitoring, habitat surveillance and conservation advocacy	INDO	Mammal
22 Biodiversity conservation in Nakai – Nam Theun National Park in the Annamite Mountains of Lao PDR	LAOS	Multi-Taxa
23 Ending the practice of bear bile farming in Lao PDR	LAOS	Mammal
24 Launching the Saola Foundation, a non-profit organization dedicated to conservation of the Saola and its habitat in the Annamite Mountains	LAOS	Mammal
25 Anti-poaching strategies to protect Sunda pangolins and other threatened species Deramakot Forest Complex, Sabah, Malaysia	MSIA	Mammal
26 Crucial Bat Pollinators: Promoting and mainstreaming the importance of bat pollinators in Peninsular Malaysia	MSIA	Mammal
27 Citizen Action for Tigers: engaging people to value and protect tigers and their habitat in Malaysia	MSIA	Mammal
28 Restoring a population of critically endangered Burmese Star Tortoises at Chattin Wildlife Sanctuary, Myanmar (Phase II)	MYAN	Reptile
29 Tamaraw: One Plan Approach Conservation Project	PHI	Mammal
30 West Visayan Species Recovery Project	PHI	Multi-Taxa
31 The use of local dogs in detecting wild Palawan Pangolins for research and conservation	PHI	Mammal
32 Ex- and in-situ conservation of the critically endangered Palawan Forest Turtle	PHI	Reptile
33 Community-based conservation of the Philippine Cockatoo and its habitats	PHI	Bird
34 Saving the Great Philippines Eagle in Northern Sierra Madre Mountains of Luzon Island, Philippine	PHI	Bird
35 Project Palaka – Phase II	PHI	Reptile
36 Community-based monitoring for Critically Endangered Delacour's Langur in Kim Bang Forest, Ha Nam Province	VIET	Mammal
37 Finding solutions to the civet farming industry and its impacts on Owston's Civet conservation in Vietnam	VIET	Mammal
38 Saving the Critically Endangered Edwards's Pheasant – a flagship for forest conservation in Vietnam	VIET	Bird
39 Tackling SEA's Wildlife Crime	REG	Multi-Taxa
40 Establishment and enactment of an international animal welfare and husbandry standard within South East Asia	REG	Multi-Taxa
41 Publication support for 'Gajah' Journal	REG	Mammal
42 Testing the potential of passive acoustic monitoring units to estimate fossa population density	GLO	Mammal
43 Development of a metabarcoding protocol for prey species of the fossa to reduce carnivore-human conflict	GLO	Mammal
44 Save the Tasmanian Devil – Veterinary expenses to contribute to the goal of creating a resilient wild devil population	GLO	Mammal
45 Species360 Conservation Science Alliance Support	GLO	Multi-Taxa

