

WILDLIFE RESERVES SINGAPORE

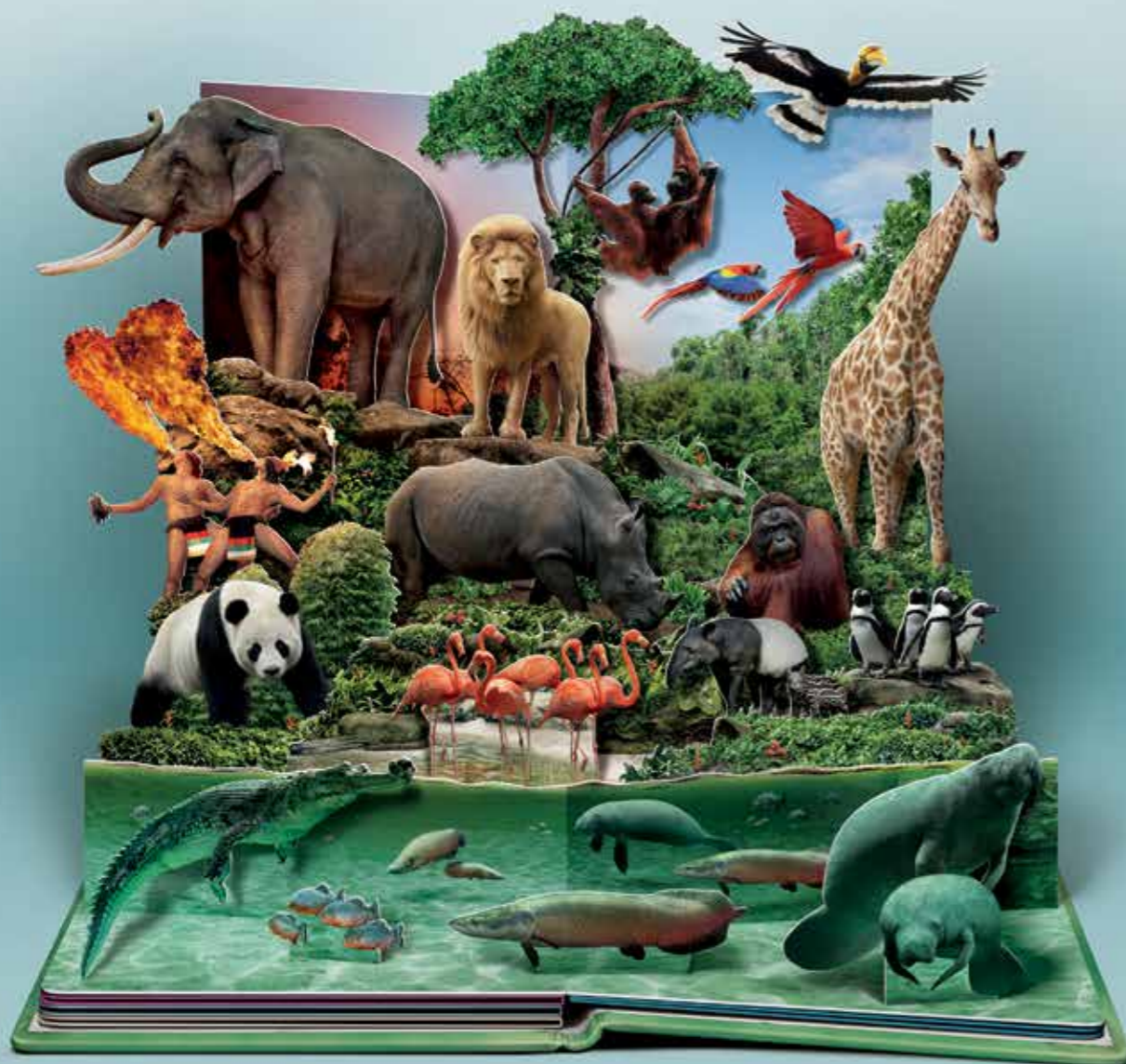
YEARBOOK 2015-16



ABOUT WILDLIFE RESERVES SINGAPORE

Wildlife Reserves Singapore (WRS) is the operating arm of Mandai Park Holdings, 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. Each year, Jurong Bird Park welcomes over 850,000 visitors, Night Safari 1.1million, Singapore Zoo 1.7 million and River Safari 1 million.



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WILDLIFE RESERVES SINGAPORE

Message From



S Dhanabalan
Chairman
Mandai Park Holdings



Mike Barclay
Group CEO
Mandai Park Holdings

With the establishment of Mandai Park Holdings (MPH) in October 2015, a new board of directors was established under MPH to oversee both Wildlife Reserves Singapore (WRS, the company operating our four wildlife parks) and Mandai Park Development (MPD, the company tasked with positioning Mandai as a coherent and highly appealing nature and wildlife destination). With the dissolution of the WRS Board, we would like to express our heart-felt thanks to the outgoing Chairman Ms Claire Chiang and her board members Mr Philip Tan, Mr Chia Ngiang Hong, Mr Kaviratne Nihal Vijaya Devadas CBE, Mr Raymundo A Yu Jr, Mr Lionel Yeo, Mr Kee Teck Koon, Mr Sim Hwee Cher and Ms Neo Ghim Huay for their excellent service to WRS. We are delighted that Claire, Hwee Cher, Lionel and Teck Koon agreed to join the new MPH Board, ensuring good continuity in decision-making and active inputs from past experience.

The new management team will build on the firm foundations of care for wildlife that have been nurtured over the past 45 years. There are exciting new opportunities, to establish Mandai as the home of five wildlife parks, supported by attractive public spaces, an indoor nature-themed education centre and various accommodation options. Our goal is to deliver even more meaningful guest experiences and encourage an appreciation of the natural world in future generations.

We welcomed a record 4.67 million guests in FY 2015/2016 across our four wildlife parks (a 2% growth over the previous year) and generated multiple opportunities for our guests to be inspired to care for wildlife.

In celebration of SG50, WRS launched various promotions to encourage Singaporeans to visit and

rediscover our parks. The "Be a Feather Friend" promotion offered a year-long membership to Jurong Bird Park for the price of one admission and brought in 56,000 new members, an 80% increase over the same period last year. Despite the challenging global economic landscape, our parks enjoyed strong tourist attendance.

Four koalas joined us from Australia with much fanfare to mark 50 years of diplomatic relations between Singapore and Australia, and they captured the hearts of our Singapore Zoo guests. We were sad to bid them farewell at the end of the year.

Our staff stayed focused on creating exceptional guest experiences and improving animal care with refreshed exhibits, facilities and programming. At Singapore Zoo, we upgraded the African painted dog exhibit. We also added a sheltered walkway to enable our guests to reach the heart of the Zoo from the entrance in comfort, come rain or shine. At Jurong BirdPark, the revamped Wetlands Exhibit showcases the brilliantly-coloured scarlet ibises and roseate spoonbills, together with other aquatic feathered jewels. River Safari added a new Touch Pool to allow guest interaction with sea stars, sea cucumbers and shellfish. Other new attractions at River Safari include the Mary River, which features Australian lungfish and colourful rainbow fish, and a mangrove zone inhabited by archer fish.

We hosted the 23rd Southeast Asian Zoos and Aquariums (SEAZA) Conference and many other specialist workshops; we were honoured to be able to take the leadership in providing platforms for colleagues in the region to share expertise so as to improve zookeeping standards and to encourage a deeper collaboration on conservation work in richly biodiverse hotspots.

In alignment with the developments at Mandai, WRS' vision, mission and core values were refreshed to energise and guide us on the path to be a world-leading zoological institution. We will continue to invest in our people, infrastructure, guest engagement, digital capabilities, conservation work and education, whilst ensuring financial, environmental and operational sustainability.

WRS has one of the most valuable living collections in the world, with over 21,000 animals representing 984 species, of which 21% are on the IUCN Red List of Threatened Species. We are focused on enhancing our staff expertise to provide even better care for these precious animals, building specialised skillsets for managing the different taxonomic groups through intensified training and overseas attachments.

Collaboration with zoos around the world deepened and reached a new high with WRS' participation

in seventeen Managed Species programmes, including severely threatened species such as the Bali mynah, rhinoceros hornbill, tree kangaroo and red panda. These programmes focus on worldwide co-ordinated efforts to care for assurance populations of endangered species and to breed them to enhance their genetic pool. This effort reflects our commitment to play a greater role in the conservation of endangered species at the global level.

Staying true to our mission to protect biodiversity, we strengthened our support for conservation work, both locally and in Southeast Asia where biodiversity hotspots abound. We funded 13 local field projects and one workshop, and we are heartened to witness the growing interest in our local nature heritage. Regionally, we supported 26 projects, up from 18 last year.

Touching hearts and inspiring actions have been the core of our education conservation programmes and wildlife campaigns. This year, we engaged over 140,000 school children and members of the public with robust and interactive programming, and we could not have achieved this without the help of some 1,900 volunteers who believe in our cause to spread the conservation message.

Protecting wildlife and environmental sustainability go hand in hand. We are initiating a number of initiatives to 'go green for wildlife' as we embark on a journey to embrace sustainable best practices.

None of this would have been possible without our staff, who continue to give their best and to win industry recognition. Singapore Zoo was voted the best zoo in Asia and top three in the world for the TripAdvisor Travellers Choice Awards. River Safari clinched the new ASEAN Tourism Award at the 29th ASEANTA Awards for Excellence. In the Singapore Experience Awards organised by the Singapore Tourism Board, Mohammad Sharil Bin Saine of Jurong Bird Park won the 'Best Customer Service - Visitor Attractions' award. In the Excellent Service Awards, a record total of 41 staff members were honoured, with six receiving Star awards, nine gold and 26 silver.

As the new Mandai precinct begins to take shape, we would like to thank all our board members, partners, adopters, sponsors, volunteers and friends for their continued belief in, and backing for, our efforts to celebrate the diversity of wildlife and to protect and sustain biodiversity throughout the region. Please join us for the next phase of our journey, as we work to create something even more wondrous for future generations.

Vision

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

Mission

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

Values

Excellence

We strive for the highest standards in all we do.

Teamwork

We achieve more together.

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.

Strategic Thrusts

Create exceptional guest experiences.

Grow our revenue to sustain our business.

Play a leading role in conserving biodiversity in Singapore and the Region.

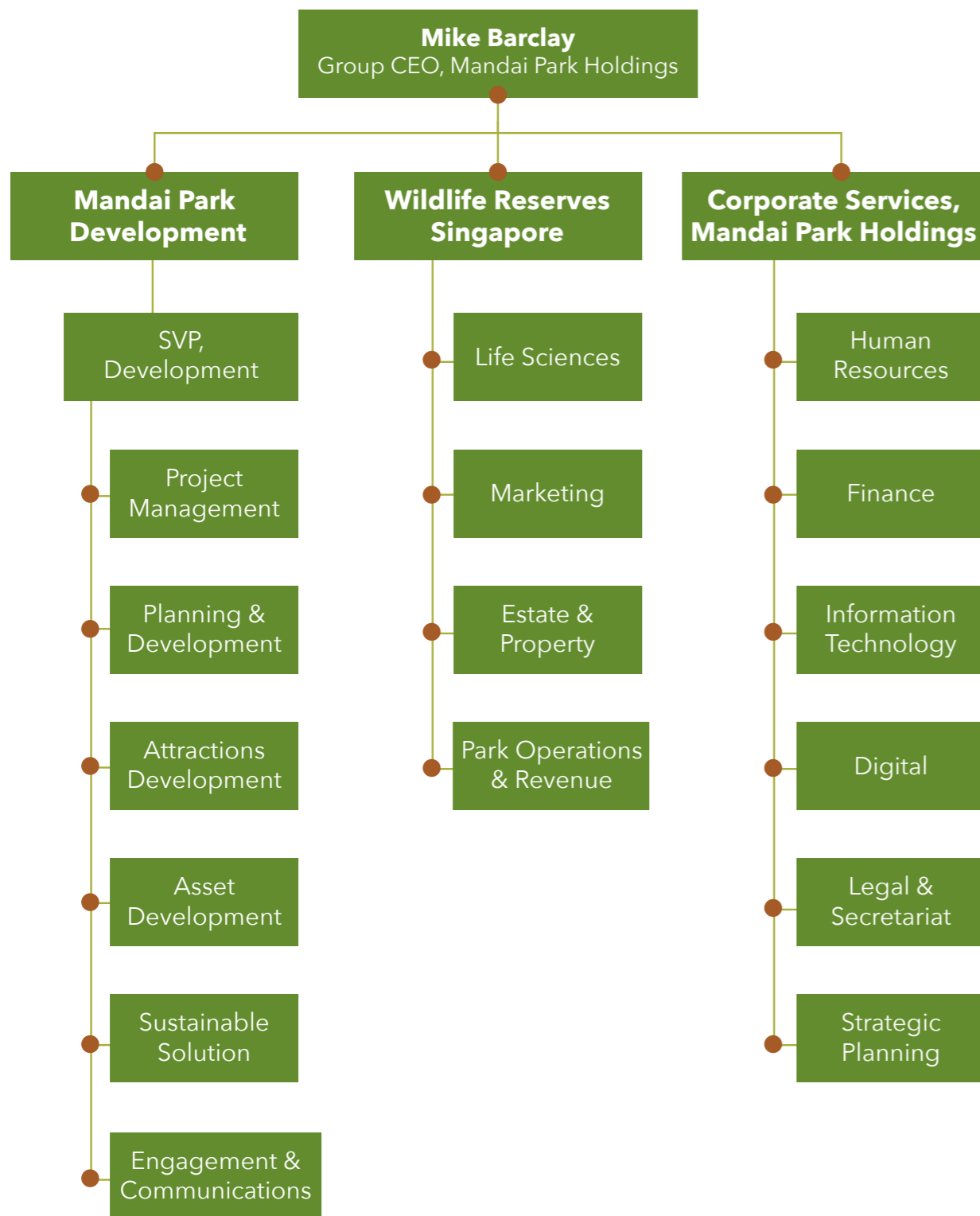
Provide world-class care for our living collection.

Apply leading organisation and human resource practices.





Mandai Park Holdings



Board of Directors, Mandai Park Holdings

Chairman

Mr S DHANABALAN

Mr S Dhanabalan is also Chairman of Temasek Trust, the philanthropic arm of Temasek. He serves on the board of GIC. 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.

Directors

Mr Mike BARCLAY

Mr Barclay holds the position of the Group CEO of Mandai Park Holdings. He is also a Director at the Changi Airport Group, the Mount Faber Leisure Group and Sentosa Leisure Management.

Ms CHEO Hock Kuan

Ms Cheo Hock Kuan joined Temasek in 2002 and is currently Head, Strategic & Public Affairs Group. She is on the Board of Ascendas-Singbridge Pte Ltd, Fullerton Financial Holdings Pte Ltd and Pavilion Capital Holdings Pte Ltd.

Board of Directors, Mandai Park Holdings

Directors

Ms Claire CHIANG

Ms. Chiang, Senior Vice President, Banyan Tree Holdings, is a co-founder of Banyan Tree Hotels & Resorts. She is Chairperson of Banyan Tree Global Foundation, Wildlife Reserves Singapore Conservation Fund and China Business Development. She is also the Chairperson of Executive Committee, National Book Development Council of Singapore.

Mr FOCK Siew Wah

Mr Fock is the Group Chairman of PSA International Pte Ltd. He also serves as Chairman of Pavilion Capital Holdings Pte Ltd.

Mr Dilhan Pillay SANDRASEGARA

Mr Sandrasegara is the Head, Enterprise Development Group and Singapore and the Co-head of Americas of Temasek International Pte Ltd. He serves on the boards of the Singapore Management University, Singapore Institute of Legal Education, Changi Airport Group (Singapore) Pte Ltd, Changi Airports International Pte Ltd, Temasek Life Sciences Ventures Private Limited, Fullerton Financial Holdings Pte Ltd., the National Research Foundation in Singapore, Mandai Park Holdings Pte Ltd, Vertex Venture Holdings Ltd and Ascendas-Singbridge Pte Ltd.

