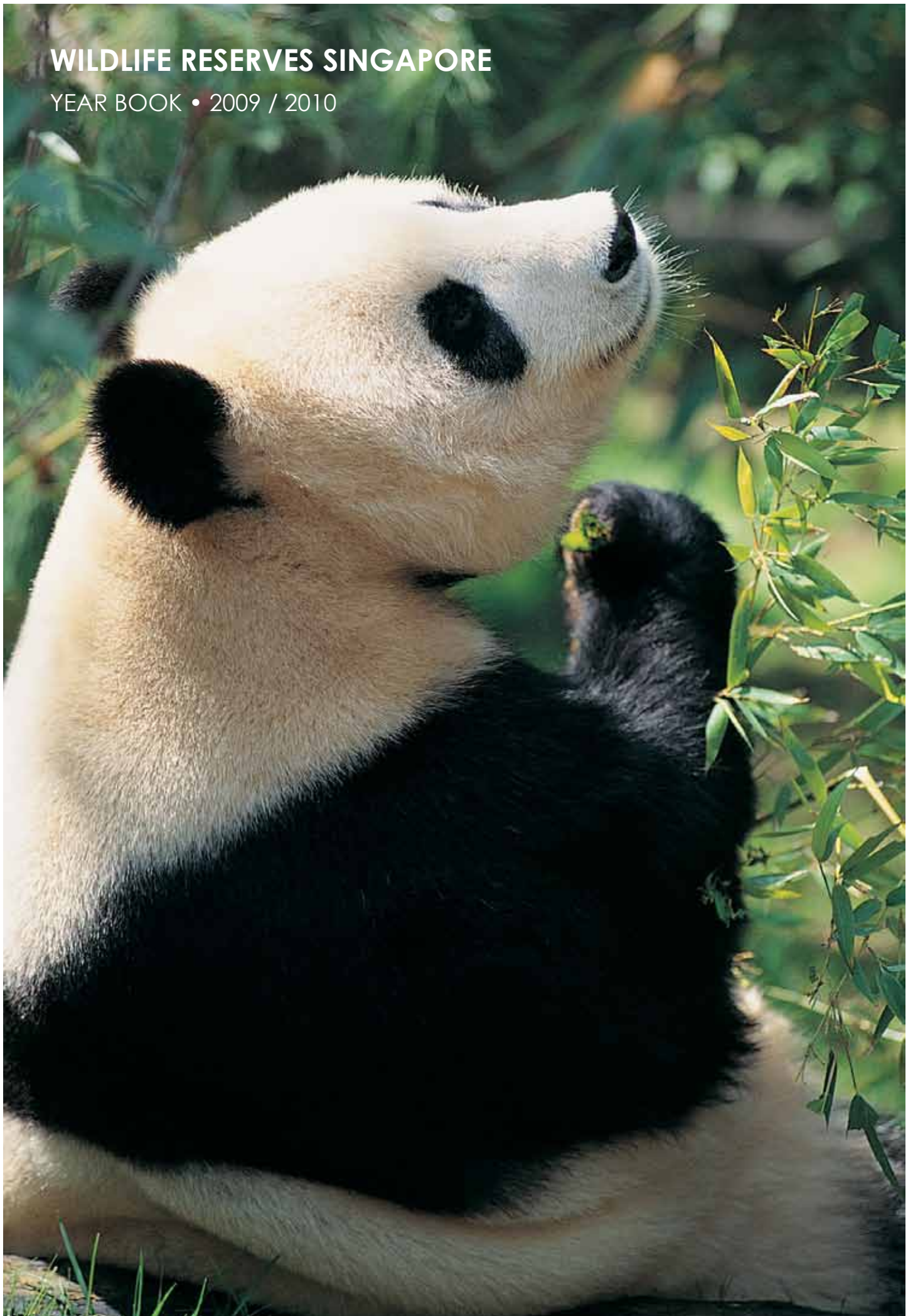
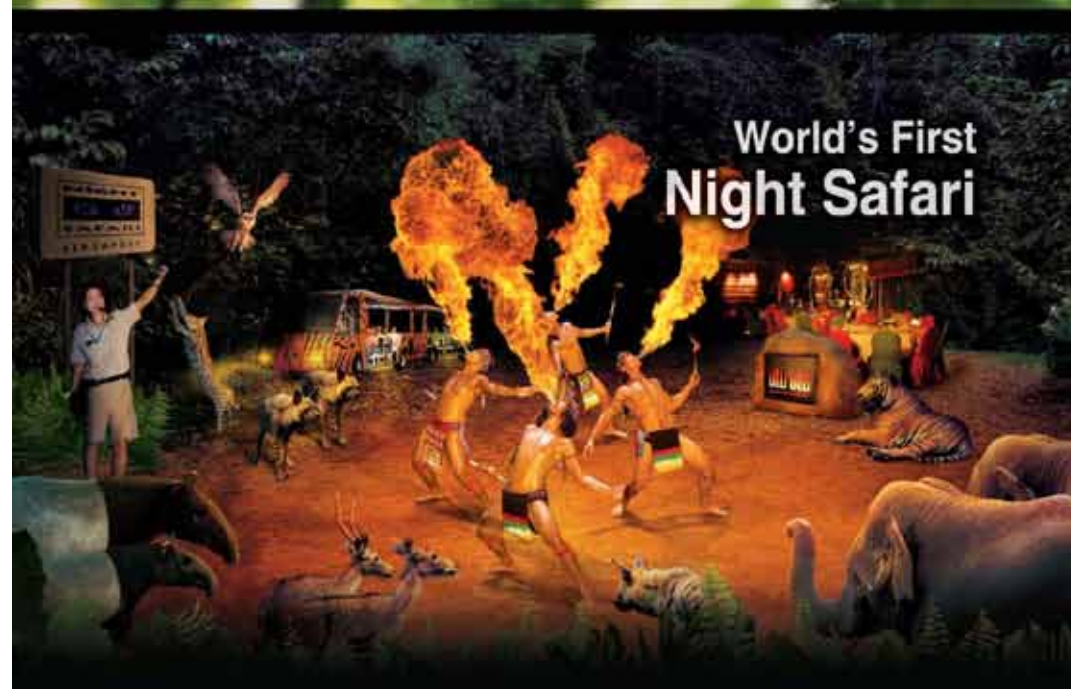


# WILDLIFE RESERVES SINGAPORE

YEAR BOOK • 2009 / 2010







## Wildlife Reserves SINGAPORE

Wildlife Reserves Singapore (WRS) is the parent company of award-winning attractions Jurong Bird Park, Night Safari, Singapore Zoo and the upcoming River Safari. WRS parks strive to be world-class leisure attractions, providing excellent exhibits of animals presented in their natural environment for the purpose of conservation, education and recreation. In 2009, Jurong Bird Park served 900,000 visitors, the Night Safari, more than 1.1 million visitors and Singapore Zoo welcomed more than 1.6 million visitors.