ANNEX Managed Species Programmes FY 20–21

SPECIES	PROGRAMME	IUCN	SPECIES	PROGRAMME	IUCN
<i>Acinonyx jubatus jubatus</i> Southern Cheetah	EEP	VU	<i>Cuon alpinus</i> Red Dhole	EEP	EN
<i>Acridotheres melanopterus</i> Black-winged Myna	ISB	CR	<i>Cyanopitta spixii</i> Spix's Macaw	ISB	EW
<i>Aegypius monachus</i> Cinereous Vulture	EEP	NT	<i>Dendrolagus goodfellowi</i> Goodfellow's Tree Kangaroo	GSMP	EN
<i>Ailurapoda melanoleuca</i> Giant Panda	CWCA	VU	<i>Dryonastes courtoisi</i> Blue-crowned Laughingthrush	GSMP	CR
<i>Ailurus fulgens</i> Red Panda	GSMP	EN	<i>Elephas maximus</i> Asian Elephant	EEP	EN
<i>Alligator sinensis</i> Chinese Alligator	EEP	CR	<i>Ephippiorhynchus senegalensis</i> Saddle-billed Stork	ESB	LC
<i>Alopecoenas sanctaerucis</i> Santa Cruz Ground-dove	EEP	EN	<i>Equus grevyi</i> Grevy's Zebra	EEP	EN
<i>Aluatta caraya</i> Black Howler	ESB	LC	<i>Gallinula criniger</i> Mindanao Bleeding-heart	SSP	VU
<i>Amazona lilacina</i> Ecuador Amazon	EEP	EN	<i>Garrulax bicolor</i> Sumatran Laughingthrush	EEP	EN
<i>Amazona viridigenalis</i> Green-cheeked Amazon	EEP	EN	<i>Geokichla dohertyi</i> Chestnut-backed Thrush	EEP	NT
<i>Anas melleri</i> Meller's Duck	EEP	EN	<i>Giraffa camelopardalis</i> Giraffe	EEP	VU
<i>Anodorhynchus hyacinthinus</i> Hyacinth Macaw	EEP	VU	<i>Goura cristata</i> Western Crowned-pigeon	ESB	VU
<i>Anodorhynchus leari</i> Lea's Macaw	ISB	EN	<i>Goura sclaterii</i> Slater's crowned pigeon	ESB	NT
<i>Anthracoeros malayanus</i> Black Hornbill	ESB	NT	<i>Goura victoria</i> Victoria Crowned-pigeon	ESB	NT
<i>Aonyx cinereus</i> Oriental Small-clawed Otter	ISB	VU	<i>Gyps africanus</i> African White-backed Vulture	ESB	CR
<i>Aptenodytes patagonicus</i> King Penguin	EEP	LC	<i>Helarctos malayanus</i> Sun Bear	ESB	VU
<i>Ara ambiguus</i> Buffon's Macaw	EEP	EN	<i>Heloderma horridum</i> Mexican Beaded Lizard	EEP	LC
<i>Ara glaucogularis</i> Blue-throated Macaw	EEP	CR	<i>Heloderma suspectum</i> Gila Monster	EEP	NT
<i>Ara rubrogenys</i> Red-fronted Macaw	EEP	CR	<i>Hippopotamus amphibius</i> Common Hippo	EEP	VU
<i>Asacornis scutulata</i> White-winged Duck	EEP	EN	<i>Hylobates lar</i> Lar Gibbon	SSMP	EN
<i>Astrochelys radiata</i> Radiated Tortoise	ESB	CR	<i>Hylobates pileatus</i> Pileated Gibbon	EEP	EN
<i>Astrochelys yniphora</i> Ploughshare Tortoise	ISB	CR	<i>Leontopithecus chrysomelas</i> Golden-headed Lion Tamarin	ISB	EN
<i>Aythya baeri</i> Baer's Pochard	ESB	CR	<i>Leontopithecus rosalia</i> Golden Lion Tamarin	ISB	EN
<i>Balearica pavonina</i> Black Crowned Crane	ESB	VU	<i>Liasis sauensis</i> Savu Python	ESB	EN
<i>Bos gaurus</i> Gaur	ISB	VU	<i>Lorius domicellus</i> Purple-naped Lory	ESB	EN
<i>Buceros bicornis</i> Great Hornbill	EEP	VU	<i>Lorius garrulus</i> Chattering lory	ESB	VU
<i>Buceros rhinoceros</i> Rhinoceros Hornbill	EEP	VU	<i>Lycodon pictus</i> African Hunting Dog	EEP	EN
<i>Bucorvus leadbeateri</i> Southern Ground Hornbill	ESB	VU	<i>Macaca silenus</i> Lion-tailed Macaque	EEP	EN
<i>Bugeranus carunculatus</i> Wattled Crane	ESB	VU	<i>Malacochersus tornieri</i> Pancake Tortoise	EEP	EN
<i>Cacatua alba</i> White Cockatoo	EEP	EN	<i>Manis javanica</i> Sunda Pangolin	SSMP	CR
<i>Cacatua haematuropygia</i> Red-vented Cockatoo	EEP	CR	<i>Manouria emys</i> Asian Brown Tortoise	EEP	CR
<i>Cacatua moluccensis</i> Moluccan cockatoo	EEP	VU	<i>Mauremys annamensis</i> Vietnamese Leaf Turtle	EEP	EN
<i>Cacatua sulphurea citrinocristata</i> Citron-crested cockatoo	EEP	CR	<i>Mauremys sinensis</i> Striped-neck Turtle	EEP	EN
<i>Callimico goeldii</i> Goeldi's Monkey	EEP	VU	<i>Melursus ursinus</i> Sloth Bear	EEP	VU
<i>Capra falconeri</i> Markhor	ESB	NT	<i>Mico argentatus</i> Silvery Marmoset	EEP	LC
<i>Casuarus casuarus</i> Southern Cassowary	ESB	VU	<i>Muscophaga violacea</i> Violet Turaco	ESB	LC
<i>Cattopuma temminckii</i> Golden Cat	EEP	VU	<i>Myrmecophaga tridactyla</i> Giant Anteater	EEP / ISB	VU
<i>Ceratogymna atrata</i> Black-casqued Hornbill	EEP	LC	<i>Neofelis nebulosa</i> Clouded Leopard	EEP	VU
<i>Cercopithecus torquatus</i> Red-capped Mangabey	ESB	EN	<i>Nomascus gabriellae</i> Buff-cheeked Gibbon	ESB	VU
<i>Cercopithecus neglectus</i> De Brazza's Monkey	EEP	LC	<i>Nycticebus coucang</i> Sunda Slow Loris	EEP	VU
<i>Chelodina mccordi</i> Roti Island Snake-necked Turtle	EEP	CR	<i>Otocyon megalotis</i> Bat-eared Fox	EEP	LC
<i>Chilabothrus angulifer</i> Cuban Boa	ESB	NT	<i>Pan troglodytes</i> Chimpanzee	EEP	EN
<i>Choeropsis liberiensis</i> Pygmy Hippo	EEP	EN	<i>Panthera leo persica</i> Asiatic Lion	EEP	EN
<i>Chrysocyon brachyurus</i> Maned Wolf	EEP	NT	<i>Panthera onca</i> Jaguar	EEP	LC
<i>Cicinnurus regius</i> King Bird-of-Paradise	ESB	LC	<i>Panthera pardus kotiya</i> Sri Lankan Leopard	EEP	VU
<i>Ciconia abdimi</i> Abdim's Stork	ESB	LC	<i>Panthera tigris jacksoni</i> Malayan Tiger	ISB	CR
<i>Crocota crocata</i> Spotted Hyena	EEP	LC	<i>Paradisaea raggiana</i> Raggiana Bird-of-Paradise	SSP	LC
<i>Cryptoprocta ferox</i> Fossa	EEP	VU	<i>Pelecanus rufescens</i> Pink-backed Pelican	ESB	LC