Mr KEE Teck Koon

Mr Kee is the Non-Executive Chairman of Changi Airports International Pte Ltd, and Alexandra Health Fund Ltd. He also holds directorship positions in CapitaLand Ltd, Raffles Medical Group Ltd, NTUC Enterprise Co-operative Ltd, NTUC Income Insurance Co-operative Ltd, and Lien Foundation.

Mr SIM Hwee Cher

Mr Sim is PricewaterhouseCoopers Singapore's Vice Chairman of Operations and the Head of Audit. He is also a member of the PwC Executive Board for Singapore, China, Hong Kong and Taiwan. Mr Sim sits on the Council of the Institute of Singapore Chartered Accountants (ISCA) and is the Honorary General Secretary of National Council of Social Service and Council member of Community Chest.

Professor TAN Chorh Chuan

Professor Tan is the President of the National University of Singapore and the Chairman of the Board of the National University Health System. He is also the Deputy Chairman of Singapore's Agency for Science, Technology and Research (A*STAR); Senior Advisor to the Governing Board of Duke for Science, Technology and Research (A*STAR); Senior Advisor to the Governing Board of Duke NUS Graduate Medical School; and Member, Board of Directors of the Monetary Authority of Singapore.

Professor Leo TAN

Professor Tan is the Chairman of the Garden City Fund, President of the Singapore National Academy of Science, Vice Chair of the Singapore Environmental Council and Chair of the Science Sub-Commission of the Singapore National Commission for UNESCO. He also represents Singapore as Governor on the Asia-Europe Foundation.

Mr Lionel YEO

Mr Lionel Yeo is the Chief Executive of the Singapore Tourism Board. He currently serves on the board of the Sentosa Development Corporation, and on the Board of Governors of Raffles Institution.

Committee Members & Honorary Consultants

Expert Committee on Zoonoses

Chairman : Dr Leong Hon Keong
 Secretary : Dr Charlene Fernandez
 Members : Dr Ooi Eng Eong
 Dr Chan Kwai Peng
 Dr Koh Tse Hsien
 Dr Cheng Wen-Haur
 Dr Serena Oh
 Mr Kumar Pillai

Animal Welfare and Ethics Committee

Chairman : Prof Leo Tan
 Secretary : Dr Cheng Wen-Haur
 Members : Dr Chew Siang Thai
 Dr Leslie Retnam
 Dr Tan Hwa Luck
 Mr Wong Tuan Wah
 Dr Chris R Shepherd
 Ms Grace Chua
 Dr Stephanie Ho

Honorary Consultants

Dr Tan Hwa Luck
 Dr Myra Elliott
 Prof Soon-Chye Ng
 Dr Koos van den Berg
 Dr Anjulia Thomas
 Dr Frederic Chua
 Dr Hsu Li Chieh
 Dr Chew Huck Chin
 Dr Pipin Kojodjojo

WRSCF Specialist Panel

Dr Shawn Lum (Chairman)
 Dr Geoffrey Davison
 Dr Astrid Yeo
 Dr David Bickford
 Dr Cheng Wen-Haur
 Dr Leong Tzi Ming
 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 & Chief Life Sciences Officer
Ms Belina Lee Chief Corporate Development Officer
Mr Melvin Tan Chief Estate and Property Officer
Ms Low Wai Peng Chief Financial Officer
Mr Marcus Heng Chief Human Resource Officer
Ms Isabel Cheng Chief Marketing Officer
Ms Sherri Lim Chief Park Operations & Revenue Officer
Mr Raja Segran Director Animal Presentation
Dr Sonja Luz Director Conservation & Research
Mrs Daisy Ling Director Corporate Services
Ms May Lok Director Education
Mr Barry Chong Director Estate Management
Mr Cham Tud Yinn Director Exhibit Design
Mr Steven Wong Director Finance
Mr Steven Tan Director Food & Beverage
Ms May Yeo Director Human Resources
Ms Sandy Lee Director Marketing
Mr Andrew De Silva Director Park Operations
Ms Joanne Kang Director Retail
Mr Kumar Pillai Director Special Projects
Mr Andrew Chai Director Technical Services
Dr Luis Carlos Neves Director Zoology
Dr Serena Oh Assistant Director Veterinary



YEAR IN REVIEW

Dissolution of WRS Board

Establishment of Mandai Park Holdings (MPH) and a new MPH Board

WRS welcomed a record 4.67million guests

Singapore Zoo was voted the Best Zoo in Asia and top three zoo in the world for the TripAdvisor Travellers Choice Awards

River Safari won Best New ASEAN Tourism Award for Excellence

Mohammad Sharil Bin Saine, Jurong Bird Park won the 'Best Customer Service - Visitor Attractions' award in the Singapore Experience Awards by the Singapore Tourism Board

SG50 celebrations continued at WRS parks

Koalmania hit Singapore. Four koalas were on loan to Singapore Zoo from Lone Pine Sanctuary for six months

WRS hosted the 23rd Southeast Asian Zoos and Aquariums (SEAZA) Conference in Singapore Zoo

Giant pandas Kai Kai and Jia Jia's first breeding attempt

Jurong Bird Park celebrated 45th anniversary

Wetlands Exhibit opened in Jurong Bird Park

First giraffe birth in 28 years in Singapore Zoo

African painted dog exhibit opened in Singapore Zoo

Completion of sheltered walkway from the entrance to heart of the Zoo

Ah Meng, the new Zoo icon unveiled

Mary River and Touch Pool opened in River Safari

Release of 'Why Did The Pangolin Cross The Road', a bilingual children's storybook funded by LKY Bilingualism Fund

CREATING EXCEPTIONAL GUEST EXPERIENCES

In the face of fierce competition in the attractions industry, the challenging global economic landscape, and guided by the vision to be a world-leading zoological institution, WRS put in even greater efforts to provide guests with memorable and meaningful wildlife experiences. A holistic approach is adopted to provide hassle-free, immersive and inspiring guest experiences before, during and after park visits. This is achieved through constant rejuvenating animal collection, exhibits and infrastructure, strengthening service delivery and programming, embracing best practices in park operations and enhancing accessibility to the parks.

Koalamaniam Hit Singapore



In celebration of 50 years of bilateral ties between Singapore and Australia, a koala exhibit was officially launched at Singapore Zoo on 20 May 2015, displaying four female koalas on a six-month loan from Lone Pine Koala Sanctuary in Queensland, Australia. The launch was officiated by Singapore's Minister for Foreign Affairs and Law K Shanmugam and Australia's Minister for Foreign Affairs Julie Bishop. The koalas were an instant hit with guests and attracted good crowds.

To generate even greater interest, a 'Koalamaniam' campaign was activated with novel publicity efforts, promotions and programmes. A koala nicknaming contest, in collaboration with radio station Kiss92FM, engaged the public to give the four koalas nicknames with Singapore flavour. Eventually, the koalas got to handpick their nickname in Malay - Cantik (beautiful), Sayang (love), Manja (affectionate) and Nila (originated from Sang Nila Utama, the founder of the Kingdom of Singapura in 1299). A "50 Bridges Platinum Cocktail with the Koalas" created to mark the SG50 celebrations, was hosted by the Australian High Commission in Singapore. Other activities included the



Ms Julie Bishop, Minister for Foreign, Australia and Mr K Shanmugam, Minister for Foreign Affairs and Law officiating the launch of Koala Exhibit.

launch of a special Zoo Goes To School outreach programme 'Koalas and Pals', koala activity stations for children, and performances with the didgeridoo, an Australian aboriginal musical instrument. At the end of the six-month loan, a farewell party, packed with activities that spanned three weeks in December, was held to send off the four furry ladies.

The Koalamaniam campaign garnered a bronze award for Best PR campaign by an in-house Communications Team.



School children learnt about koalas and other Australian animals during 'Koalas And Pals', an outreach programme launched as part of the 'Koalamaniam' campaign.

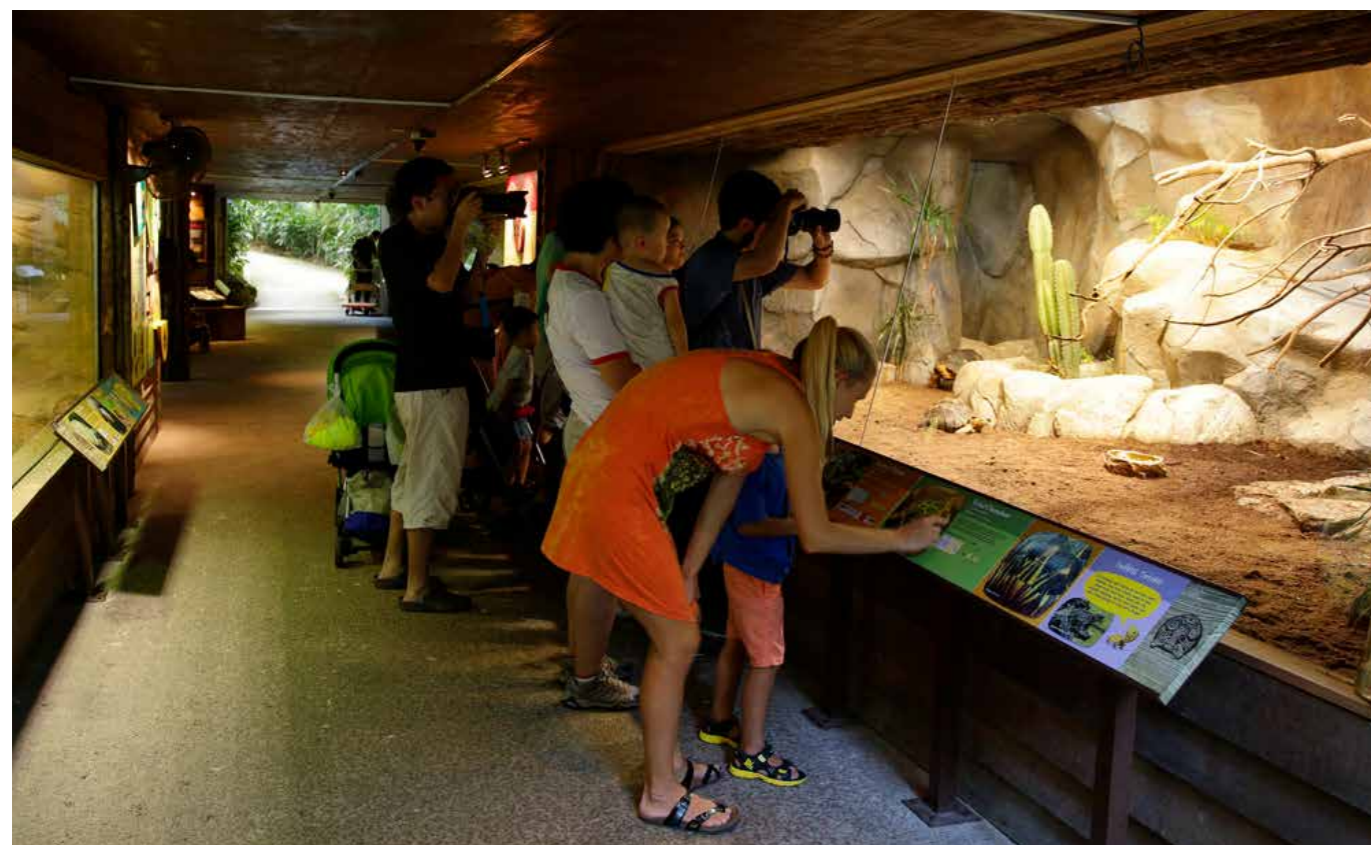
Tortoise Shell'ter - A Sanctuary For Endangered Reptiles

Critters Longhouse was converted into a new exhibit, Tortoise Shell'ter to house gravely threatened tortoises including the ploughshare tortoise, which is one of the top 25 most endangered tortoises in the world. Tortoise Shell'ter provides a conducive environment for assurance colonies of endangered tortoises to thrive in, and hopefully to breed and enhance

the gene pool of their speices. It also serves as a sanctuary for confiscated tortoises that were smuggled across borders for the illegal wildlife trade. Keeper talks are held to engage the public on conservation issues of turtles and tortoises, which are disappearing at an alarming rate as a result of consumption and the illegal pet trade.



The critically endangered ploughshare tortoise is found only in Madagascar.



Tortoise Shell'ter not only provides a conducive environment for endangered tortoises to thrive but also engages the public on the plight of turtles and tortoises.

Painted Dogs of The Grassland

The new African Painted Dog Exhibit, which opened in October 2015, allows WRS to participate in the Australasian Managed Species Programme, which focuses on worldwide co-ordinated efforts to care for assurance populations of endangered species, in this case, the African painted dog, and to breed them to enhance their gene pool.

where guests can watch the keepers perform daily conditioning of the painted dogs for routine checks. Training and conditioning of such nature were previously done only in back-of-house areas. By allowing guests the opportunity to witness this activity and to interact with the keepers, it is hoped the former will gain a better appreciation of high standards of animal care in WRS, and a deeper understanding of the endangered African painted dog.

To enhance guest experience, the new exhibit boasts a special feature - a designated area



Painted dogs hunt co-operatively and when they return to their den, they regurgitate food for the pup, the old and the sick.



A dedicated area in the exhibit allows guests to watch training and conditioning of the painted dogs for routine checks.

Bird-Watch @ Wetlands Exhibit

At Jurong Bird Park, the Spoonbill Exhibit was rejuvenated, with more bird species added to create a biodiverse wetland habitat. This exhibit, aptly renamed Wetlands, is designed to simulate a bird observation hide for guests to bird-watch in a sheltered and comfortable environment. The most

eye-catching inhabitants of this new habitat are the stunning scarlet ibises with bright red plumage, and the attractive roseate spoonbills, named for their unique spoon-shaped bill. Other wetland species found here include the Mandarin ducks, night herons, wood ducks and hammerkops.



Guests can spend quiet time at **Wetlands Exhibit** to bird-watch from the viewing gallery, which is designed to simulate an observation hide. Apart from the eye-catching scarlet ibis and roseate spoonbill, this exhibit is home to other wetland bird species such as the magpie geese, Mandarin ducks, night herons, wood ducks and hammerkop.

Enhancing The River Journey

Responding to feedback, efforts were stepped up to enhance River Safari for better guest experience. River Wonders, which showcases the diverse life forms found in freshwater ecosystem, replaced the American beaver exhibit. Featuring a dazzling variety of freshwater fish species as well as terrestrial animals that live along river banks, River Wonders serves to highlight the fragility of river ecosystems and their threatened inhabitants.



The angelfish is one of the many fish species found in River Wonders, which showcases the biodiversity of freshwater ecosystems.

The Murray River habitat was converted to Mary River, which houses the ancient Australian lungfish. Mary River drains into a mangrove habitat where archer fish put up spectacular displays of water jets 'gunning down' crickets and meal worms. Sharing this habitat are the mudskippers - fish that skip on land and are adapted to stay out of water for a long period. The mangroves exit to a marine habitat, as they would in nature. Presented as Touch Pool, this marine habitat allows guests to enjoy close contacts with sea stars, sea cucumbers and shellfish while learning more about the invertebrates from the aquarists.

River Trails, which feature live commentary and feeding activities, and Animal Encounters were launched.

Throughout River Safari, the exhibits were enhanced in a studied manner with different aquatic plant species and other landscape features to provide more shade and hiding places for the watery creatures, and to add to the aesthetics of the aquatic river habitats.



Mary River drains into a mangrove habitat before it exits into a marine habitat that is the **Touch Pool** - an interactive area offering guests a close encounter with sea stars, horseshoe crabs and other marine creatures.

Breaking The Language Barrier

To create a better experience for Mandarin-speaking guests and to ensure effective conservation messaging, a WeChat Chinese audio guide was launched at River Safari, with support of Singapore Tourism Board. The audio guide, which features 17 exhibits, provides nuggets of interesting information and highlights conservation issues relating freshwater ecosystems. A similar audio guide at Singapore Zoo would be launched in mid-2016.