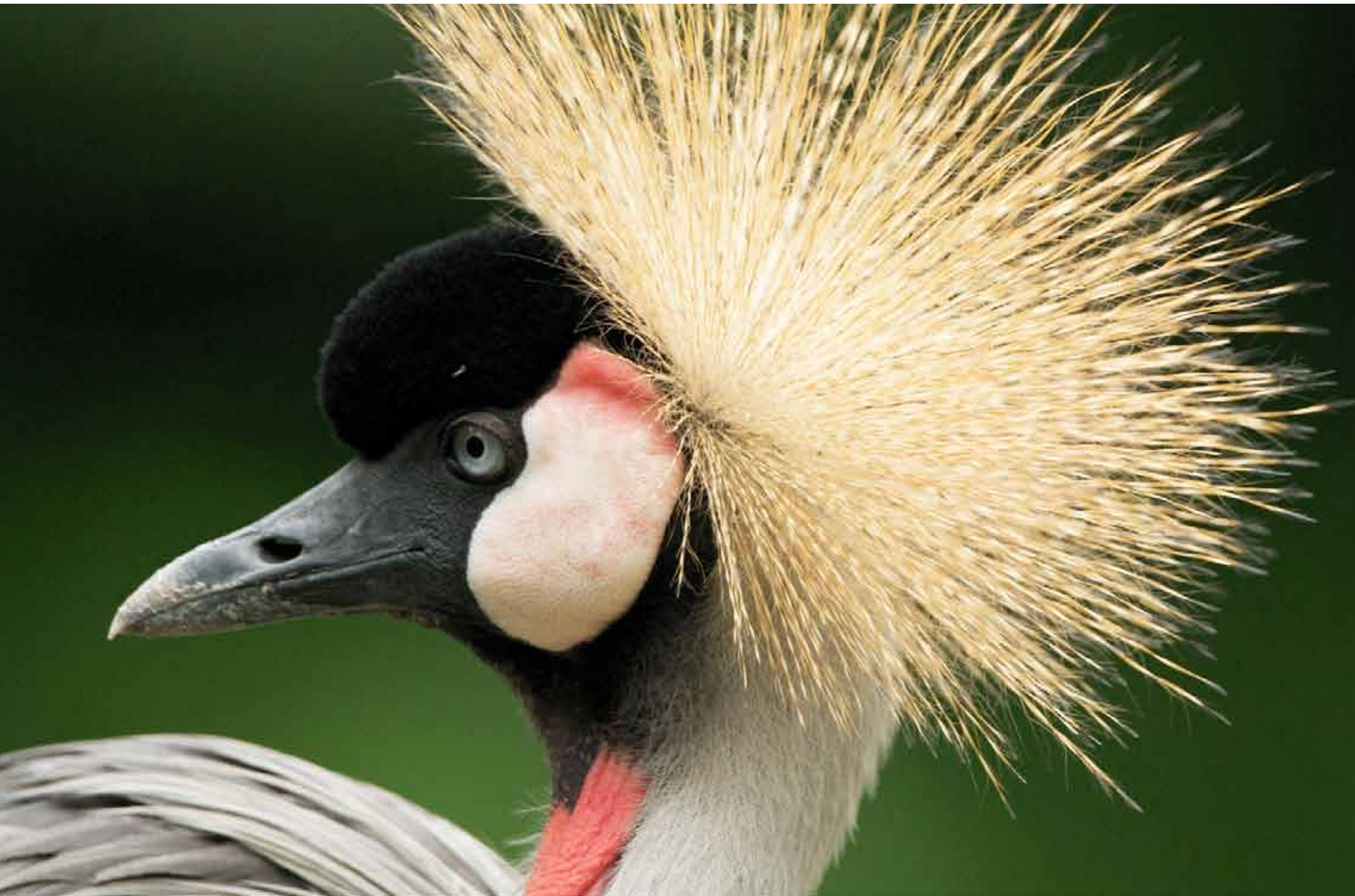
WRS parks are the first zoological institutions in Southeast Asia to achieve both ISO 14001 and OHSAS 18001 certifications, which indicate compliance with the highest standards in environment, health and safety standards.

In the areas of conservation and research, WRS parks have undertaken multiple projects, which focus on species such as the oriental pied hornbill, pangolin and orang utan, through collaborations with various organisations and institutions. Recent conservation efforts include working with the community and partners to highlight conservation needs for native todody cats, banded langurs and rhinoceros hornbills. All WRS parks are designated rescued wildlife centres by the governing authority.

Wildlife Reserves Singapore Group







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## CHAIRPERSON'S MESSAGE

The constant march of development and the needs of a burgeoning population continue to place tremendous pressure on natural resources everywhere. Wildlife Reserves Singapore has solidly thrown its weight behind the coalition of organisations who care enough to find real ways to redress the balance.

This year, our passion for conservation found expression in the move to put our money where our mouth is. President SR Nathan in July helped launch the Wildlife Reserves Singapore Conservation Fund (WRSCF). Dedicated to wildlife conservation and education, its focus is on native animal conservation efforts, achieved through direct field conservation work, education and public awareness, human-animal conflict resolution, capacity building and sharing of best practices. We are proud to announce that \$0.20 from every admission ticket goes into this fund, demonstrating the importance we place on committing material resources towards supporting native wildlife.

In the same vein, our signing of a Memorandum of Understanding with the Wildlife Conservation Society to collaborate on field conservation and public education to protect biodiversity in the face of global climate change and human encroachment is indicative of the gravity of our green conscience. The MOU is the first signed by an Asian zoological institute with the society.

While our efforts on the conservation front may have been our proudest in terms of what we are aiming to do for nature, it is without a doubt that our most popular announcement over the course of the year has been that WRS would receive a pair of male and female Giant Pandas from China Wildlife Conservation Association (CWCA). The pandas are symbolic of the close relationship between Singapore

and China as the Republic celebrates the 20th Anniversary of friendly Sino-Singapore relations. It was Chinese President, Hu Jintao, no less, who made the announcement in November.