ABBREVIATIONS & ACRONYMS

PROGRAMME

- EEP** – European Endangered Species Programme
- ESB** – European Studbook
- GSMP** – Global Species Management Plan
- ISB** – International Studbook
- SSMP** – Significant Species Management Plan

IUCN RED LIST STATUS

- EW** – Extinct in the Wild
- CR** – Critically Endangered
- EN** – Endangered
- VU** – Vulnerable
- NT** – Near Threatened
- LC** – Least Concern

ANNEX Scientific Publications FY 20–21

PEER REVIEWED PUBLICATIONS

- Cabana F, Yusof O, Kawi J, Li D, Huang Y, Wang P, Tay T. 2020. **Seasonal diet switching in captive giant pandas**. *Ursus* 31e4: 1-8.
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- Goh, G.S.L., Chong, S.M. and Xie, S., 2020. **Radical surgical excision of dermal squamous cell carcinoma in a Pesquet's parrot (*Pittrichas fulgidus*)**. *Journal of Exotic Pet Medicine*, 35, pp.48-49.
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- Shearn, R., Wright, A.E., Mousset, S., Régis, C., Penel, S., Lemaitre, J.F., Douay, G., Crouau-Roy, B., Lecompte, E. and Marais, G.A., 2020. **Evolutionary stasis of the pseudoautosomal boundary in strepsirrhine primates**. *Elife*, 9, p.e63650
- Xie, S., Shuang-Li, G., De Busscher, V. and Hsu, C.D., 2020. **What Is Your Neurologic Diagnosis?** *Journal of the American Veterinary Medical Association*, 257(7), pp.703-706
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- A Sustainable Solution: Zooquaria Autumn 2020**

CONSERVATION ACTION PLANS

Sulu Hornbill conservation strategy and action plan

HUSBANDRY GUIDELINES

EAZA Best Practice Guidelines for Straw Headed Bulbul

Wildlife Reserves Singapore Group



JURONG BIRD PARK
2 Jurong Hill Singapore 628925

NIGHT SAFARI / RIVER SAFARI / SINGAPORE ZOO
80 Mandai Lake Road Singapore 729826
Tel: 62693411

www.wrs.com.sg