In the pipeline is an initiative to leverage on technology to provide tram commentary for Singapore Zoo and Night Safari in eight different languages, a leap forward in breaking the language barrier for tourists from different countries.

To meet the demand for customised programmes from more sophisticated tourists from China, a suite of programmes with Chinese content, particularly with sleepover itineraries for student and family groups, was launched. The programmes received very good feedback from the participants and trade partners, and are set to grow in demand.



'Scan and learn' WeChat audio-guide provides an additional platform for WRS to engage Chinese-speaking guests on wildlife trade and other conservation issues.

Improving Infrastructure, Capacity Management and Accessibility

Apart from rejuvenating exhibits, park infrastructure was also enhanced. A sheltered walkway was added to ensure that guests can reach the heart of Singapore Zoo from the entrance in comfort, come rain or shine. With the establishment of a new Technical Services department, preventive maintenance programme for transportation and rides was strengthened, and monthly shut down of Amazon River Quest and Carousel rides was rescheduled after opening hours of the parks to ensure that guest experience is not comprised by the closure.

Night Safari introduced time-based admissions in December 2015 for better capacity management to reduce waiting time to enter the park and to board the tram. Admissions are regulated on an hourly basis and time slots can be pre-booked, allowing guests greater flexibility in planning their trip for a more pleasant experience.

A new limousine service by Singapore Express Attractions was introduced in March 2015 to provide an alternative, convenient departure for guests from all parks at Mandai.



Adding a covered walkway from the Entrance to the Heart of the Zoo was one of the many initiatives taken to address guest pain points.

Service From The Heart

WRS' service culture was further strengthened with one of the refreshed corporate values to reflect the importance of hospitality and service from the heart. The staff certainly live out the service value, evidenced by the numerous compliments from guests and the awards won. Mohammad Sharil bin Saine from Jurong Bird Park clinched the Best Customer Service, Visitor Attractions award at the Singapore Experience Awards 2015, organised by

the Singapore Tourism Board. A total of 41 staff members were also awarded the Excellent Service Award 2015, with six receiving the Star award, nine Gold and 26 Silver.

River Safari was one of 17 finalists for the Singapore Service Excellence Medallion 2015, organised by the national GEMS Up movement for quality service.



Mohammed Sharil bin Saine, winner of the Best Customer Service, Visitor Attractions Award 2015 by Singapore Tourism Board



Dear Singapore Zoo,

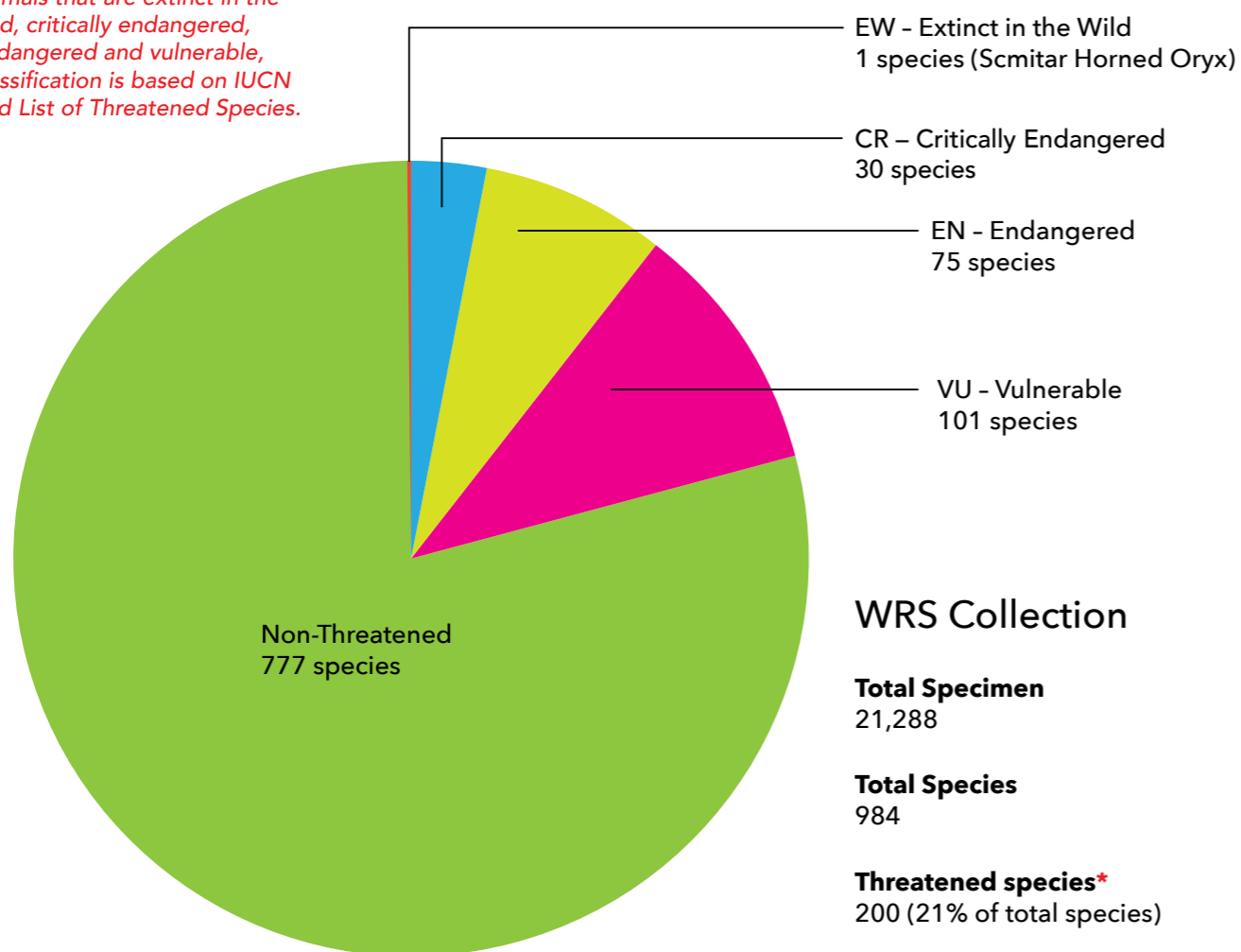
It has been a truly remarkable experience visiting your park and a bewilderment seeing the animals kept in their natural habitat. The journey around the park was tiring due to my age, however, the resting stops were very close in range from one another providing temporary comfort for my wife and I. My favourite exhibit was the White Tigers. Splendid architecture with such a beautiful animal being housed it in. My experience was delightful not only by the park but also by one of your staff, one of your staff named 'Luqmaan'. He made my pre-visit to the park wonderful and went the extra mile with his great service afterwards. While waiting for my wife at the entrance of the park, I was having trouble opening my bottled water. This young gentleman came up to me suddenly to offer his assistance with a smile. After which, he stayed by my side, inquiring about my visit and shared a lot of details about the parks with me. I was amazed by his knowledge and his passion for the establishment.

W. Dennis

PROVIDING WORLD-CLASS ANIMAL CARE

With slightly over 21,000 specimens representing 984 species, WRS holds one of the world's most valuable and relevant living collection for a wildlife institution. Of the species cared for by WRS, 21% are listed as threatened* according to the International Union for Conservation of Nature Red List Assessment. The year saw step-up efforts in strengthening staff expertise to provide even better care for these precious animals. Training and overseas attachments for Zoology and Veterinary staff were greatly intensified to build domain knowledge and specialised skillsets for managing the different taxonomic groups in our living collection.

**threatened species include animals that are extinct in the wild, critically endangered, endangered and vulnerable, classification is based on IUCN Red List of Threatened Species.*



Saving species at the global level

Collaboration with zoos around the world deepened and reached a new high with WRS' participation in seventeen Managed Species programmes to help save severely threatened species (please refer to complete listing on the right). These programmes focus on worldwide co-ordinated efforts to care for assurance populations of endangered species and to breed them, with the ultimate aim for exchange among participating zoos, in order to enhance their gene pool. The increased participation reflects WRS' commitment to play a greater role in wildlife conservation at the global level. The number of managed species is set to increase further as WRS journeys towards its vision to be a world-leading zoological institution.

One project under the Managed Species programme that has gained good progress is the conservation of the Mindanao bleeding-heart dove. This species is threatened by habitat destruction in its native country, the Philippines but it breeds well in Jurong Bird Park. So far, Jurong Bird Park has sent ten bleeding-heart doves to a protected area in the Philippines for repopulation.

Under the Australasian Managed Species Programme, a female Goodfellow's tree kangaroo arrived from Melbourne Zoo to eventually pair with Singapore Zoo's resident male for breeding.

The globally managed species in WRS' collection include :

1. Goodfellow's tree kangaroo (ASMP)
2. Red panda (ASMP)
3. African painted dog (ASMP)
4. Giant river otter (EEP)
5. Sloth bear (EEP)
6. Sri Lankan leopard (EEP)
7. Emperor tamarin (EEP)
8. Goldie's monkey (EEP)
9. Giant panda
10. Rhinoceros hornbill (EEP)
11. Palm cockatoo (EEP)
12. Buffon's macaw (ESB)
13. Hooded pitta (SSP)
14. Mindanao bleeding-heart dove (SSP)
15. Papuan hornbill (ESB)
16. Blue-crowned laughing thrush (GSMP)
17. Bali starling (ESB)

Notes
 ASMP - Australasian Species Managed Programme
 GSMP - Global Species Managed Programme
 EEP - European Endangered Species Programme
 ESB - European Studbook Foundation
 SSP - Species Survival Programme



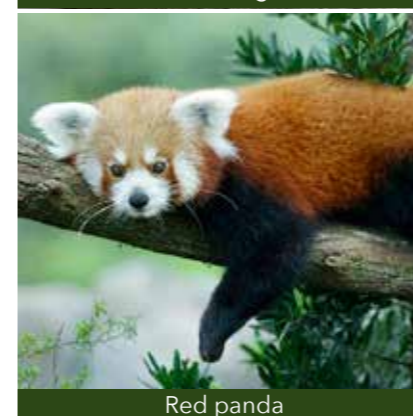
Mindanao bleeding-heart dove



Goodfellow's tree kangaroo



Goeldi's monkey



Red panda



Giant river otter



Papuan hornbill

Enhance Genetic Diversity

Apart from participating in globally-coordinated efforts through various Managed Species Programmes to conserve threatened species, WRS also works with individual zoos on species exchange programmes to enhance the gene pools of the living collection.

The critically endangered Malayan tiger breeding programme received a boost with the arrival of two Malayan tigers from Zoo Negara. The two feline newcomers add genetic diversity to the existing collection of four Malayan tigers. Another big cat, a female leopard also arrived from Bioparc Fuengirola, Spain.

A total of three agile wallabies and three grey kangaroos were received from Maharani Zoo, Goa Batu Secret Zoo, Indonesia, and Yokohama City Zoo, Japan.

Turtles and tortoises are among the world's most threatened animals because of unsustainable

collection for human consumption and the exotic pet trade. In recent years, WRS has taken a very active role in conserving these reptiles by dedicating space to keep assurance populations, in the hope to breed and eventually release them back into the wild.

Collaborative efforts with Wildlife Conservation Society and Rotterdam Zoo resulted in the arrival of ten Roti Island snake-necked turtles and 17 Annam leaf turtles respectively. These critically endangered turtles are cared for in Singapore Zoo and form assurance colony to ensure the survival of the species even if a catastrophic event wipes out the populations in the wild.

Two female Aldabra giant tortoises arrived as donation from Casela Adventure Park, Mauritius. The Aldabra giant tortoise is vulnerable to extinction because of excessive hunting in the past and now, the rising sea levels in the Aldabra Atoll as a result of climate change.



One of the two female Aldabra giant tortoises donated by Casela Adventure Park. It is hoped that the females will eventually breed with WRS' collection of giant tortoises to improve the gene pool of this threatened species.



The Annam leaf turtle or Vietnamese pond turtle is critically endangered because of conversion of its habitat for rice production, and unsustainable harvesting for food and traditional medicines.



Roti Island snake-necked turtle - an unusual animal with a very long neck. It is heavily smuggled for the illegal pet trade, and many of do not survive the journey.



Veera, the male orang utan receiving a final check from the vets before leaving for Taiping Zoo & Night Safari, Malaysia. Kumaran, Head Keeper (third from the left) accompanied Veera on the trip.



Veera arrived safely at Taiping Zoo & Night Safari, Malaysia. Kumaran, Head Keeper, seen here feeding Veera, stayed behind to settle him in.

Under the exchange programme, WRS parks sent a good number of animals to various zoos around the world during the reporting year. Most noteworthy was the export of Veera, a male Bornean orangutan to Zoo Taiping & Night Safari, Malaysia, based on a breeding programme recommended transfer. Veera was selected because he presented genetic compatibility with the orangutan collection in Taiping Zoo.

A female false gharial was sent to Los Angeles Zoo as part of an exchange agreement for a young female Komodo dragon to enhance the genetic diversity of Singapore Zoo's collection of the world's largest living lizard.

Babies Galore

During the reporting period, there were over 700 births across four WRS parks. These births were from 150 species, of which 40 are listed as threatened under the IUCN Red List. Most noteworthy birth was that of a male giraffe on 31 August 2015, the first giraffe baby in 28 years at Singapore Zoo. He was aptly named Jubilee, commemorating Singapore's jubilee anniversary of independence.



Jubilee was born on 31 August, Singapore Zoo's first giraffe baby in 28 years. This 'tall' bundle of joy stood at a height of 1.9 metres at birth!

Female pygmy hippo Minah gave birth to her 11th calf, the 23rd pygmy hippo born since Singapore Zoo started caring for this endangered species 42 years ago. Two southern white rhinoceros babies were born, bringing a total of 17 successful births of this species at Singapore Zoo.

For primates, critically endangered Sumatran orangutan Chomel, the granddaughter of legendary Zoo icon Ah Meng, gave birth to a male in September 2015. Female Bornean orangutan Binte gave birth in February 2016 to a young male, her fourth baby. The two births are precious additions to enhance the gene pool of these threatened apes. Other primate births included a Patas monkey, black howler monkey, Javan langur and black-and-white colobus. The tamarins did well too, with twin births from the red-bellied and golden-headed lion tamarins, and triplets from the critically endangered cotton-top tamarins.

In April 2015, a spectral tarsier was born in Night Safari, the first-ever successful breeding for the species. Other births at Night Safari included two oriental small-clawed otters and two spotted hyenas.

Over at Jurong Bird Park, it was a busy year too. A total of 450 chicks were hatched and raised. First-time breeding achievements were recorded for the endangered green peafowl and difficult to breed as it nests exclusively in termite mounds in the wild. Some noteworthy hatchlings from rare species included the king and lesser birds-of-paradise, hyacinth, blue-throated and green-winged macaws, white cockatoos, golden and sun conures, brown-necked parrots, silver-beaked and turquoise tanagers.

Jurong Bird Park has long been recognised as a leading authority in managing and breeding hornbills, and this year the park welcomed hatchlings of the southern ground, trumpeter, Papuan, Oriental pied, Von der Decken and Malayan black hornbills.



Chomel and her babies (one of which is adopted)



Javan Langur and baby



Southern Ground Chick



Colobus monkey and baby



Juvenile oriental pied hornbill



Lesser bird-of-paradise chick



Spectral tarsier



Pygmy hippo and calf

Better Care For The Giants

As part of the continued effort to improve animal care, WRS made a critical decision to phase in the protected contact system, from free contact, for the elephants in both Singapore Zoo and Night Safari. The protected contact system requires all elephant training and interaction to be conducted through a physical safety barrier, with the animals responding to positive reinforcement through rewards such as food treats. Within the modern zoo community, the protected contact system is currently deemed the safest way to manage elephants while ensuring proper animal care and welfare. The complete implementation of the protected contact system for WRS will take up to five years as it involves major re-design and construction of the elephant exhibits, back-of-house facilities and training of the elephants and elephant keepers. The first phase of moving towards the protected contact system was the cessation of programmes involving direct guest contact, such as elephant rides. This allows the elephants to spend more time in the exhibits and socialise among themselves.