The strong support from both governments will give us great impetus to work with our Chinese counterpart in global nature and wildlife conservation, and to learn, adopt and implement best practices. I would also like to take this opportunity to thank CapitaLand Limited for helping to make the panda plans possible with its pledge to support the 10-year collaborative programme with a conservation donation.

The two pandas are scheduled to arrive in Singapore in the second half of 2011. They are bound to be the star occupants of the dynamic River Safari project which is well under way in terms of construction. River Safari will house one of the world's largest collections of freshwater wildlife and many critically endangered animals including the giant pandas. The attraction will feature boat rides and freshwater habitats of the famous rivers of the world like the Mississippi, Congo, Nile, Ganges, Mekong and Yangtze. It is hoped that by bringing visitors up close to freshwater ecosystems and the related life forms, we can inspire them to care and take positive actions in the preservation of these important habitats, on which our survival ultimately depends on.

Clearly, it has been a year of great achievement and we are delighted that our goal to develop a strong sense of corporate social responsibility has manifested itself in such concrete measures. We will not tire in these efforts, and I thank our shareholders, sponsors, donors, supporters and friends for the many ways you have all encouraged us and enabled us in our goals.

Yours sincerely,

A handwritten signature in black ink that reads "Claire Chiang". The signature is fluid and cursive, with the first name "Claire" and last name "Chiang" clearly distinguishable.

Claire Chiang  
Chairperson, Wildlife Reserves Singapore





## GROUP CEO'S MESSAGE

A shaky global economy and the two newly-opened integrated resorts may have been grave challenges, however, Wildlife Reserves Singapore triumphed by strengthening our performance and never losing sight of the reason for our existence – to be a reputable zoological institution to inspire people to discover and protect biodiversity.

In our role as the guardian of the wild in Singapore, we spent the year refining the methods through which we achieve this. We officially launched the Wildlife Reserves Singapore Conservation Fund (WRSCF) to conserve endangered native wildlife, with President Nathan as Patron of the fund. Since inauguration, WRS has committed close to \$1 million to WRSCF, and the fund has collaborated with the National University of Singapore to save the banded leaf monkey, and very soon many other native animals in Singapore.

Conscious of the need to share our knowledge, we sponsored zoo practitioners in the region so they could learn from the facilities and adopt practices we take for granted. We partnered with Wildlife Conservation Society, USA on turtle conservation in Cambodia; Begawan Foundation, Indonesia on releasing Bali mynahs; Asahiyama Zoo, Japan, on knowledge and animal exchange; China Wildlife Conservation Association on saving of endangered wildlife in China; and, our National Parks Board on the reintroduction of the oriental pied hornbill in Singapore.

The two most exciting pieces of developments announced over the reporting year – our impending reception of giant pandas from China and the development of the River Safari – are simply the tip of the iceberg where efforts to broaden WRS's offerings are concerned. We have also successfully acquired some rare animals, including two raccoon dogs from Japan, six Mekong River giant catfish from Thailand and two giant river otters.

Singapore Zoo's collection alone stood at 3,700 specimens representing 305 species. As 36% of these species are classified as threatened with extinction, it is clear our collection is immensely valuable. We welcomed our first Komodo dragon baby in 34 years; the hatching is also the first in Asia, outside Indonesia where Komodo dragons are found naturally. Over at the Night Safari, our collection stood at 1,990 specimens representing 120 species. Significant new acquisitions included the highly endangered Indian rhino and two clouded leopards. A new slow loris display and a barasingha exhibit were also added to enhance visitor experience.

The avian collection at Jurong Bird Park stands at 4,600 specimens representing 380 species, and there were over 400 hatchings. We completed upgrading of the Birds of Prey Show area, opened the new Hawk Café, and initiated development plans for Birds of Play Children's Play Land, Penguin Coast and conversion of the old panorail into a ground tram system for the coming year.

The two-month long Hollywood Dinosaurs Exhibition, which used state-of-the-art technology in animatronics and engineering to showcase life-size dinosaurs, attracted more than 100,000 visitors.

Thanks to our Education team and with the help of the Ministry of Education, we have revamped Bird Park's entire educational strategy and curriculum over the past two years to poise ourselves as a mainstream learning hub. We built the Bird Discovery Centre, introduced the Docent, Conservation Ambassador and Wildlife Buddy volunteer schemes, took knowledge to students with Bird Park Flies To Schools programmes, introduced Chinese storybooks, hosted teachers workshops and sleepover camps, and much more.

Our organisation endured a salary-freeze to protect jobs for everyone, but in the process, we outperformed industry averages. Last year the attendance to our parks was at a record high of 3.7 million visitors, a 2% growth year on year. We continue to recognise the importance of cultivating ownership in our staff, training and grooming them to provide better service to visitors. The training certainly yielded results - WRS bagged the most number of Star and Gold winners at the Excellent Service Awards for the third year in a row. Night Safari won the Best Visitor Attraction Award, adding to a total of 19 for WRS, out of 21 awards given out by STB so far for the best in the leisure attraction category. We continue to pursue operational excellence, adhering to the rigorous Environmental Management System (EMS ISO 14001) and Occupational Health & Safety Management System (OHSAS 18001) standards in the process. To further strengthen our commitment to conserving the environment, we will work towards the ISO 14064 certification, an emerging standard on greenhouse gas accounting and verification.

Striking the tricky balance between financial viability and conservation credibility is the tightrope we continue to walk. We want to foster support for our fragile ecosystem in every visitor to our parks, thus winning a mandate to introduce more enriching and experiential developments for the noblest causes.

Yours sincerely,

A handwritten signature in black ink that reads "Fanny Lai". The signature is fluid and cursive, with a small dot at the end.

Fanny Lai  
Group CEO, Wildlife Reserves Singapore

# BOARD OF DIRECTORS



## CLAIRE CHIANG, CHAIRPERSON WRS and WRSCF

Ms Claire Chiang, Senior Vice President Bayan Tree Holdings, started the Retail Business of the Group in 1996 and has since been at the helm overseeing the opening of 70 retail outlets in the world. Ms Chiang is also the chairperson of Bayan Tree Global Foundation. Her role involves directing and guiding the continual process of Bayan Tree Holding’s overall commitment to the CSR journey to ‘Embrace the Environment, Empower The People’. She sits on the Global Governing Board of Caux Round table which is an international network of principled business leaders working to promote sustainable capitalism.