Under the protected contact system, the elephants are responding well to training. Separated by a physical barrier, the keepers are able to work with the elephants to carry out routine checks, foot care and perform procedures such as blood collection and administration of medicines.

Inuka Turned 25

Inuka, the first polar bear to be born in the tropics, turned 25 on Boxing Day, 2015. He is in his golden years, based on the average life span of 25 years for polar bears under human care. However, with good husbandry, enrichment programmes and veterinary care, they can live much longer. Sheba, Inuka's mother, for example, died at the age of 35. Inuka's last health check in July 2015 found age-related conditions such as arthritis and dental issues. The veterinary team is monitoring his health closely and providing the appropriate care to ensure that he continues to enjoy a great quality of life.

To kick off Inuka's 25th birthday celebration, a photo exhibition about polar bears' arctic habitat was launched on 16 December 2015. The exhibition, titled 'Our Arctic Future', highlights the threat that climate change poses to arctic ecosystems and polar bears. It was developed by the Natural History Museum of Denmark and governments of Greenland and Faroe Islands for the Danish Ministry of Foreign Affairs. Danish Ambassador to Singapore Ms Berit Basse opened the exhibition in Singapore Zoo's Frozen Tundra where Inuka lives.



Mr Mike Barclay, Group CEO, Mandai Park Holdings and Ms Berit Besse, Danish Ambassador to Singapore launching 'Our Arctic Future' photo exhibition at Frozen Tundra where Inuka lives.



Dr S Vasoo, Director of Singapore Press Holdings Foundation Limited, adding the final touch to Inuka's birthday cake. SPH Foundation Ltd has been a long-time adopter of Inuka.



Inuka enjoying his birthday cake of ice blocks and fruits prepared lovingly by his keepers.

Stress-Free Routine Checks and Transfers

Guided by the goal of providing world-class care for the living collection, WRS undertook an intensive operant conditioning programme to achieve stress-free routine checks, transfers, and basic veterinary examinations and procedures. A holistic approach was adopted and a consultant was engaged to help develop the programme.

A number of species made good progress in the training, which is supported by positive reinforcement. The spectral tarsiers were successfully conditioned for weight taking, which led to early detection of pregnancy (based on weight change) and prompted

changes in husbandry that resulted in the first-ever successful breeding for this species. Some orangutans have been conditioned for blood collection voluntarily while marmosets and tamarins respond well to target training and need not be captured for weighing or transfers. The giraffes are trained for weighing and administration of medicines and bongos are also conditioned for weight taking and injections. The progress in operant conditioning allows for close monitoring of animal health and facilitates early interventions and medical care, where needed, without stressing the animals and the keepers.



Doris, River Safari Aquarist, uses different colour targets to train Canola, the manatee to flip over and present her belly for routine checks, and also in preparation for ultra sound scanning when she becomes pregnant eventually.



Many animals such as the white tigers, giraffes, bongos and orangutans have been successfully trained for blood collection and administration of medicines voluntarily. Such training requires tenacity and patience from the keepers but the end result is well worth it. It means less stressful routine and medical checks for the animals and their keepers.

Pandas In The Mood For Love

Female giant pandas are unique in that they are only receptive for breeding for two to three days in a year. It was no surprise that female giant panda Jia Jia created much excitement and captured tremendous media attention when she came into peak oestrus and showed readiness to breed in April 2015. Male giant panda "Kai Kai" was mixed together with her to try natural breeding but without success. Artificial insemination was then decided.

"Kai Kai" was anaesthetized to collect fresh semen and Jia Jia was anaesthetized subsequently, twice within two days, for the insemination process with Kai Kai's semen. A long wait followed, with everyone looking forward to the good news. However, by mid-September, it was confirmed that the insemination did not yield any result and another year-long wait for Jia Jia to come into peak oestrus began.



As peak oestrus approached, Jia Jia grew restless. Kai Kai responded and there were lots of vocalization between both. There were also attempts to seek each other out through the door separating their exhibits. Unfortunately, when they finally met, they were unsuccessful in mating.



After Kai Kai and Jia Jia's failed to breed naturally, the veterinary team went ahead to collect semen from Kai Kai and artificially inseminated Jia Jia. The vets received guidance and help from Chinese experts Mr Wang Peng Yan, Deputy Director, China Conservation & Research Centre for the Giant Panda, and Miss Zhou Ying Min. Professor Ang Soon Chye, who pioneered IVF in Singapore, also assisted the veterinary team in the procedure.

Rescue, Rehabilitation and Release

Besides taking care of WRS' living collection of over 15,000 animals, the Veterinary and Zoology staff spend lots of effort in providing medical care for, and rehabilitating confiscated and rescued animals. During the report year, WRS received 1,436 such animals, which comprised mainly snakes, turtles, tortoises, lizards, birds and palm civets. All were given medical checks and attention, followed by rehabilitation, where needed. Only 52% were released back into Singapore's nature reserves or other forested areas, the rest being exotic species and therefore cannot be released, or simply physically unfit for release. For exotic species, they were either absorbed by WRS, if they fit into the animal collection plan, or were (some still are) held temporarily until suitable recipient zoos or sanctuaries were (can be) found for rehoming.



These marmosets and tamarins were probably smuggled into Singapore for the illegal pet trade. They were found abandoned, in tiny cages and pet carriers, at the rear gates of Night Safari.



A three-week old leopard cat kitten was confiscated and brought to Singapore Zoo. It was hand raised and absorbed into the WRS' collection.



A hedgehog smuggled into Singapore for the illegal pet trade. It was confiscated and brought to Singapore Zoo.



Cockatoos are common donations to Jurong Bird Park. Many pet owners are unprepared to keep these parrots, which need lots of attention and can be very noisy.



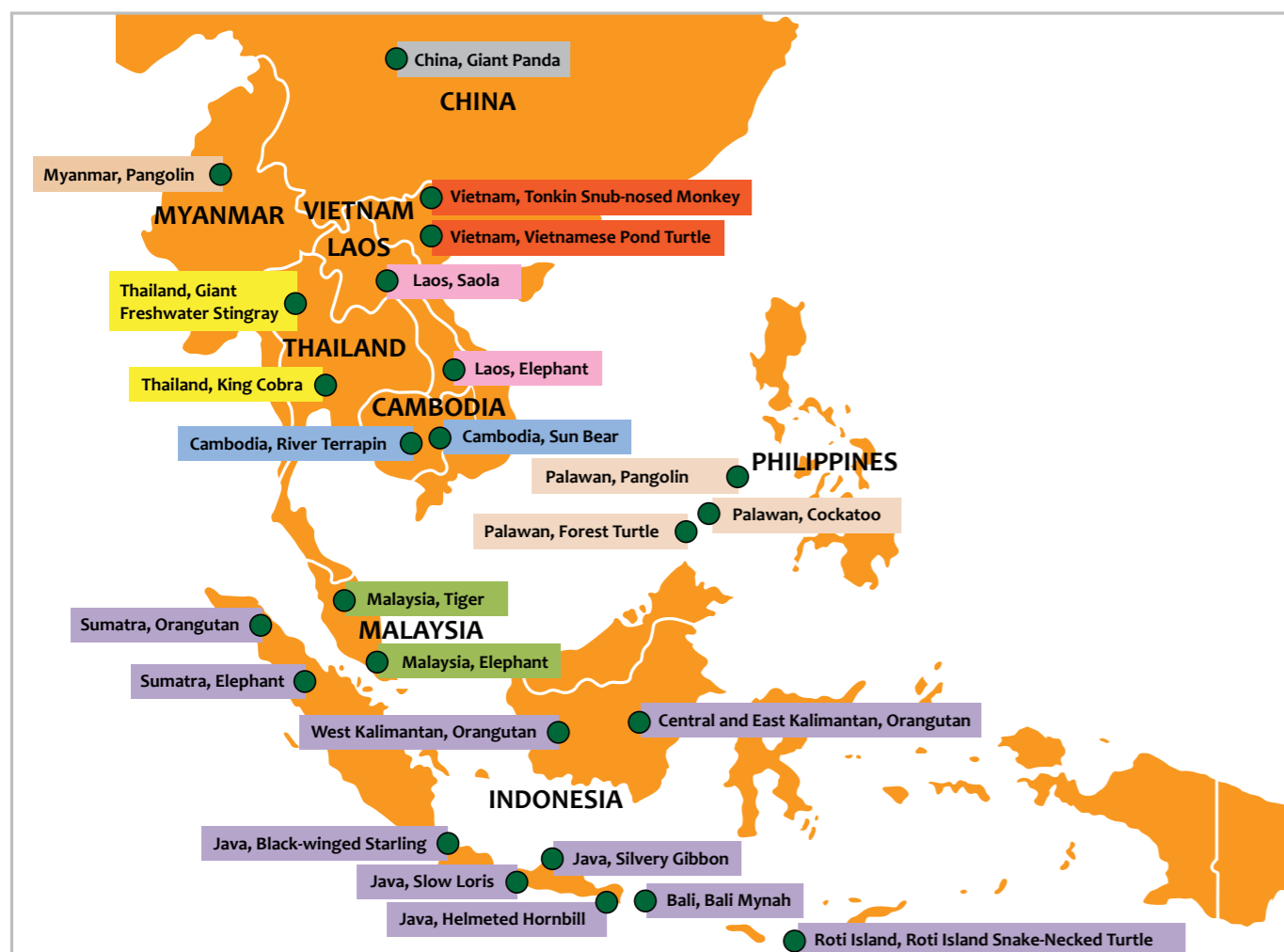
A four-month-old male baby pangolin was found along Upper Thomson by a member of the public and brought to Singapore Zoo. As he was too young to fend for himself, it was decided not to release him back into the wild. Instead, he was hand raised and become part of WRS' collection as release after being cared for by humans at such an early age would not be possible. He was solely bottle-fed on milk for a few weeks before ant eggs were introduced to him. He was gradually given a specially concocted diet for pangolins and weaned from milk. Eventually, he was transferred from the Wildlife Healthcare Centre to join the other pangolins at Fishing Cat Trail in Night Safari.

Playing A Leading Role In Conserving Biodiversity

The year saw WRS further strengthening its support for conservation work, both locally and in Southeast Asia where biodiversity hotspots abound. Regionally, WRS funded 26 projects, up from 18 the previous year. Through the Wildlife Reserves Singapore Conservation Fund, WRS supported 13 local field projects and one workshop, amidst heartening growing interest in Singapore's nature heritage. Apart from supporting regional and local projects, WRS has taken the leadership to host a number of specialist workshops and provided platforms for colleagues in the region to share expertise so as to improve zookeeping standards and to encourage a deeper collaboration on conservation work in richly biodiverse hotspots.

Regional Projects

Southeast Asia is incredibly rich in biodiversity that is amongst the world's most threatened. The rapidly growing affluence in Asia has led to increased demand for exotic food and products made from animal parts. Many species, particularly pangolins, turtles and tortoises, are disappearing at alarming rates. During the reporting period, WRS continued to support some of the projects it had funded in previous years, and also expanded funding support for new projects with greater focus on turtles, tortoises, orangutans and pangolins.



Primate Conservation - Orangutan, Snub-nosed Monkey, Javan Gibbon and Slow Loris

Reintroduction of orangutans in West Kalimantan By Yayasan International Animal Rescue, Indonesia

Bornean orangutans are declining throughout their range due to habitat destruction, fragmentation and encroachments. As a result, the number of orangutans in need of rescue and rehabilitation has increased dramatically. The ultimate goal of the project is to release the rehabilitated orangutans back into suitable forest habitat in the wild.

WRS has been supporting Yayasan International Animal Rescue in the reintroduction of Bornean orangutans in west Kalimantan since 2013. Three rehabilitant orangutans have been successfully reintroduced into the Gunung Tarak protected forest. Intensive post-release monitoring is currently being supported, and the information collected will be extremely useful in guide future reintroduction efforts.

Funding Veterinary equipment to support orangutan rehabilitation and reintroduction By Borneo Orangutan Survival Foundation, Kalimantan

This is another Borneo orangutan conservation project supported by WRS. The Borneo Orangutan Survival Foundation (BOS) rescues and

rehabilitates at risk Borneo orangutans before releasing them back into the wild. However, their veterinary teams are lacking basic equipment needed to treat rescued orangutans in critical condition. The funding from WRS enabled BOS to purchase essential equipment for the rescue and rehabilitation programme. As a result, the rate of recovery improved and more orangutans can return to their forest homes.

Mitigating Human Orangutan Conflict in Sumatra By Orangutan Information Centre

Much of the Sumatran orangutan's forest home have been destroyed due to agricultural expansion. With natural food hard to find, orangutans often venture into farms to raid crops, creating human-orangutan conflict.

To address the problem, Orangutan Information Centre in Sumatra set up its Human Orangutan Conflict Response Unit (HOCRU) in 2010 to respond to conflict situations, translocate orangutans at risk and to train local communities to humanely protect their crops from orangutan raids.

WRS supports the work of HOCRU in mitigating human-orangutan conflict. Support also includes funding for the veterinary internship programme and veterinary equipment for field operations.



A male orangutan being rescued by the Human Orangutan Conflict Response Unit in Sumatra. It would subsequently be translocated to a forest reserve. With deforestation, wild orangutans face the difficulty of finding natural food. They venture into farms and oil palm plantations and risk being killed.

Conserving The Tonkin Snub-nosed Monkey in Khau Ca Forest, Northeast Vietnam
By Primatologist Le Khac Quy

The Tonkin snub-nosed monkey is endemic to Vietnam. It is among the top 25 most endangered primates in the world, severely threatened by deforestation and intensive hunting.

Since 2009, WRS has been supporting the conservation work on the Tonkin snub-nosed monkey by primatologist Le Khac Quy and his team of local research assistants. They monitor the population and habitat, and conducted an assessment of the threats to the monkey. They also patrol the forest regularly to prevent poaching and encroachment of the protected area. The team also engages the community and trains local villagers to help monitor illegal human activities.



Tonkin snub-nosed monkey - among the world's top 25 most endangered primates.

Conserving Javan Gibbon Habitats and Promoting Shade-Grown Coffee in Java
By Coffee & Primate Conservation Project Team



Javan or silvery gibbon

The Javan or silvery gibbon is threatened by severe habitat loss and fragmentation. There is a population of about 4,000 left in west and central Java. The Coffee & Primate Conservation Project (CPCP) team is working to conserve this ape through engagement with the community and farmers, and improving sustainable agricultural practices. The team works with farmers to grow shade-coffee under forest canopy. This means that there is no need to clear forests for coffee cultivation. It is a win-win situation for all as the forest home of the Javan gibbon and other animals is protected and at the same time, the farmers' livelihood is secured. CPCP also trains the farmers to reduce pesticide and chemical fertilizer use and to become stewards of the forest that surrounds their villages.

WRS supports CPCP's community engagement work, and had sent an agricultural economist to advise farmers on improved coffee growing and

processing methods. It is hoped that high quality coffee can eventually be produced and sold at WRS F&B and Retail outlets to promote conservation awareness.



Shade coffee is grown under forest canopy - this means that the forest homes of animals are protected and the livelihood of farmers ensured. WRS is working towards retailing shade coffee at its F&B and retail outlets.

Saving the Indonesian Slow Loris through mitigating its illegal trade
By Yayasan International Animal Rescue Indonesia

The Indonesian slow loris is openly sold in many parts of the country even though it is protected under domestic and international law. The massive illegal wildlife trade is a more serious threat to the slow loris than habitat loss. WRS supports Yayasan International Animal Rescue Indonesia (YIARI) in its effort to mitigate the trade.

YIARI carries out undercover investigations and monitors the trade. They conduct workshops to educate law enforcement officials on the extent of the illegal activities and assist in medical check-ups and species identification of confiscations. Awareness campaigns were activated nationally and internationally.



Slow loris - a victim of the illegal pet trade

Elephant Conservation

Mapping Elephant Distribution and Mitigating Human-Elephant Conflict (HEC) in Peninsular Malaysia
By Management and Ecology of Malaysian Elephants (MEME)

Asian elephants have become endangered due to habitat loss and forest conversion for agriculture, development and mining. The wild elephant population in Peninsular Malaysia is estimated at 1,200. Owing to habitat loss through human encroachment, elephants often wander into plantations, creating human-elephant conflict (HEC).

Current strategies in mitigating human-elephant conflict in Malaysia is through translocation

of elephants and electric fences. To improve mitigation efforts, MEME carries out surveys and GPS-telemetry to produce a distribution map of elephants and human-elephant conflict areas in Peninsular Malaysia. MEME has made recommendations to the Wildlife Department of Malaysia on the management of HEC based on the comprehensive data collected. With WRS' support, MEME has successfully completed surveys in the states of Selangor, Johor and Terengganu.



As human activities expand deeper and deeper into the forest homes of Asian elephants, human-elephant conflicts become inevitable. In-depth studies and surveys are important for formulating measures to mitigate such conflicts.

Laos Captive Elephant Care and Management Programme & Elephant Hospital By Elefant Asia



WRS supports Elefant Asia in providing mobile veterinary care for the captive elephants in Laos. Many logging elephants suffer from injuries, and abscesses and calluses caused by work chains.

Laos is home to about 470 captive elephants, many of which endure terrible hardships working in the logging industry. Working elephants get abscesses and calluses caused by work chains, as well as broken legs and foot injuries. They also suffer from digestive problems, exhaustion and malnutrition.

WRS supported Elefant Asia in providing mobile veterinary care for captive elephants in remote

areas of Laos. Elefant Asia also trained mahouts to render medical care to elephants so that treatments do not lapse in the absence of veterinarians.

As the logging industry has declined in recent years, many mahouts and their elephants are jobless. WRS worked with Elefant Asia to ensure alternative livelihoods for the mahouts so that they can continue to care the elephants.

Mitigating human-elephant conflict in Indonesia By Veterinary Society for Sumatran Wildlife Conservation (VESSWIC)

With a remaining population of about 2,000 wild Sumatran elephants, this critically endangered subspecies is on the brink of extinction. It is threatened by habitat loss, human-elephant conflicts and illegal killing.

VESSWIC, founded in 2003, provides veterinary expertise and other services to help conserve Sumatran wildlife. WRS supports a Conservation Response Unit (CRU) managed by VESSWIC. The Response Unit has been conducting patrols to detect and prevent illegal activities in the Mount

Leuser National Park area. Due to the monitoring activities, the Unit was able to help mitigate human-elephant conflict by driving wild elephants away from the villages before they were able to venture into the farmland, thus preventing damage of crops. The Unit has also trained the local community in effective ways of mitigate human-elephant conflict. The captive elephants of the CRU have significantly increased the numbers of tourists visiting Tangkahan, providing tourism income for the locals. This benefit has convinced them to stop forest destruction and to protect the forests instead.

Pangolin Conservation

Movements of the Palawan Pangolin By Katala Foundation

The Palawan pangolin is one of eight pangolin species. It is illegally traded for its blood, meat, skin and scales, resulting in a fast decline in its population. Research and conservation efforts for the species are severely lacking, making conservation efforts difficult.

WRS supports Katala Foundation's field work, which has filled the knowledge gap on movement patterns, the home range and population of Palawan pangolins. The information is especially important in designing a protected area for the species. It will also be useful for management of the Palawan pangolin under human care, which may be needed if a rescue facility is established in the near future.

Rescue facility for pangolins in Northern Myanmar By Myanmar Wildlife and Forest department (MOECF)

The pangolin population in Myanmar is not well studied and under tremendous threat due to the illegal trade. Live pangolins are often confiscated, and care for them is inadequate.

WRS has been successful in caring for and breeding pangolins. Armed with the husbandry knowledge, it is assisting Myanmar Wildlife and Forest department in the establishment of a rescue centre to house and provide medical care for rescued pangolins before releasing them back into the wild.



The pangolin is believed to be the most trafficked animal in the world. Each year, thousands are killed for their scales, meat and blood, mainly to meet the demand in China and Vietnam.

Tiger and Bear Conservation

Citizen Action To Save The Malayan Tiger By Malaysian Conservation Alliance for Tigers (MYCAT)



There are fewer than 300 Malayan tigers left in the forests of Peninsular Malaysia. The greatest threat to the survival of this critically endangered species is poaching for the illegal trade in tiger body parts. Habitat loss, prey depletion and conflict with humans add to the problem.

In 2010, Malaysian Conservation Alliance for Tigers (MYCAT) started a conservation initiative to involve members of the public. They launched the Citizen Action for Tigers (CAT) Walk. They train volunteers to assist forest rangers in monitoring the Sungai Yu River Wildlife Corridor. This area is an important conduit between Taman Negara National Park and the Main Range, which are the two largest tiger landscapes in Malaysia. The ongoing CAT Walks have seen a drastic decline in the number of snares found in the Sungai Yu River Wildlife

Corridor, indicating that poachers are deterred by the presence of volunteers and the CAT Walk programme. Human encroachment into Taman Negara National Park has also declined. With WRS's support, 68 CAT Walks covering 421km have been conducted at Sungai Yu River Wildlife Corridor.

In early 2015, MYCAT expanded the CAT Walk programme to 5Day/4Night and named the new initiative 'Realm of the Tiger' to reach out specifically to the zoo community. Head Keeper Anand Kumar and Deputy Head Keeper Sesth Said from WRS participated in the inaugural 'Realm of the Tiger' programme. Inspired by the trip, they have been sharing their experience with WRS' guests to help raise awareness about the plight of tigers.



Head Keeper Anand Kumar and Deputy Head Keeper Sesth Said from WRS participated in the the inaugural **Realm of the Tiger** programme, a CAT Walk for the zoo community. Tiger scratch marks and scats were observed by them during the trip.

Stingray Conservation

Field Research of Giant Freshwater Stingray By Veterinary Medical Aquatic Animal Research Centre (VMARC), Chulalongkorn University



Mr Chow Hon Yien, Junior Aquatic Management Officer, River Safari (in blue and orange shirt) joined the research team in Thailand to learn more about in-situ conservation work on the giant freshwater stingray.

The giant freshwater stingray is among the world's largest freshwater fish and can weigh up to 600kg. It is found in several rivers in Thailand, including the Mekong and Chao Phraya. Sensitive to high levels of ammonia and nitrate, the giant freshwater stingray can be used as a bio-indicator of habitats. Sadly it is critically endangered by overfishing, habitat degradation and pollution.

Very little is known of this giant fish. VMARC's goal is to study the species in order to implement effective conservation measures to save it. They study the stingray's breeding cycle and the reproductive hormone levels of males and females in preparation to start a breeding programme.

WRS supported VMARC by providing veterinary equipment to capture and tag giant freshwater stingrays and to conduct haematology analysis. The research has shed light on how to determine the sexual maturity of the stingray.

In November 2015, River Safari Junior Aquatic Management Officer Chow Hon Yien joined the team at their research site in Amphawa district by the Mae Klong River. He assisted with the capture and release of four stingrays and in the process learned to perform blood draw, ultrasound and collection of venom.

Arresting The Decline In Sun Bear Populations Through Strategic Conservation Planning By Free The Bear Fund



WRS' support for a holistic plan conservation action plan is an important step towards saving the Malayan sun bear, which is probably the most threatened of all bears.

The sun bear is the least studied and possibly most threatened bear species. Over the past 30 years, its population has declined by over 30% because of habitat loss and fragmentation and poaching for the illegal trade in wildlife pets, meat and medications.

Through WRS' funding support, Free The Bear organization facilitated the 1st International Symposium on Sun Bear Conservation and

Management, bringing together conservationists and researchers to analyze threats to the bear, its distribution and the effectiveness of conservation efforts thus far. As follow-up action, a first workshop of its kind on Integrated Sun Bear Conservation Action Plan was organized to discuss issues highlighted at the symposium and a holistic five-year action plan integrating ex-situ and in-situ conservation efforts to save the sun bear.

Saola Conservation

Saving Saolas In Laos By IUCN SSC Saola Working Group and Global Wildlife Conservation

The saola, a hoofed animal, was only discovered in May 1992, and was the first large mammal discovered anywhere in the world since 1936. Found only in Laos and Vietnam, the saola is a critically endangered ungulate, with fewer than 250 in the wild. It is of little value in the wildlife trade. However, it is often caught in snares, set up mostly by poachers for wild boars and deer to supply the illegal wildlife trade, driven by an increased demand for traditional medicines and bush meat in China and Vietnam.

Improved protection, particularly snare removal, is key to saving the saola from extinction. WRS supports in recruitment, training, equipment and salaries for rangers to conduct patrols in Xe Sap National Protected Area, Laos. In 2015, more than 58 poacher camps were destroyed and 1,758 snares were removed. This was a great achievement, not only in protecting the saola but also the other animals that share the saola's forest home.



Three of the 1,758 snares removed by the rangers patrolling Xe Sap National Protected Area. The salary of the rangers is supported by WRS. The saola is often trapped in snares meant to trap wild boars and deer for the illegal wildlife trade.



The Saola, discovered in May 1992, is an elusive hoofed animal found only in Laos and Vietnam.

Turtle Conservation

Forest Turtle Conservation, Rescue and Rehabilitation By Katala Foundation Inc, The Philippines



WRS responded swiftly to Katala Foundation's call for help to rescue 4,312 confiscated freshwater turtles. It provided funding and veterinary support. Dr Sonja Luz from WRS was on site to treat the confiscated turtles, which were in poor health conditions.

The Palawan forest turtle is critically endangered, threatened by over exploitation for the international pet trade, habitat destruction and local consumption. To conserve this turtle, Katala Foundation Inc (KFI) adopted it as their focal species.

The Foundation holds the only assurance colony of the Palawan forest turtle but it faces challenges in breeding the species. More research and improved facilities will certainly help in enhancing the success rate of breeding this turtle under human care. WRS provided funding support to enable research to be conducted and husbandry conditions to be improved.

In June 2015, a total of 4312 live and 90 dead freshwater turtles were confiscated and sent to KFI. Of these, 3,907 individuals were the Palawan forest turtle. Owing to the lack of equipment and facilities, as well as poor health conditions of the confiscated turtles, KFI struggled with the rescue effort.

WRS responded swiftly to KFI's call for help with financial support of SGD 15,000 and veterinary support. Dr Sonja Luz, Director of Conservation and Research, WRS travelled to KFI with medical supplies and assisted in the rehabilitation process. A total of 2,828 turtles were eventually rehabilitated and released, an incredible feat as success rates for rescue and rehabilitation efforts for turtles are usually extremely low. Timely response and teamwork had saved the turtles.



Home sweet home - 2,828 turtles were saved and eventually released back into the wild, deep in the forest not accessible to motor vehicles. It is hoped that the release sites will provide a safe haven for these reptiles.

**Saving Cambodia's Royal Southern River Terrapin
By Wildlife Conservation Society (WCS)**

The Southern river terrapin, Cambodia's national reptile, is one of the rarest terrapins in the world. The species was presumed extinct in Cambodia until 2001, when a small population was re-discovered along the Sre Ambel River, in Koh Kong Province. The discovery led to the protection of the area by royal decree. Success in protecting the nests, raising hatchlings and confiscating poached turtles means that expansion of the existing facility is needed.



The southern river terrapin is critically endangered and WRS is contributing to its conservation by caring for an assurance colony, which is thriving.

Funds from WRS enabled the project team to enhance existing ponds, install a filtration system and improve site security to prevent poaching. The new facility strengthens the team's efforts in caring for an assurance population of the Southern river terrapin to ensure the survival of the species even if a catastrophic event wipes out the terrapins in the wild.

**Ensuring the Survival of the Roti Island Snake-Necked Turtle
By Wildlife Reserves Singapore (WRS), Turtle Survival Alliance (TSA) and Wildlife Conservation Society (WCS)**



Owing to its unusual appearance, the Roti Island snake-necked turtle is one of the most sought after illegal pets.

The critically-endangered Roti Island snake-necked turtle is one of the most sought after animals in the pet trade. In 2001, it was declared illegal to trade this turtle. However, the protection came too late. Over collection has led to sharp decline in its number. Today, only two or three populations remain in the central highlands of Rote Island.

In collaboration with the Wildlife Conservation Society and the Turtle Survival Alliance, WRS has set up an assurance colony of Roti Island snake-necked turtles to ensure the survival of the species even if a catastrophic event wipes out the turtles in the wild. WRS staff also visited Roti island to explore in-situ project collaboration with TSA and WCS.

By Wildlife Reserves Singapore (WRS), Turtle Survival Alliance (TSA) and Wildlife Conservation Society (WCS)

The Vietnamese pond turtle is critically endangered and can only be found in a small area in central Vietnam. It was abundant in the 1930s but after 1941 it was not sighted in the wild for 65 years until a population was rediscovered in 2006. Despite its rarity, the Vietnamese pond turtle is still being traded as food. Its habitat is also threatened with agricultural expansion, aquaculture, and development.

Collaborating with the Wildlife Conservation Society and the Turtle Survival Alliance, WRS has set up an assurance colony of Vietnamese pond turtles in Singapore Zoo. WRS is committed not only to safe-keep this assurance colony but also to breed the species and in future release the offspring back to into the wild.



The critically endangered Vietnamese pond turtle is also known as the Annam leaf turtle. The assurance colony in WRS is thriving and it is hoped that the turtles will breed soon to add to its gene pool.

Snake Conservation

Conserving The King Cobra in Rural Northeast Thailand By Suranaree University of Technology



King cobra

The king cobra is the world's largest venomous snake. As a predator, it plays a critical role in maintaining the balance in an ecosystem. However, not much is known about this species as it is understudied. The king cobra is often found around human habitation, creating human-snake conflict.

WRS partnered the project team from Suranaree University of Technology to study how king cobras use human-dominated areas. The data revealed



Apart from funding support, WRS also participated in capacity building by sending Deputy Head Keeper Jose Pedro to share with the project team methods of capturing king cobras in a safe manner.

the seasonal movements of the snakes and have enabled the team to devise strategies to reduce human-snake conflicts in villages. A non-lethal snake removal programme for villages and seminars to educate the locals on king cobras are on-going conservation efforts involving the community. WRS' Deputy Head Keeper, Jose Pedro, also visited the team to share methods of capturing king cobras in a safe manner.

Bird Conservation

Breeding and Reintroduction of The Bali Starling By Begawan Foundation

Poaching of Bali starlings for the illegal songbird trade has led to a drastic decline in its population. The species is now listed as critically endangered. Begawan Foundation aims to save the species through a breeding and reintroduction programme. WRS assists the Foundation in maintaining high standards of veterinary care and husbandry through capacity building. In October 2015, two WRS staff visited the project site to provide advice on improving husbandry for the birds in Begawan Foundation.

To strengthen the genetic health of the species, WRS and the Foundation collaborate on an exchange programme. WRS sent Bali starlings bred at Jurong Bird Park to the Foundation, in exchange for unrelated birds so that new blood can be



Bali starling

introduced to the breeding group in Jurong Bird Park.

Reintroduction of the black-winged starling in West Java, Indonesia By Cikananga Conservation Breeding Centre

The black-winged starling is found naturally only in Java. It is critically endangered because of poaching for the illegal songbird trade. To conserve the species, Cikananga Conservation Breeding Centre embarked on breeding and reintroduction programme to enhance its wild population.

By providing funding support for this project, WRS helps the Breeding Centre fulfil its objective in conserving the black-winged starling through breeding, reintroduction as well as community education.

Since Cikananga embarked on the reintroduction programme, four chicks have hatched at the release site. In June 2015, five more birds were released. It is hoped that this programme can help to repopulate the black-winged starling in its natural habitat in Java.