Ms Chiang co-authored the award-winning book ‘Stepping Out : The Making of Chinese Entrepreneurs’ published in 1994. She is one of the first two women to be elected to serve on the Board of the Singapore Chinese Chamber of Commerce and Industry. Ms Chiang was awarded ‘Woman of the Year’ in 1999 for her contribution to the community.

Ms Chiang served as a Nominated Member of Parliament for two terms (1997 to 2001) during which she raised many policy issues related to the social service sector, women, family, education and the disadvantaged. Her government portfolios include

Chairing the Employer Alliance, an appointment by the Singapore Ministry of Manpower and Co-Chairing the Pro-Family Business Council and the Partner Connection fund under the Ministry of Community Development, Youth and Sports.

Ms Chiang is a member of the Board of Governors of Raffles Girls’ Secondary School, and also a member of the Raffles Institution Board of Governors.

In 2008, Ms Chiang was accorded a Pingat Bakti Masyarakat (Public Service Medal) and the inaugural Singapore Innovation Park Fellow Award. In the same year, she was appointed as a Justice of the Peace by Singapore President SR Nathan.

In April 2009, Ms Chiang, together with her husband Mr Ho Kwon Ping, Executive Chairman of Bayan Tree Holdings, was a joint recipient of the Hospitality Lifetime Achievement Award at the annual China Hotel Investment Summit.

Ms Chiang is the Patron and Advisor of HELP Family Service Centre. Despite her heavy commitment, Ms Chiang continues to serve as a volunteer with Help Every Lone Parent (HELP), Rotary Club of Suntec City and the People’s Association (PA) in Singapore.



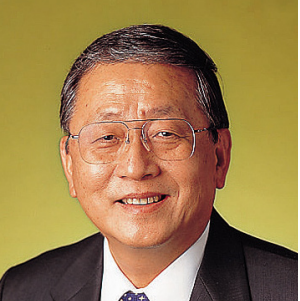
## MS FANNY LAI

Fanny volunteered as a docent at Singapore Zoo prior to joining Singapore Zoological Gardens in 2004. She is a strong advocate of wildlife conservation and believes that more people can be inspired to take individual responsibility in this area.

Fanny has been a Council member of the World Association of Zoos and Aquariums (WAZA) and of the South East Asia Zoo Associations (SEAZA) since 2004 and a Council member of Attractions of Singapore Association (ASA) for the same period. She is also a Trustee of the Wildlife Reserves Singapore Conservation Fund and a Board member of the Asian Geographic Society.

In 2008, Fanny was the first recipient of the Marketing Institute’s “Marketer of the Year” Award for developing a marketing strategy which has brought many awards and successes for Wildlife Reserves Singapore. The same year, she was also named the Woman Professional of the Year by the Institute of Advertising Singapore.

Fanny holds an Executive MBA from the University of Chicago Graduate School of Business.



## DR NGIAM TONG TAU

Dr. Ngiam Tong Tau, a Colombo Plan Scholar, is a veterinarian who graduated from the University of Sydney with a Bachelor in Veterinary Science in 1968. He also obtained his Doctor of Philosophy in Veterinary Medicine from the Royal Veterinary College, University of London, UK in 1974. Dr. Ngiam was the Director of Primary Production, Ministry of National Development from 1984 until 1999 and as the Chief Executive Officer and Director General of the AgriFood and Veterinary Authority of Singapore from 1999 until his retirement in August, 2005. He has received several national honors including the Public Administration Meritorious Medal which is one of the highest award conferred by the Government for service to the country.

Dr. Ngiam was an Adjunct Professor at the School of Biological Sciences, National University of Singapore from 1993-2005. He is currently a Board Director of the Oceanus Group Limited, Zagro Asia Limited, Temasek Life Science Laboratory Ltd., Tropical Marine Science Institute and AgriFood Technologies Pte Ltd. He is also the Chairman of the Advisory Panel of Food Innovation & Resource Centre, Singapore Polytechnic and member of the Advisory Panel of the Applied Life Science Department of the Temasek Polytechnic.



## MS YEO LIAN SIM

As Chief Regulatory Officer of the Singapore Exchange, Ms Yeo is responsible for maintaining a robust regulatory framework for Singapore Exchange’s operation of a fair, orderly and transparent market as well as safe clearing of trades. Ms Yeo has been with Singapore Exchange since July 2004.

Before Singapore Exchange, Ms Yeo was at Temasek Holdings where she was responsible for capital resource management. For most of her career, she was at the Monetary Authority of Singapore where she held successive responsibilities in various areas, including managing the Singapore dollar exchange rate, investment of foreign reserves, and regulation of the securities and futures markets.

Ms Yeo serves on the board of Shared Services for Charities Limited, Audit Committee of National Council of Social Service and the Singapore Institute of Directors Council.

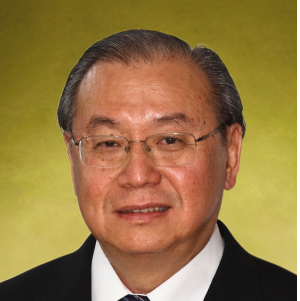
Ms Yeo graduated with Honours in Economics and Political Science from the University of Singapore and holds a Master’s degree from the London Business School, UK. Ms Yeo was awarded the Public Administration Medal (Gold) at the Singapore National Day Honours in 1994.



## MR SMOLA STEFAN JOACHIM

Stefan, a German citizen and Singapore PR, has been on the Board since 2005. He studied at Westfälische Wilhelms-Universität Münster, Germany. After graduating as Diplom-Kaufmann (German MBA equivalent) he joined a large German public limited financial organisation and worked in various management positions in markets and investment banking. Developing people - and through that the development of business - is his philosophy. Numbers fascinate him.

He worked in Munich and London before he came to Singapore in 2000 as Chief Operating Officer for the Asian business. In 2004 he also took on the role of CEO for the Singapore branch. The bank turned into a major European player through a number of cross- border mergers. After 28 years in banking he left the organisation. He and his wife are keen lovers of nature. His two daughters are grown up and working in Singapore and Australia. He enjoys charity work, cooking, gardening and photography.