Black-winged starling

Establishing A Field Station To Facilitate Conservation of The Philippine Cockatoo By Rasa Island Wildlife Sanctuary and Katala Foundation, The Philippines

Poaching and habitat loss have severely threatened the Philippine cockatoo. Fortunately, the Rasa Island Wildlife Sanctuary in Narra, Palawan remains a stronghold for this critically endangered species. Katala Foundation Inc. is helping to conserve the cockatoo through a breeding programme. In order to accommodate its field staff, as well as visiting supporters or researchers to carry out conservation-related activities, a field station in Narra needs to be established. WRS' funding support will enable more conservation activities to be conducted. Construction of the field station is well under way.



Philippine or red-vented cockatoo



Local Field Projects Supported By Wildlife Reserves Conservation Fund (WRSCF)

WRSCF was set up with the purpose of conserving Singapore's threatened native wildlife. It seeks to fund projects which make a pragmatic, substantial and long-lasting contribution to local biodiversity conservation. During the reporting year, WRSCF supported a total of 13 projects and one workshop for the Asian Elephant Conservation Group.

With greater awareness, interest in local wildlife has deepened and it is encouraging to note that WRSCF has been receiving increased numbers of project proposals.

Pangolin Conservation

The Sunda pangolin is one of the few remaining mammalian species in Singapore. Urbanisation has resulted in the fragmentation of its forest habitat. Many pangolins have been killed in road accidents in Singapore.

Not much is known about the local Sunda pangolin and understanding the natural history, genetics and behaviour of this species will contribute to formulating and implementing effective conservation measures.



While pangolins in other parts of Asia are poached mainly for the illegal wildlife trade, those in Singapore are frequently killed in car accidents. Understanding the ecology and behavior of pangolins in Singapore is important for implementing effective conservation measures.

Study On The Sunda Pangolin Using VHF And GPS Tracking Devices By Helen Catherine Nash

This project builds on previous pangolin tracking studies and aims to further the understanding of movement, home range and habitat selection of Sunda pangolin in Singapore. The tracking results revealed that the pangolins were surprisingly comfortable using urban areas including roads, tracks, a golf club, a school, drains, construction sites and temporary housing. This suggests that local pangolins have in some ways adapted to living in an urban environment. The data collected will help to enhance conservation management plans for the species.



Ecology And Genetics Of The Sunda Pangolin Using NGS Technology By Amrita Srivathsan

Recent research suggests that pangolins under human care over a period of time may possess different gut microbes compared to those in the wild, creating potential hurdles for reintroduction to the wild. By using Next Generation Sequencing (NGS) technology to study the gut contents and faeces of pangolins, information on their diet, gut microbes and parasites can be obtained. The results of the study may help in establishing better diet management of pangolins under human care and eventual reintroduction in the wild.

NGS technology can also be used to sequence the genomes of individual pangolin and the information gathered may be used to enhance breeding and reintroduction efforts.

Evaluate The Use Of Trained Dogs For Conservation (with a focus on the Sunda Pangolin) By Louise Fletcher

Trained dogs have been used as a unique and efficient tool in field conservation work involving olfaction-based investigations. However, in Southeast Asia, the use of such dogs in locating scat and live targets is uncommon.

This project aims to evaluate training a dog team (trainer and dog) to provide WRS with an efficient tool to conduct Environmental Impact Assessments (EIAs) that involve elusive species such as pangolins and primates. The dog team will be useful for long term population studies and surveys on the local population of the Sunda pangolin.



Tracking pangolins to study their behavior involves tagging them with a tracking device before releasing them back into the wild for close monitoring.

Horseshoe Crab Conservation

The coastal horseshoe crab and the mangrove horseshoe crab are native species in Singapore. These creatures are threatened by coastal development, land reclamation, pollution and entanglement in abandoned fishing nets. The coastal horseshoe crab can still be spotted in small numbers along the coasts of Changi Creek, Kranji Dam and Kranji-Mandai mudflats. The Kranji-Mandai mudflats are also the only habitat for the mangrove horseshoe crab. Any habitat modifications are likely to pose adverse effects on both species of horseshoe crabs.

Population Ecology and Breeding of The Mangrove Horseshoe Crab By Laura-Marie Yap Yen Ling

The mangrove horseshoe crab is a native species in Singapore. Its survival has been threatened by coastal development, land reclamation, pollution and entanglement in abandoned nets.

This study aims to collect sufficient data so that the breeding and spawning grounds of the mangrove horseshoe crab can be sanctioned as a nature reserve for these arthropods. Breeding of the horseshoe crab under human care and eventual reintroduction into the wild may be needed to ensure its survival. Information gathered on its growth pattern, foraging and breeding behaviours will be critical to the success of such initiatives. The acquired knowledge will also help in the development of an effective conservation programme to manage its population and natural habitat.

Awareness Campaign For Horseshoe Crabs By Mak Kin Weng Linus

As with any wildlife conservation project, creating awareness through education and public engagement is a critical factor for success. This awareness campaign involves a survey on public knowledge about horseshoe crabs as well as efforts to educate the public, especially primary and secondary school students, on the threats faced by horseshoe crabs. It is hoped that with great awareness, members of the public will be inspired to take actions to care for the horseshoe crab.

Horseshoe crabs are ancient animals. They have been around over 400 million years ago, way before dinosaurs roamed the Earth. These ancient animals are now under serious threats but it is uplifting to know that much efforts have been channeled towards conserving them.



Freshwater Crab Conservation

Saving the Singapore Freshwater Crab from Extinction By Daniel Ng Jia Jun



Protecting the critically endangered Singapore freshwater crab (*Johora singaporensis*) from extinction is a significant step towards protecting Singapore's nature heritage.

This freshwater crab is uniquely Singapore and found nowhere else in the world. Located only in three small streams on our island, it is one of the top 100 most threatened species in the world. A slight change in its habitat could wipe out the species completely. The project involves monitoring the population of this crab in the streams and the findings have led to the introduction of the species in a new suitable location. A facility in WRS has been set up to house the species, and hopefully in time, to breed it for release into the wild.

Note :
For additional information and national strategy on the conservation of the Singapore freshwater crab, please visit www.nparks.gov.sg/biodiversity/community-in-nature-initiative/singapore-freshwater-crab

Bird Conservation

Population Structure of The White-Rumped Shama in Singapore By Ng Ying Xin Elize

The white-rumped shama is listed as critically endangered in Singapore. It is popularly kept as a songbird, mostly imported from the other Asian countries with some locally poached. The 'wild' white-rumped shama population in Singapore is likely to include caged bird escapees and unwanted released individuals. This project aims to determine the composition of the 'wild' population, and the impact of escaped and released shamas, if any, on the population structure. The result of this research will help to advise the relevant local authorities



White-rumped shama

on changes to be made to the songbird trade in Singapore to enhance the conservation of the native white-rumped shama.

Study On Population Viability of Babblers By Cros Emilie, National University of Singapore

Local birds such as the babbler is very sensitive to habitat fragmentation. With rapid urban development in Singapore, only four species of babblers remain.

This study, into its second year, analyses the genetic diversity of the four species of babblers to determine the viability of their populations. Over 150 babblers have been studied. The project aims to understand how habitat modifications affect the birds so that appropriate conservation measures can be recommended to prevent extinction of the remaining species of blabbers.



Studies have shown that babblers have their own language. They use 15 different sounds for specific situations, and are able to send meaningful messages. Studying these birds may help us understand the evolution of our language.



Photo Credit David Tan

Milky stork

Milky Stork Conservation Genetics By Dr Frank Rheindt

The milky stork is believed to have ranged in Singapore but is now locally extinct. Its population in other parts of Southeast Asia is on a decline. WRS holds a population of the milky storks under its care and a breeding program for this endangered species has become a priority. However, it is important to determine the genetic identity of these milky storks as there is hybridisation to some extent between this species and the closely related painted stork. The research, a collaborative effort between WRS and National University of Singapore, aims to carry out molecular analysis of both stork species.

Understanding the genetic status of the milky and painted storks will help in establishing a breeding programme for pure milky storks in Singapore for its continued survival.

Snake Conservation

Tracking Reticulated Pythons in Singapore By Mary-Ruth Low

Wild pythons frequent housing compounds and industrial warehouses in Singapore. After being captured, they were brought to Singapore Zoo for tagging with a passive inductive transponder before being released into secondary forests or wasteland areas. However, these snakes appear to have strong homing instincts as they regularly return to their initial capture sites.

To understand the natural and post-translocated movements of reticulated pythons, this project uses radio and GPS telemetry to track individual pythons. A total of 27 snakes are being monitored and the information gathered will be useful for implementation of effective measures to prevent the snakes from re-entering their initial capture sites and help to mitigate human-snake conflicts.



Researcher Mary Ruth tracking wild reticulated pythons with radio and GPS telemetry.



A wild reticulated python well camouflaged among leaf litter. Can you spot it?

Ant Conservation

Study On Singapore's Native Ant Communities By Mark Wong Kah Loon

Unknown and unloved - despite the important role ants play in our ecosystem, very little is known about them. The objectives of the study are to systematically document the diversity of local ant species and produce the first updated species inventory since the last study done in 1924. It also aims to identify rare and vulnerable native ant communities, their ecology and geographic distribution. Publishing educational resources on ants, hosting ant workshops and fieldwork for volunteers to generate public awareness will be the other outcomes of this project.



Photo Credit: David Tan



Photo Credit: David Tan



Photo Credit: David Tan



Photo Credit: David Tan



Photo Credit: David Tan



Photo Credit: David Tan



Photo Credit: David Tan



Photo Credit: David Tan

1. Straw-headed bulbul
2. Grey-headed fish eagle
3. Purple heron
4. Common birdwing
5. Magpie robin
6. Four-lined tree frog
7. Green crested lizard
8. Colugo

Biodiversity Survey

Wildlife In Our Backyard By Paige Lee

This study, third year in running, aims to understand the diversity of local fauna. A total of ten surveys - five on birds, four on herpetofauna and one on amphibians were conducted in Singapore Zoo, Night Safari and River Safari. Owing to their location within the Central Catchment Nature Reserve, these parks present themselves as an important wildlife corridor and unique foraging and breeding grounds for local wildlife. Some 250 volunteers helped in the surveys, which were great platforms for community engagement in local wildlife conservation.



Ten biodiversity surveys were conducted during the reporting year, with the efforts of WRS staff and some 250 volunteers.

Workshops And Conferences

An unprecedented number of conferences, workshops and strategy meetings were organised by WRS during the reporting year. Taking the leadership to provide platforms for sharing, learning and collaboration among colleagues within the zoo fraternity helps to take WRS a step closer to its vision to be a world-leading zoological institution.

SEAZA Conference (1 to 4 November 2015)

WRS hosted 23rd Southeast Asian Zoos and Aquariums Association (SEAZA) Conference, a significant event in the calendar of regional zoos. Focusing on the theme 'A Common Goal Towards Sustainable Captive Population of S.E.A.', the conference aimed to promote coordinated and collaborative efforts in managing threatened species in the region to achieve optimal conservation outcomes. The conference was well-attended by 201 participants and created good platforms for learning, sharing and networking. A one-day post-conference workshop on Education Master Planning and Interpretation was organized for 16 participants.

Specialist Workshops and Meetings

Apart from the SEAZA conference, WRS team was kept busy with cross-agency coordination to host the following events :

- National Strategy Meeting for the Banded Leaf Monkey
- Asian Elephant Conservation Group Meeting (funded by WRSCF)
- Asia's First Songbird Crisis Summit
- Helmeted Hornbill Meeting
- 1st Asian Elephant Endotheliotropic Herpes Virus Strategy Meeting
- ASEAN Captive Elephant Working Group (ACEWG) 2ND Meeting
- Asian Primate Red List Assessment Workshop
- Sundaic Freshwater Fish IUCN Red List Workshop



The opening ceremony for the 23rd SEAZA conference was graced by Ms Susan Hunt, President, World Association of Zoos and Aquariums, Mr Mike Barclay, Group CEO, Mandai Park Holdings, Mr S Dhanabalan, Chairman, Mandai Park Holdings, Mr Phan Viet Lam, President, SEAZA, Dr Cheng Wen Haur, 1st Vice President, SEAZA and Deputy CEO, WRS, and Dr Jason Chin, 2nd Vice President, SEAZA.

Conserving Local Biodiversity Through Stakeholder Engagement

Protecting local wildlife can be effective only with cross-agency collaboration and engagement of all stakeholders. Four working groups comprising representatives from WRS, National Parks Board (NParks), Agri-food and Veterinary Authority of Singapore (AVA), Animal Concerns Research and Education Society (ACRES), the universities and relevant specialist groups met regularly to strategise conservation measures for the Singapore freshwater crab, Sunda pangolin, common palm civet and python.

One significant outcome of the collaboration was a strategy document for conservation of the Singapore Freshwater Crab. The document sets the direction and provides guidance for stake holders to work together in a coordinated manner to save one of the world's top 100 most threatened animals. For details of the document, please visit : www.nparks.gov.sg/biodiversity/community-in-nature-initiative/singapore-freshwater-crab

Research Projects

During the reporting year, WRS staff led or facilitated a total of 51 research projects with subject specialists, researchers and students. Of these projects, fifteen were completed and the rest on-going. The completed projects were :

- Haematology and serum biochemistry parameters for wild and captive Sunda pangolins.

- Blood reference ranges of captive and wild Sunda pangolins.
- Retrospective study of capillariasis in toucans.
- Prevalence of Capillaria spp. and Coccidia spp. in five species of Bird-of-Paradise at the Jurong Bird Park.
- Evaluation of stress levels of proboscis monkey collection in Singapore Zoo.
- An investigation into the effects of isolation on the stress levels of captive common brushtail possums.
- Examining the Effect of Visitor Interactions on the Welfare of Aquatic Species in a River Safari Touch Pool by Monitoring Stress-Related Behaviours and Water Quality.
- A population-genomic assessment of white-rumped shamas across Southeast Asia.
- Non-invasive techniques to identify species from genetic material.
- Personality of the St. Andrew cross spider and its effect on web-decorating behaviour and foraging success.
- Facial attractiveness in macaques.
- Urban common palm civets in Singapore: distribution, breeding pattern and morphological measurements.
- Features of anthropogenic bat roosts in Singapore.
- Investigating the roosting behaviours of fruit bats in Singapore Zoo.
- Surveys to understand guest perception of conservation and the evaluation of the impact of the 'You Buy They Die' campaign.



Cross-agency collaboration and stakeholder engagements focus on conservation strategies for four key local species - Sunda pangolin, python, Singapore freshwater crab and common palm civet.

Engage And Inspire

WRS continued to explore innovative platforms and deepen partnerships to reach out to different segments of the community on conservation messaging and call to action. Evaluation surveys revealed that the conservation messaging has been effective in raising awareness and inspiring actions in the participants of the education programmes.

Why Did The Pangolin Cross The Road?

To generate greater awareness for local wildlife, the first-ever children's bilingual storybook on the pangolin was published by WRS, and has been used as a supplementary reader in many pre-schools. The production cost of the publication was funded by Lee Kuan Yew Bilingualism Fund. It came as a pleasant surprise that the storybook not only inspired children and teachers but also youths to want to do their part in saving the pangolin, a local mammalian species found in the forested areas of Singapore.



Engaging the young ones in local wildlife conservation through education is the first step towards protecting Singapore's biodiversity.



We are a group of students from River Valley High School. We are currently embarking on a project to raise awareness about the conservation of Singapore's fauna. Our project is to produce a picture story book that focuses on the Sunda pangolin, oriental pied hornbill and coral reefs. Through our research, we came across the book that you published, called "Why did the pangolin cross the road?" and it was the main inspiration for our project.

Toh SiHui, Amelia Tjia, Wei Qining and Liberty Neo

Educate and Empower

WRS parks continued to be immensely popular as Living Classrooms and welcomed a total of 155,000 school visitors, from pre-schools to tertiary institutions.

Support and funding from the Committee to Promote Chinese Language Learning (CPCLL) enabled 60 pre-schools to take part in 'Wow Wild Learn', a programme which is designed to encourage children to learn Chinese in an innovative way. It involves a half-day training workshop for pre-school teachers to equip them with the know-how to conduct learning journeys at River Safari, outreach school talks, self-guided

school visit to River Safari and provision of reading resources for the students.