## MR PHILIP TAN

Mr Tan was appointed to the Board on 1 April 2008. He was in the commerce and industry sector for 11 years prior to joining the banking and finance sector. He joined the Overseas Union Bank in 1979, holding various senior positions prior to his retirement in 2002 as Executive Vice President.

He holds a Bachelor of Accountancy from the University of Singapore and a Bachelor of Laws from the University of Wolverhampton, UK. He also holds a post-graduate diploma in Business Administration from the Manchester Business School, UK. He is a Fellow of the Institute of Certified Public Accountants of Singapore, CPA (Australia), the Association of Chartered Certified Accountants, UK and an Associate of the Chartered Institute of Management Accountants, UK.

Mr Tan is currently a director of Guthrie GTS Limited, Fullerton Fund Management Company Ltd, Union (2009) Limited, Alliance Financial Group Berhad, Alliance Bank Malaysia Berhad and National Kidney Foundation.



## MR CHIA NGIANG HONG

Mr Chia Ngiang Hong has over 30 years of experience in the real estate industry. He obtained his Master in Business Administration with Distinction from the University of Hull, UK

Mr Chia was with the DBS Group before joining City Developments Limited (CDL) in 1981 where he is currently its Group General Manager.

He has been serving as the Vice President of the Real Estate Developers’ Association of Singapore (REDAS) for many terms. He is also a fellow in the Singapore Institute of Surveyors & Valuers (SISV).

Mr Chia has also served as a former Board Member and subsequently as Deputy Chairman of Building and Construction Authority. He is presently serving as a Council Member in Workplace Safety and Health (WSH) Council under Ministry of Manpower.

He also chairs the Consultative Committee to the Department of Real Estate at National University of Singapore and is a member of the Advisory Panel of the BCA Academy.



## MR KAVIRATNE NIHAL VIJAYA DEVADAS CBE

Mr Kaviratne’s career with Unilever spanned 40 years in Asia, Europe and Latin America. He now serves as an independent, non-executive Chairman/Director/ Advisor in various companies in India, Singapore, Indonesia and the Netherlands. These include StarHub, SATS, Fullerton Financial Holdings, Akzo Nobel, GSK, TVS and Titan.

Half his time is spent on societal work as Chairman of the Indian Cancer Society, Governing Board Member of The Bombay Mothers & Childrens Welfare Society, and Founder of the St Judes India ChildCare Centres to provide holistic care for needy children suffering from serious diseases. He was the Founder President of the International Wine & Food Society, Bombay Branch, and is a Chevalier du Tastevin.

An Economics graduate from Bombay University, he attended the AMP at Harvard and the AEP at North Western. Cited in the Queen’s 2004 New Year Honours List in the UK he was awarded the CBE for services to UK business interests and to sustainable development.



## MS AW KAH PENG

Ms Aw Kah Peng was appointed Chief Executive of the STB effective 1 January 2009. Ms Aw has a strong record of local and international experience gained during her 18 years at the Singapore Economic Development Board and before that with the Singapore Institute of Standards and Industrial Research.

Ms Aw is a board member of the Singapore Tourism Board, Sentosa Development Corporation and Singapore GP Pte Ltd. In addition, she is a council member of the National Arts Council and a member of the Air Traffic Rights Committee (ATRC). Ms Aw was also appointed as an official member of the International Advisory Board by the executive Committee of the City of Rotterdam, to help Rotterdam develop their economic ambitions.

Ms Aw holds a degree in Chemical Engineering from the National University of Singapore. She is also a Fellow of the Sloan School of Management and holds a Masters in Business Administration from the Massachusetts Institute of Technology.



# COMMITTEE MEMBERS & HONORARY CONSULTANTS

## EXPERT COMMITTEE ON ZONOSSES

- CHAIRMAN: Dr Leong Hon Keong
- SECRETARY: Dr Charlene Fernadez
- COMMITTEE MEMBERS: Dr Ooi Eng Eong
- Dr Chan Kwai Peng
- Dr Serena Oh
- Dr Tan Ai Ling
- Ms Fanny Lai
- Mr Kumar Pillai

## ANIMAL WELFARE & ETHICS COMMITTEE

- CHAIRMAN: Prof Leo Tan
- SECRETARY: Mr John Sha
- COMMITTEE MEMBERS: Ms Tan Poh Hong
- Ms Angelina Choy
- Dr Shawn Lum
- Dr Leslie Retnam
- Dr Tan Hwa Luck
- Dr Michael Gumert
- Dato Dr Dionysius Sharma
- Mr Chris Shepherd
- Mr Wong Tuah Wah
- Prof Peter Ng Kee Lin
- Ms Fanny Lai
- Mr Biswajit Guha
- Mr Raja Segran

## HONORARY CONSULTANTS

- Dr Ong Leong Boon
- Dr Tan Hwa Luck
- Dr Myra Elliott
- Prof Soon-Chye Ng
- Associate Prof Francis Seow-Cheon
- DrYap Chin Kong
- Dr Eugene Stephen Reynders
- Dr Anjulia Thomas
- Dr Frederic Chua
- Dr Wong Yue Shuen
- Dr Francis Hui
- Dr Aymeric Lim

## WRSCF SPECIALIST PANEL

- CHAIRMAN: Dr Geoffrey Davison
- Dr Astrid Yeo
- Dr Shawn Lum
- Dr Richard Corlett
- Dr Diong Cheong Hoong
- Associate Prof Lim Tit Meng
- Prof Peter Ng Kee Lin
- Mr Biswajit Guha

# SENIOR MANAGEMENT





# YEAR IN REVIEW

The reporting year was one of carefully considered expansion. While the many new exhibits, attractions and inaugural events which characterised the previous year settled into their second year of operations, WRS focused on laying the groundwork this reporting year for exciting things to come in the future.