Engagement on the wonders of the natural world and conservation issues was not limited to school visitors but expanded to connect with in-park guests. Key messages were weaved into marketing events held during the school holidays and major festivals. It is heart-warming to know that efforts to generate awareness about wildlife conservation through edutainment have reaped positive response. It is hoped that the positive experience sparks the desire for actions that nurture a better environment not just for wildlife but for ourselves as well.



Pre-school Chinese language teachers at the 'Wow Wild Learn' training workshop, during which they equipped themselves with the knowledge to conduct meaningful learning journeys for their students.



Pre-schoolers visit River Safari to learn Chinese in a novel way through an encounter with giant pandas Kai Kai and Jia Jia and the use of songs and stories.

All in all, it was a great experience for adults & kids alike. Many thanks to the programme creator, event organizer, the staff and the animal keepers. It's your vision, commitment and hard work in teaching children about birds/environment in interesting/stimulating ways that make all the difference that for sure would go well beyond these 2 days!

Kate, participant of Sleep With Penguins Family Camp



Overnight camps such as 'Sleep with The Penguins' at Jurong Bird Park, are very popular with schools and families. For WRS, the programmes created wonderful opportunities for deep engagement with the participants and to spark a sense of wonder about the natural world.

As the overseas travel markets mature and become more sophisticated, demand for customised programmes increases. One key area of growth is the overseas student travellers (OST) segment from China and a suite of programmes with Chinese content, particularly with sleepover itineraries, were launched to cater to this segment.

Beyond the gates of WRS parks, the conservation message and call to action continued to impact

students and members of public through outreach programmes including Istana Open House, Biodiversity Festival, visits to malls and schools. This year, WRS added two outreach programmes 'River Safari Flows to School' and 'Night Safari Glides to School', in addition to the existing ones 'Zoo Goes To School' and 'Bird Park Flies To School'.

'You Buy They Die' 2016

Following the positive outcome from You Buy They Die campaign 2015 in raising awareness in the illegal wildlife trade, a second phase was launched in March 2016 to target youths and working adults. A 360 mobile application, created by POSSIBLE and fronted by the yellow-crested cockatoo and Sunda pangolin, was used to reach out to the tech-savvy target audience about illegal wildlife trafficking. The 'Call to Action' element of the campaign was to invite netizens to pledge their support against illegal wildlife trade. The campaign, supported by Outdoor, Digital, Social and In-park communications, has garnered 30k pledges.



Guest Engagement Through Volunteers

During the reporting year, some 1,936 volunteers played the role of wildlife ambassadors and devoted 36,054 volunteer hours to engage and inspire guests. Apart from projecting a powerful voice for wildlife, the volunteers also extend a personal touch to enhance overall park experience for the guests.

Trainings for conversational Chinese were drummed up to equip volunteers with the proficiency to interact with the growing number of Chinese-speaking guests - an extremely important segment for target messaging on the illegal wildlife trade.

You Buy They Die campaign went outdoors on MRT trains, in addition to in-park communications, and digital and social platforms. It garnered tremendous publicity and 30,000 pledges against wildlife trade from netizens.



Volunteer Programmes FY15/16	No. of volunteers	No. of volunteer hour
Docents	138	3312
Conservation Ambassadors	87	2436
Wildlife Buddies Training	1071	6426
Work Experience Programme	62	4960
Avian/Zoology Keeper Volunteers	40	12800
Vet Volunteers	68	6120
WRS Events/ Projects	470	7121
Total	1936	36054

Sustaining Our Business

Against the backdrop of competitive tourism landscape and ever-changing business environment and consumer needs, WRS stays nimble and yet grounded by the growth pillars to remain sustainable, both financially and environmentally, through delivering exceptional guest experiences and world-class animal care, conserving biodiversity, growing revenue streams and adopting best practices in human resources and organizational processes.

The Icon Lives On

The late Ah Meng was synonymous with Singapore Zoo. This orangutan was a household name and still has a special place in the heart of many Singaporeans. She was also the only non-human recipient of Singapore Tourism Award for Special Contribution To Tourism. When she passed on, some 4,000 people attended her funeral.

On Feb 25, 2016, Ishta, Ah Meng's granddaughter, was renamed the new 'Ah Meng'. She was chosen among Ah Meng's offspring for her personality which is very similar to that of her late grandmother.

The new Ah Meng is the matriarch in the making - patient, friendly and caring towards other orangutans, the same qualities that set her late grandmother apart from the rest.

Icons as wildlife ambassadors is a powerful way to create emotional connections between park guests and animals. Such connections are crucial to building deep affinity for the natural world and inspiring the desire to protect it and its amazing life forms. It is hoped that the new Ah Meng continues to tug the heartstrings of many people and help spread the conservation message.



Ishta, the late Ah Meng's granddaughter, was chosen to be the new Ah Meng for her personality - patient, friendly and caring, just like her late grandmother (photo above).



Reeling In The Crowd



The tongue in cheek koala campaign in the vernacular captured the attention of many Singaporeans. Novel and creative marketing campaigns are important drivers for guest attendance.



WRS received a record number of 4.67 million guests, achieved through innovative product offerings, aggressive marketing and sales efforts, strategic partnership and excellent media relations. Apart from creative advertising campaigns, collaboration with partners such as NTUC, People's Association and SAFRA on yearlong on-site discount for their members certainly helped to reel in the crowd. Throughout the year, different admission promotions, bundle pricing for multi-parks and rides were also rolled out for both locals and tourists.

In conjunction with Jurong Bird Park's 45th anniversary, a campaign 'Generations of Fun' was organised during the June school holidays. Grandparents were accorded free admission to

the park and enjoyed bonding with their families across generations. Old school games such as Chaptah, Kuti Kuti, Hantam Bola and others allowed grandparents and parents to share with the younger generation the games they used to play. There were also Kampong Stories, a story-telling session during which participants learn how Singapore got her name.

The sales team continued to forge strong partnership with tour operators and expand the tourist markets, particularly in China and India through sales trips and strong presence at trade shows. Despite challenging global economic landscapes, WRS parks enjoyed strong tourist attendance, particularly from top five countries - India, China, Australia, Japan and Korea.

WRS parks remained as popular venues for corporate events, retreats and family days, bringing in good numbers of guests in a single day, for instance, Jurong Bird Park received a strong crowd of 10,000 guests for PAP Community Foundation Family Day.

Excellent media relations, high profile events and campaigns, and captivating stories have generated tremendous publicity and top-of-the-mind awareness for WRS. In addition to local and overseas media coverage, media junkets were organised to host journalists from China, India, Australia, the Philippines, Indonesia and Malaysia, providing them with insights into the unique and differentiated wildlife experiences WRS parks offer.

விலங்கியல் தோட்டத்தில் பொன்விழா கொண்டாட்டம்



ஐந்தாவது வருஷாண்டின் விளக்கம்

சிறப்பியல்புள்ள ஐந்தாவது ஆண்டு நிறைவை சிங்கப்பூர்வாசிகள் ஐந்தாவது வருஷாண்டின் முக்கிய நிகழ்வாகக் கொண்டாடினார்கள். ஐந்தாம் வருஷாண்டின் முக்கிய நிகழ்வாகக் கொண்டாட்டம் துவங்கியது. ஐந்தாவது வருஷாண்டின் முக்கிய நிகழ்வாகக் கொண்டாட்டம் துவங்கியது. ஐந்தாவது வருஷாண்டின் முக்கிய நிகழ்வாகக் கொண்டாட்டம் துவங்கியது.

விளக்கம்

ஐந்தாவது வருஷாண்டின் முக்கிய நிகழ்வாகக் கொண்டாட்டம் துவங்கியது. ஐந்தாவது வருஷாண்டின் முக்கிய நிகழ்வாகக் கொண்டாட்டம் துவங்கியது. ஐந்தாவது வருஷாண்டின் முக்கிய நிகழ்வாகக் கொண்டாட்டம் துவங்கியது.

鸚鵡做体检

保持健康不是人类的专利，鸟儿也需要定期接受健康检查。

裕廊飞禽公园在本月20日为园内34只鸚鵡 (pelican) 进行例常身体检查。整个过程大概三个小时。

兽医先为鸚鵡抽取血液样本进行检验，再让鸟儿服下驱虫药及打预防针。

这项常年身体检查有助于确保鸟儿保持健康，及早发现病征，给予治疗。

配合新加坡独立50周年的庆祝活动，本地居民可以申请成为Feather Friends会员，付一天票价就可全年免费进入飞禽公园。预知更多详情，可上 <http://members.wrs.com.sg/>。

(新加坡野生保育集团提供)



WRS to throw giant panda party for Kai Kai and Jia Jia

Children who are the same age as the panda pair will enjoy free entry to the River Safari for the month of September.

POSTED: 27 Aug 2015 17:09 UPDATED: 27 Aug 2015 16:31



Giant pandas Kai Kai and Jia Jia. (Photo: Goh Chiew Tong)

SINGAPORE: Children aged seven and eight will be given free admission to the River Safari from Sep 1 to 30, as part of birthday celebrations for giant pandas Kai Kai and Jia Jia.

First baby giraffe in nearly 30 years born in S'pore zoo

November 12, 2015

He was born taller than most of us are right now.

Jeanette Tan

It seems our resident giraffes are more Singaporean than we thought — this revelation coming after news of the Mandalay zoo welcoming its first baby giraffe in almost three decades; and in the nation's birthday month, no less.

He doesn't have a name yet (yep, it's a 'he'), and he was born on August 31, but with all younglings, his keepers and parents (Roni, from Israel, and Growie, from the Netherlands, both of whom migrated here in 2005) needed to spend the first few months of his life letting him grow in an environment protected from scary noises, camera flashes, stuff older animals are used to.

Our not-so-little unnamed friend was born towering 1.9m in length, and has since grown 40cm to his current height of 2.3m. But he's still a smallie compared to his parents, as you'll see in the pics below.



Meet Canola the Baby Manatee (5 photos)

Aquarists provide round-the-clock care for abandoned calf Canola and re-introduce her to her manatee family. — at River Safari, Singapore



Like Comment Share

780 Shares

11,984 people like this.

Most Relevant

An Evening In The Wild



F&B menus were periodically refreshed in response to guest feedback and to cater to the different segment of guests. Dining experience for catered events was enhanced with the launch of 'An Evening In The Wild'. The experience starts with sundown cocktail, in the company of the ankole cattle, followed by an exclusive tram ride before arriving at the tipi tent to be greeted by furry friends and a breathtaking view of the serene Seletar Reservoir at dusk. After a sumptuous dinner, great wine and company, the journey into the rainforest continues on the tram and ends off with Creatures of the Night Show.



Enhancing Retail Experience

The four retail outlets at Night Safari were renovated to feature fresh theming in Safari Shop, Glow Grotto, Artiforest and Village Bazaar, each with differentiated merchandise ranging from plush, garments to local confectionery and snacks.



Expanding Membership Base

As part of the SG50 celebrations, Jurong Bird Park rolled out 'Be A Feather Friend' membership recruitment drive. This year-long promotion offered conversion of a regular one-day ticket to annual membership so the guests can visit Jurong Bird Park as often as they wish and rediscover the attraction as a fun-filled, wholesome place where local families bond and create great memories. The promotion brought in 56,000 new members, an 80% increase over the same period last year.



Our People

WRS adopts forward-looking, best-in-class practices to develop human resources and improve business processes, with strong focus on nurturing highly-skilled, passionate staff to deliver world-class animal care standards for the living collection.

Training And Development

Great emphasis is placed on staff training to enhance skill sets needed to deliver exceptional guest experiences, improve work processes and enhance safety.

During the reporting year, each WRS staff fulfilled at least two training days. Training programmes were very diverse, ranging from courses on safety, first aid, guest experience delivery, specific software applications, leadership to animal management and enrichment.

Overseas study trips, conferences and workshops are key components for staff development, in particular to enhance domain knowledge and expert skills for the Life Sciences team, as well as to keep abreast with the latest best practices in the zoo fraternity. An intensive work exposure and attachment programme to some of the world's most reputable zoos was also put in place for key Zoology staff.

In April 2015, three staff members from Zoology and Veterinary were attached to Lone Pine Sanctuary, Australia, for training in preparation for the arrival of koalas on loan to Singapore Zoo.

Curator of Elephants spent almost two months (joined later by a Junior Animal Management Officer for elephants) visiting selected European and American wildlife institutions to study their elephant protected contact facilities, activity-based exhibits and guest interaction programmes. Primate and reptile keepers deepen their knowledge in their respective field through attendance of the Callitrichid Husbandry Workshop at the Durrell training centre, and Reptile and Amphibian Husbandry Workshop organized by the Australasian Society of Zoo Keeping and Symbio Wildlife Park respectively.



Saravanan, Curator of Elephants (second from the right) and Udhaya Kumar, Junior Animal Management Officer (fifth from the right) visiting San Diego Wild Animal Park during their study trip.



WRS has a passionate team who lives out the core values of the organization, always striving for excellence, working as a team and serving from the heart.



Internship & Work Attachment

WRS offers internship to students from technical colleges, polytechnics and universities to enable them to acquire life skills and work experience in an authentic learning environment. A Memorandum of Understanding with Republic Polytechnic resulted in a total of 34 students taking internship in WRS, up from 17 in the previous year.

Work attachment to Zoology, Veterinary and Education offers students and school teachers opportunities to acquire specialist skills in a different environment.

The internship and work attachment programmes have garnered very positive feedback from the participants and their schools. The engagement has created a path for WRS to achieving its goal as an employer of choice.

Staff Engagement

The Quarterly CEO's Townhall is an important platform for staff engagement and open communication. Apart from sharing updates on park developments and business progress, and recognising staff for outstanding performance, WRS' refreshed vision, mission and values (VMV) were reinforced through activities that encouraged active staff participation.

CEO's luncheon for staff was launched to promote closer interaction in small groups and to encourage robust and open communication.

The Year Ahead

Since the conceptualisation of Night Safari, there has not been a more exciting time at Mandai than now. While the plan for the new Mandai precinct unfolds, WRS continues its journey to be a world leading wildlife institute by providing world-class animal care and constantly refreshing exhibits, facilities and programming to deliver meaningful wildlife experiences to guests so as to promote nature appreciation.

Master Planning

As the planning and development of the Mandai precinct takes shape, WRS gears up to rejuvenate Singapore Zoo, Night Safari and River Safari to ensure that the existing attractions are holistically integrated with the new attractions and facilities. Master planning for the three parks is under way, with outcomes to address customer pain points such as capacity issues and guest flows, deliver uplifting wildlife experiences and a sense of wonder, embrace sustainable best practices and facilitate world-class animal care through provision of well-designed exhibits and back-of-house facilities.

Rejuvenate and Refresh

As the master plan will take a few years to come to fruition, continual rejuvenation of exhibits and upgrading of facilities in the meantime are essential to maintain high standards. A robust animal collection plan was also put in place to achieve more effective conservation outcomes and guest engagement.

The koala exhibit will be redesigned to house two tree kangaroos from Adelaide and Taronga Zoos. Tree kangaroos are endangered and zoos around the world have been working on a co-ordinated programme to conserve them. By caring for them, and hopefully breeding them eventually, WRS contributes to the conservation of these marsupials.

A new exhibit for golden tamarins and different species of marmosets is being developed at Tram Station 2 at Singapore Zoo. Golden lion tamarins are small monkeys found in Brazil, and like many other rainforest animals, are endangered by deforestation. Worldwide conservation efforts and captive breeding programmes have been very successful in saving golden lion tamarins from extinction. Caring for these endangered primates not only enables Singapore Zoo to participate in the global conservation programme but also to tell the success conservation story to guests to inspire hope and positive actions.