## HIGHLIGHTS OF THE YEAR

- Wildlife Reserves Singapore Conservation Fund (WRSCF) was launched on 10 July 2009. The Fund is an independent conservation fund dedicated primarily to native wildlife conservation and education.
- WRS and WRSCF signed a memorandum of understanding to formalise collaboration with the world-renowned conservation establishment, Wildlife Conservation Society (WCS), New York, on field conservation and public education to protect biodiversity.
- WRS announced that it will receive a pair of giant pandas from China Wildlife Conservation Association (CWCA) as part of the collaboration to promote giant panda conservation, raise public awareness of China wildlife conservation and to implement giant panda breeding programme. The giant pandas will be housed in River Safari.
- Construction of River Safari, the fourth attraction of WRS and Asia's first freshwater-themed wildlife attraction got underway.
- Night Safari won the Best Visitor Attraction Award, adding to a total of 19 for WRS, out of 21 awards given out by STB for the best in the leisure attraction category.
- A tour agency named 'Wildlife Travel & Tours' was set up in September 09 to provide one-stop leisure attraction offerings to tourists.
- Hollywood Dinos, a travelling exhibition that employs animatronics to showcase life-size dinosaurs, was held at Jurong Bird Park from 12 December 2009 to 18 February 2010.
- Hawk Café at Jurong Bird Park entrance courtyard opened to offer popular local fare to visitors.
- Night Safari welcomed the first birth of a Sunda pangolin. This is also the first captive-born Sunda pangolin in the world. The Sunda pangolin is one of the last few mammalian species still found in Singapore and is highly endangered.
- The first Komodo dragon was hatched in Singapore Zoo, after many attempts to breed the endangered reptile in the last 34 years.



Douc langur  
PHOTO: BJORN OLESEN



# WILDLIFE RESERVES SINGAPORE CONSERVATION FUND (WRSCF)

The Wildlife Reserves Singapore Conservation Fund (WRSCF) was registered in 2009 as a charity and an institution of public character with the primary purpose of conserving endangered native wildlife. The launch of WRSCF marked a significant milestone for WRS as one of the world's foremost zoological institutions. By committing material resources towards supporting native wildlife, WRS can now play a more prominent role as the guardian of wildlife in Singapore.

Momentous steps were taken in sealing the position of WRS as one of the world's top conservation and nature-based attraction groups. On 10 July 2009, President SR Nathan did WRS the honour of launching the Wildlife Reserves Singapore Conservation Fund (WRSCF), an independent conservation fund dedicated primarily to native wildlife conservation and education.

PHOTO: BJORN OLESEN



Additionally, WRSCF supports the NUS Ah Meng Memorial Conservation Fund, set up in conjunction with the National University of Singapore (NUS). WRSCF has committed \$500,000 over five years to the Ah Meng Memorial Conservation Fund to support the academic research and study of endangered native wildlife undertaken by students and faculty members of NUS. The first project to receive funding from the NUS Ah Meng Memorial Conservation Fund is a study on the banded langur, one of Singapore's native endangered species.

In support of the noble cause of protecting Singapore's natural heritage, WRS has on top of its traditional conservation and research spending further made a pledge to contribute 20 cents from every paying admission ticket sold in its three parks to WRSCF. For the year, the contribution made towards this fund was approximately S\$ 560,000.

An independent Specialist Panel comprising professionals from various organizations was set up to review grant applications. The Specialist Panel comprises eight members :

- **Dr Geoffrey Davison**, Asst Director, NParks (Chairman of Specialist Panel)
- **Dr Astrid Yeo**, Director, Agri-food and Veterinary Authority of Singapore
- **Dr Shawn Lum**, Lecturer, National Institute of Education
- **Professor Richard Corlett**, National University of Singapore
- **Associate Professor Diong Cheong Hoong**, National Institute of Education
- **Associate Professor Lim Tit Meng**, CEO, Singapore Science Centre
- **Professor Peter Ng**, Director, Raffles Museum of Biodiversity Research
- **Mr Biswajit Guha**, Director Zoology, WRS

WRSCF welcomes individuals and organizations to submit their proposal in the area of native wildlife conservation and education efforts. Details on application procedures and guidelines can be viewed at [www.wrscf.org.sg](http://www.wrscf.org.sg)



Below (from left):  
Dr John G. Robinson,  
Executive Vice President,  
Conservation & Science,  
WCS, Mrs Daisy Ling,  
Hon MD WRSCF,  
Dr Steven Sanderson,  
President & CEO, WCS,  
President S R Nathan,  
Ms Claire Chiang,  
Chairperson, WRS &  
WRSCF, Mr Ward Woods,  
Chair, WCS, and Ms  
Fanny Lai, Group CEO,  
WRS.

## Landmark Partnership With Wildlife Conservation Society (WCS)

On 29 January 2010, WRS and WRSCF signed a memorandum of understanding to formalise collaboration with the world-renowned conservation establishment, the Wildlife Conservation Society (WCS), New York. The area of focus is on field conservation and public education to protect biodiversity in the face of climate change and human encroachment into wild places.

WCS is one of the oldest names in the arena of wildlife conservation. Established in 1895, it is involved in over 500 conservation projects in more than 60 countries. In New York City, it manages the Bronx Zoo, New York Aquarium, Central Park Zoo, Prospect Park Zoo and Queens Zoo. WRS is the first major zoological institution in the region to partner with the world-renowned WCS.



President Nathan presided over the MOU signing. In inking the partnership, a commitment to protecting biodiversity in Singapore, Asia and around the world was signified. The parties will collaborate to undertake field conservation projects, coordinate efforts on research methodologies and technical expertise in protecting biodiversity. Another focus will be to promote public education on wildlife conservation issues.

Below: Celebrity WRSCF Ambassadors Gurmit Singh and Kym Ng graced the inaugural WRSCF Charity Bazaar with their presence and made donations to the Fund.

## Fund Raising And Outreach

### CHARITY BAZAAR

A charity bazaar was held on 3 and 4 October at Jurong Bird Park and Singapore Zoo respectively to raise funds for WRSCF. The event at Singapore Zoo was graced by the presence of celebrity WRSCF Ambassadors, Gurmit Singh and Kym Ng, who auctioned off personal items and donated the proceeds to WRSCF. Face painting and school band performances upped the ante on the fun while a 'recycle your phones' activity saw Nokia donating US\$2 towards WRSCF for every phone brought in.



### DONATION BOXES

A total of 44 donation boxes were placed around Jurong Bird Park, Night Safari, Singapore Zoo, shopping centres and tourist touch points to raise funds for WRSCF. These donation boxes provide a channel for organizations and individuals to help and take action in the conservation of endangered Singapore wildlife.

### ISTANA OPEN HOUSE

WRS was invited by President SR Nathan to participate in the Open House events at Istana. These events were excellent platforms for WRS to generate conservation awareness and to raise funds for WRSCF. Apart from enjoying the Meet and Greet sessions with birds and falabella horses, visitors to Istana also had the chance to learn about endangered wildlife at the Conservation Corner set up by WRS.

Right: President SR Nathan and Mrs Nathan being greeted by celebrity bird, Amigo during an open house event at Istana.





# RIVER SAFARI

River Safari will be Asia's first freshwater-themed wildlife attraction. Its key focus is to bring visitors up close to freshwater ecosystems and the related life forms. It is hoped that the close encounters will inspire them to care and take positive actions in the preservation of these threatened habitats, on which our survival depends.



Above: The giant pandas being a crowd favourite will present opportunities for WRS to spread the conservation message to the masses.

Construction of Asia's first freshwater-themed wildlife attraction got underway as the reporting year drew to a close. Named River Safari, the fourth attraction of WRS is scheduled to open in 2012.

River Safari will be a thrilling close-up multi-sensory experience for the young and old. It is located between Singapore Zoo and Night Safari, and when completed, will offer boat rides, displays of freshwater habitats of the famous rivers of the world like the Mississippi, Congo, Nile, Ganges, Mekong and Yangtze.

The 12-hectare attraction will house one of the world's largest collections of freshwater animals and many critically endangered species such as the giant pandas. It is to showcase some 5,000 animal specimens representing 500 species. Apart from the giant pandas, visitors can look forward to viewing the giants of the freshwater ecosystems such as the giant catfish, giant stingray, giant river otters and the anaconda, the world's

heaviest snake. River Safari will also play an important role in the global captive breeding programme, ensuring the long-term survival of endangered and threatened species such as the manatee and the giant river otter.

For the well-being of the animals and to create an immersive learning journey for visitors, more than 30,000 new plants representing 300 species will be used to create naturalistic habitats and landscapes that duplicate, as accurately as possible, the various bioclimatic zones.

A survey was conducted to identify the trees growing in the area earmarked for River Safari development. Great efforts have been taken to plan construction such that endangered and mature trees can be saved. In cases where such efforts are not possible, the valuable trees will be transplanted to other suitable locations.

Below: A multi-sensory boat ride on the Amazon River to admire a myriad of South America's wildlife, many of which are threatened with extinction.

River Safari has a strong environmental mission, with the key focus of creating greater awareness of freshwater habitat conservation. The biodiversity of freshwater ecosystems is disappearing at a faster rate than the forest and marine biomes, with a reported 50% decline in the freshwater species population index since 1970. It is hoped that by bringing visitors up close to freshwater ecosystems and the related life forms, we can inspire them to care and take positive actions in the preservation of these important habitats, on which our survival depends.





# PANDA-MONIUM

WRS has the latest technology in veterinary equipment and a strong animal management team with extensive field experience to care for the giant pandas. Through close collaboration with the China Wildlife Conservation Association (CWCA), WRS is well positioned to achieve the objectives of promoting giant panda conservation and raising public awareness of wildlife conservation.

In a year when the opening of integrated resorts, celebrity restaurants and famous theme parks made waves on the Singapore tourism scene, WRS stole the thunder when it announced on November 11, 2009 that it would be receiving two giant pandas from China.

WRS has signed a Memorandum of Understanding with the China Wildlife Conservation Association (CWCA) to collaborate on giant panda conservation and research. It will receive a pair of male and female giant pandas, currently two-years old and one-year old respectively from CWCA, as part of this joint collaboration to promote giant panda conservation, raise public awareness of conservation and implement a giant panda breeding research programme.



The pandas are symbolic of the close relationship between Singapore and China as we celebrate the 20th Anniversary of friendly Sino-Singapore relations. Chinese President, Hu Jintao, made the announcement regarding the pandas following a meeting with Singapore President S R Nathan. The partnership was sealed at a signing ceremony on November 12 in the presence of President Hu Jintao and Prime Minister Lee Hsien Loong, signaling high-level support from both governments.

This fabulous development was made possible through CapitaLand Ltd. One of Asia's largest real estate companies with a strong presence in China for 15 years, it has pledged a conservation donation to support the 10-year collaborative programme.

The two pandas, which are scheduled to arrive in Singapore in the second half of 2011, will be housed in River Safari, which is slated to open in 2012. Interactive interpretives, educational programmes and behind-the-scenes experience on panda care will help to enhance visitor experience and generate awareness of the conservation issues on China wildlife.

In line with the needs of the pandas, their new home is being designed and constructed to meet the World Association of Zoos and Aquariums (WAZA) standards. The giant pandas will be housed in a 1600m<sup>2</sup> climate-controlled habitat with air-conditioning and low humidity. The temperature of the habitat will be set between 18 and 22°C and humidity controlled at 50 to 60% all year round. The ambient conditions will be adjusted to simulate the four seasons similar to their natural habitat. The habitat will also boast an off-exhibit holding area, exercise yard and a cubbing den.

The giant panda's diet consists mainly of bamboo, vegetables and special foliovore biscuits. It is estimated that a panda needs about 20kg of bamboo browse per day. In preparation for the pandas' arrival, WRS plans to cultivate six different bamboo species in its parks.

WRS has identified a team of four zookeepers, veterinarians and a researcher to focus on the husbandry needs and veterinary care of the pandas. During the next two years, the team will refine its skills in the husbandry, nutrition, housing and reproduction of pandas. In addition, four staff from China's panda team will be in Singapore - two staff at a time for six months to train the panda team in WRS and see to the establishment of the ideal habitat for the pandas in their new home.

Caring for pandas is not entirely new to WRS. In 1990, the Singapore Zoo cared for two giant pandas, An-An and Xin-Xing, for 100 days, and we look forward to welcoming our two new giant pandas in 2011!



# THE BIRDS AND THE BEASTS

While the world outside was in financial turmoil during the first half of the reporting year, the animal kingdom in WRS carried on delightfully and thrived with new births. New arrivals from zoos around the world happily settled into their new homes and some had started to breed. Enrichment activities, good animal husbandry and veterinary care continued to keep the animal collection in WRS in a great state of health.

Barely three months after the arrival of a pair of Asian lions in Night Safari, they started to breed and produced six cubs.



PHOTO: WILLIAM NAI

# BABY BOOM

WRS continued to enjoy sweet success in breeding rare and endangered species, adding to its already valuable animal collection. Jurong Bird Park hatched 367 chicks from 60 species, Night Safari saw 134 births and Singapore Zoo welcomed 269 babies to the family. Of these, the two most significant breeding successes were that of a Sunda pangolin and a Komodo dragon.