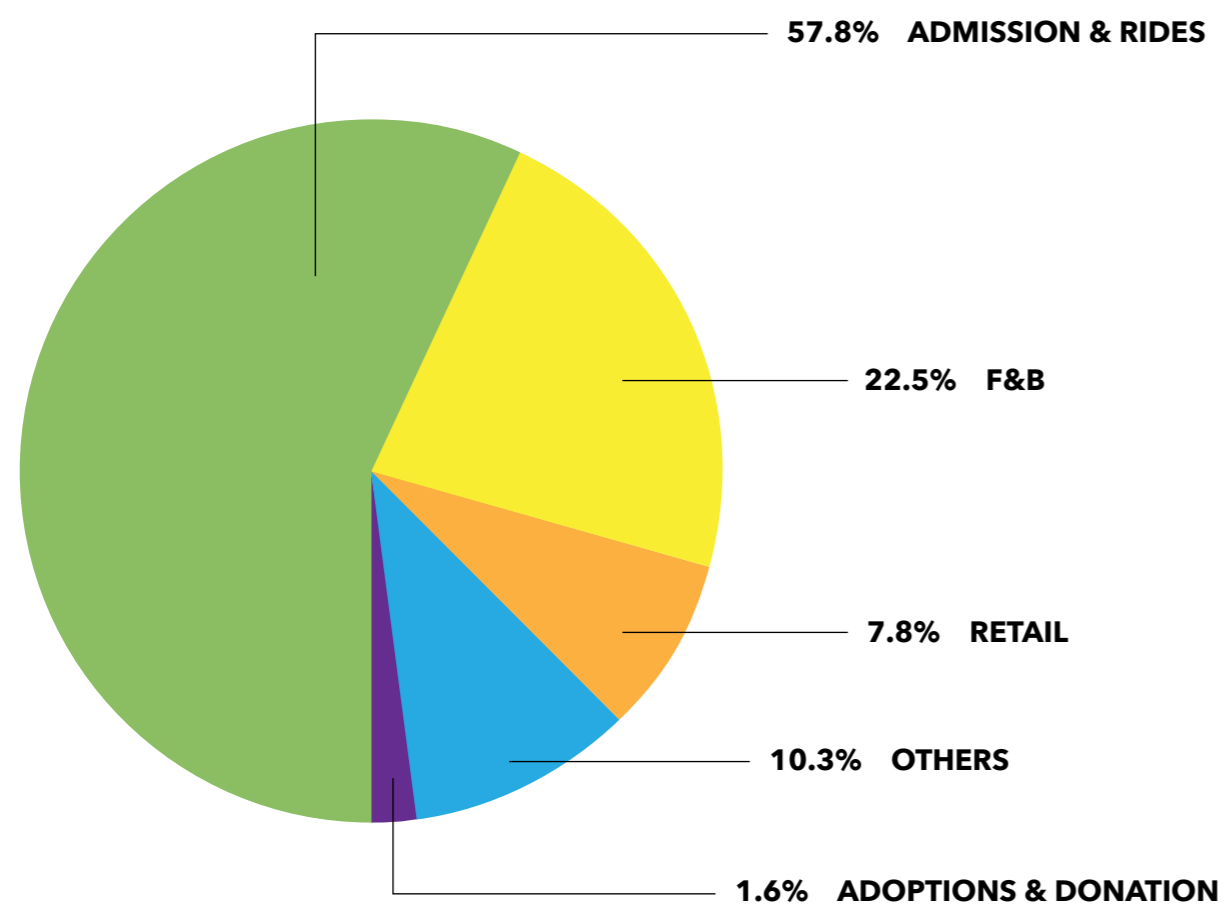
Go Green For Wildlife

Embracing best practices in sustainability has always been WRS' guiding principle for implementation of operational processes. Plans are well in place to leap forward and spread the sustainability message to guests and empower them to 'go green with wildlife'. Initiatives to reduce consumption of bottled water and plastic waste will be rolled out, together with the installation of many more water dispensers at high guest traffic locations at Singapore Zoo. Walking the talk, F&B outlets will take steps to switch to sustainably-sourced palm oil for food preparation and serve sustainably-harvested seafood.

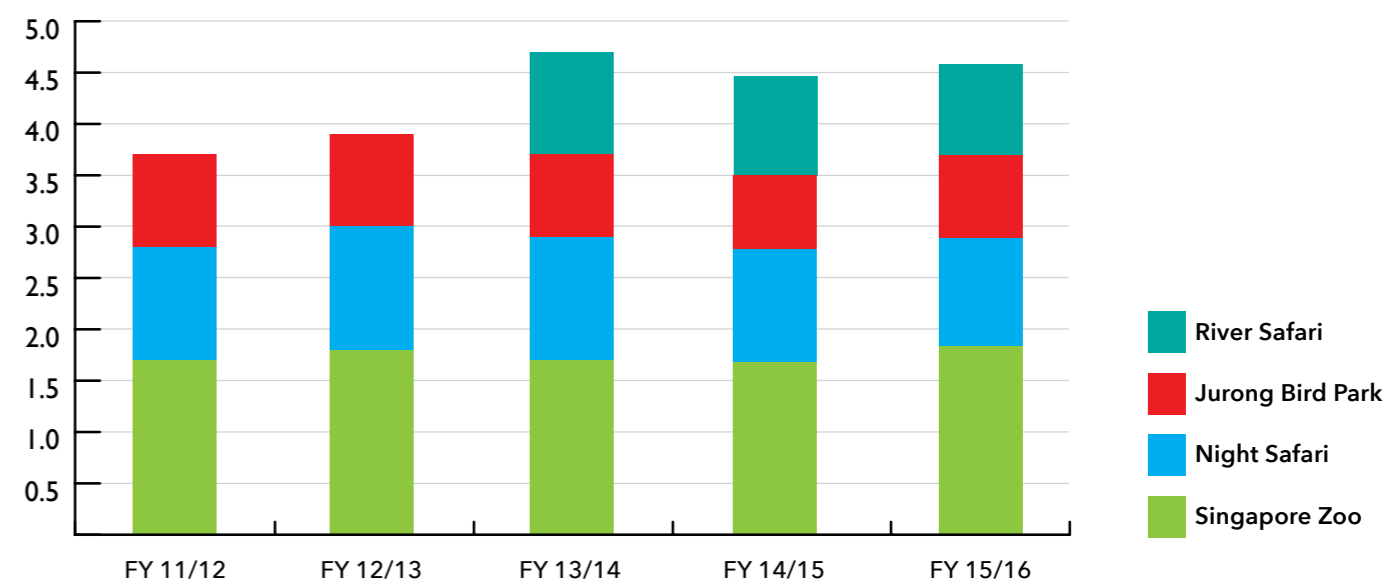


FINANCIAL HIGHLIGHTS FY15/16

TOTAL REVENUE FY 15/16 \$156,682,075



TOTAL VISITORS 4,679,384



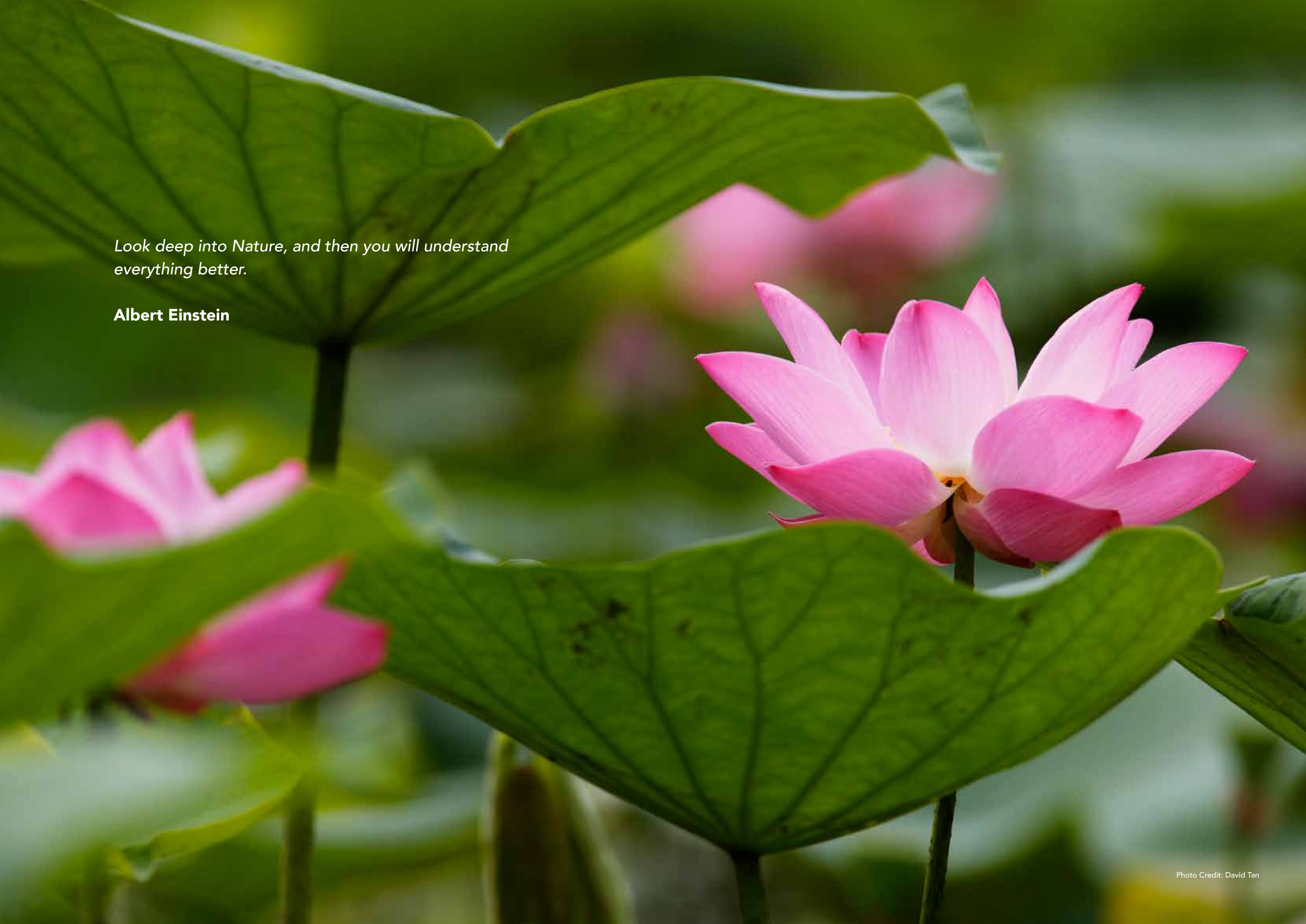


Adopters & Sponsors

Wildlife Reserves Singapore (WRS) would like to thank adopters and sponsors for their staunch support. With their encouragement, WRS is able to strengthen wildlife conservation efforts and protect biodiversity in Singapore and the region.

PARK	ADOPTER	ADOPTION	
JURONG BIRD PARK	Borden Company Pte Ltd	American Bald Eagle, Sue Allen & Eagle Statue	
	Goodwood Park Hotel Limited	Brahminy Kite, Ronnie II	
	Hong Leong Foundation	Flamingoes from the High Flyers Show	
	Lady Yuen Peng McNeice	Bali Mynah	
	Lee Foundation Singapore	Penguin Coast	
	M1 Limited	Malayan Fish Owl, Tupa	
	Protek Chemicals & Engineering Pte Ltd	White-collared Kingfisher	
	Singtel Mobile Singapore Pte Ltd	Blue-Breasted Kingfisher	
	SPH Foundation Ltd	High Flyers Show	
	Starhub Mobile Pte Ltd	Scarlet Ibis Exhibit	
	State Bank Of India (Singapore)	Flamingo Lake	
	Sutera Harbour Resort	Lesser Bird of Paradise Exhibit	
	The Shaw Foundation Pte	Fly Pass Macaws from the High Flyers Show	
	NIGHT SAFARI	Chemical Industries (Far East) Ltd	Malayan Tiger Viewing Shelter
		Coca-Cola Singapore Beverages Pte Ltd	Asian Golden Cat
Goodwood Park Hotel Limited		Fishing Cat Trail	
Haw Par Healthcare Limited		Malayan Tiger	
JTB Pte Ltd		Lion	
JTB Pte Ltd		Sambar Deer & Elephant	
Khoo Teck Puat Foundation		Fishing Cat Trail	
M1 Limited		Giraffe	
M1 Limited		Porcupine	
Martin Storey		Babirusa	
Mr & Mrs Lim Soo Peng		The Greater Flamingo	
Singapore Refining Company Pte Ltd		Marsh Bird	
Singtel Mobile Singapore Pte Ltd		Ankole	
Standard Chartered Bank		Giant Flying Squirrel	
Starhub Mobile Pte Ltd		Bharal	
Starhub Mobile Pte Ltd	Serval Segment - Creature of the Night Show		
The Shaw Foundation Pte	Slow Loris		
RIVER SAFARI	CapitaLand Limited	Presenting Sponsor & Conservation Donor of Kai Kai & Jia Jia	
	Coca-Cola Singapore Beverages Pte Ltd	Scarlet Ibis	
	JTB Pte Ltd	Red Panda	
	M1 Limited	Jewel Tank	
	Mitsui & Co. (Asia Pacific) Pte Ltd	Mekong Giant Catfish	

PARK	ADOPTER	ADOPTION
RIVER SAFARI	Singapore Airlines Ltd	Official Airline of the Giant Panda Programme
	Singtel Mobile Singapore Pte Ltd	Congo Beauties
	SPH Foundation Ltd	Amazon Flooded Forest
	The Norinchukin Bank, Singapore Branch The Shaw Foundation Pte	Alligator Gar Manatee Feeding Program
SINGAPORE ZOO	Abbott Laboratories (S) Pte Ltd	Giraffe, Growie
	Australia And New Zealand Banking Group Limited	Australian Outback
	Cheng Kim Loke Foundation	Malayan Tapir
	Coca-Cola Singapore Beverages Pte Ltd	White Tiger, Omar
	Dr Ng King Kang	Chimpanzee, Rah
	Haw Par Corporation Ltd	Leopard
	Henkel Singapore Pte Ltd	Chimpanzee, Gangga
	Hong Leong Foundation	Fragile Forest
	Industrial And Commercial Bank Of China Limited	Cotton-Top Tamarin
	Kentucky Fried Chicken Management Pte Ltd	Zebra
	Lee Foundation Singapore	Orang Utan, Chomel
	Lee Foundation Singapore	Tropical Crops
	M1 Limited	Amhara Stone Village
	M1 Limited	Orang Utan, Endah
	Mitsui & Co. (Asia Pacific) Pte Ltd	Penguin
	Mitsui & Co. (Asia Pacific) Pte Ltd	Elephants at Work & Play Show
	Mrs Christina Ong	Orang Utans, Binte & Saloma
	Ms Isabella Loh	Orang Utan, Ishta
	Ms Kay Kuok	Asian Elephant, Aprila
	Nicola Barrett	Memorial Bench
	Nomanbhoy & Sons Pte Ltd	Cheetah
	Parexgroup Pte Ltd	Mandrill
	Parkway Dental Pte Ltd	Chimpanzee, Jengo
	Protek Chemicals & Engineering Pte Ltd	Chimpanzee, Susie
	Renesas Semiconductor Singapore Pte Ltd	Pelican
	SPH Foundation Ltd	Polar Bear, Inuka
	SPH Foundation Ltd	Proboscis Monkey Exhibit at SPH Conservation Centre
	Starhub Mobile Pte Ltd	Orang Utan, Natu
	Starhub Mobile Pte Ltd	Red Langur
	State Bank Of India (Singapore)	Asian Elephant, Gambir
Thai Airways International Public Co. Ltd	Intan, Asian Elephant	
The Little Skool-House International Pte Ltd	Chimpanzee, Ida	
The Shaw Foundation Pte	The Shaw Foundation Amphitheatre	
Union Energy Corporation Pte Ltd	Orang Utan, Joko	
Wuthelam Holdings Pte Ltd	Rabbit	



*Look deep into Nature, and then you will understand
everything better.*

Albert Einstein

YEARBOOK 2015-2016

WILDLIFE RESERVES SINGAPORE

Wildlife Reserves Singapore Group



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