PHOTO: HEATH HOLDEN

Above: Nita's keeper and the vet conducting an ultrasound scan of Nita, the Sunda pangolin.

## The World's First Captive-Bred Sunda Pangolin

An ultrasound scan done on Nita, the Sunda pangolin at Night Safari on 17 December revealed that she was pregnant, carrying a well-formed foetus. On the night of 14 February 2010, Night Safari made history and welcomed the world's first captive-bred Sunda pangolin. Nita, a first-time mother was inexperienced and sadly, the baby pangolin survived only for three days. Nonetheless, this successful breeding effort will pave the way for Night Safari to future successes not only in breeding Sunda pangolin but also in raising them to adulthood.

## The Making of the Dragon

15 November 2009 was a day of great significance to WRS. That day, Singapore Zoo welcomed the arrival of the first Komodo dragon hatchling in 34 years. Komodo dragons, the largest living lizards, are endangered with fewer than 5,000 of them left in the rugged terrain of the Indonesian islands of Komodo, Rinca and Flores. Komodo dragons are particularly difficult to breed in zoos and Singapore Zoo is proud to be the first zoo in Asia, outside their native home of Indonesia, to have successfully bred the giant lizard.

In late 2008, Yoko, a female Komodo dragon on loan from Ueno Zoo, Japan, mated with Bima, a male on loan from Lisbon Zoo, Portugal. She laid a clutch of 14 eggs, which were left in the underground nest and removed four months later to check for embryonic development. Of all the eggs, only one showed positive signs of development. To enhance hatching success, the egg was incubated artificially and it hatched on 15 November. The scaly bundle of joy is testimony to Singapore Zoo's good reptile husbandry and the keepers' unwavering commitment to the conservation of the endangered Komodo dragon, despite numerous failed attempts to breed the lizard in the past.





Cheers for Cubs

Night Safari bred six Asian lion cubs, barely three months after their parents arrived from Sakkarbaug Zoo, India. The Asian lion is a critically endangered species with only 350 individuals left in the Gir forest of India. The birth of the six cubs signified Night Safari’s milestone contribution to the global captive breeding of the Asian lion.



Happy Hatchings

Jurong Bird Park saw happy hatchings yet again, with first-time breeding success for the bar-pouched hornbill, the red-tailed black cockatoo and blue-breasted kingfisher. The black hornbill produced a chick for the second consecutive year running. After a long hiatus of nine years, the rare twelve-wired bird of paradise produced one chick, expanding the precious collection to nine birds.



Sam, Senior Curator (Zoology) has been with Singapore Zoo for 38 years. He has immense experience in primate husbandry and has contributed tremendously to the successful breeding of orang utans and other primates. The reporting year saw two orang utan births, adding to a total of 25 for Singapore Zoo, and an impressive record for captive breeding of endangered primates worldwide.



During the reporting year, WRS welcomed many significant hatchings and births, in addition to those already highlighted. They included eight pelican chicks one golden conure one palm cockatoo five scarlet macaws two hyacinth macaws four blue-bellied rollers one chimpanzee one white rhinoceros two Caribbean manatees one Malayan sun bear one Malayan tapir two ring-tailed lemurs one siamang one giant anteater one Indian gaur three Himalayan tahrns eight babirusa.



Raja, General Curator looks on while Elden, Avian Management Officer feeds a hyacinth macaw, which is being hand-raised at the Breeding and Research Centre. Long hours of dedicated work and lots of passion from committed staff ensure that Jurong Bird Park always produces impressive breeding records, year after year.





## NEW ARRIVALS

WRS worked closely with zoological institutions worldwide on animal exchange programmes to leverage on shared expertise and resources. Through these exchanges, genetic diversity of animal collections and captive-bred offspring can be enhanced without the need to deplete wild populations. Noteworthy arrivals to WRS resulting from such exchanges were one Indian rhinoceros, one male Sumatran orang utan, three red river hogs and two clouded leopards.



Above: Mary, the female Indian rhinoceros arriving from Oklahoma Zoo on an exchange programme.

### Sumatran Orang Utan

The much-awaited arrival of a male Sumatran orang utan from Frankfurt Zoo took place on 2 February 2010. Sumatran orang utans are rarely available for exchange amongst zoos worldwide and this is an important addition to Singapore Zoo's orang utan collection. It represents a new genetic bloodline and promises the hope for WRS to resume the breeding of this critically endangered ape.

Right: The male Sumatran orang utan from Frankfurt Zoo arrived here on a mission to increase the number of the critically endangered ape in Singapore Zoo's collection.



PHOTO: HEATH HOLDEN

### Greater One-Horned Rhinoceros

Night Safari has not had any luck with breeding the greater one-horned or Indian rhinoceros. Through an exchange programme with Oklahoma Zoo, a female Indian rhinoceros, named Mary, was flown in and hopefully, it will be able to accomplish the mission. Habitat loss and poaching have reduced the number of Indian rhinoceroses to about 2,000 in the protected areas of India and Nepal. Captive breeding of this vulnerable animal is one way to conserve the species, apart from strict protection measures in the wild.

## REVITALISE AND INNOVATE

It is the good fortune of WRS to have a very experienced and passionate team to care for one of the world's most valuable animal collections. The enviable breeding records, world-class veterinary care, innovative exhibit designs and the naturalistic landscaping are the result of deep thoughts, careful planning and great teamwork. They represent the fruits of labour of a group of like-minded people working together to embrace WRS's green ethos.

### Slow Loris Exhibit

A new exhibit was added to Night Safari to display the slow loris, a small primate that still exists in the forest reserves of Singapore. This new exhibit supports the strategic direction taken by WRS to display native species in order to generate public awareness of Singapore wildlife. The Slow Loris Exhibit is the second such exhibit, the first being the Sunda pangolin. In the pipeline is the Common Palm Civet Exhibit, slated for opening in September 2010.

Kumar Pillai, Director (Night Safari) discussing the finishing touches needed for the new Slow Loris Exhibit with his team of Curator and Keepers. Kumar joined the Zoo in 1972 and later went on to lead the Night Safari Zoology team.



PHOTO: HEATH HOLDEN



## Red River Hog Exhibit

To improve the variety of animals visitors can enjoy along the walking trail of Night Safari, a new exhibit displaying three red river hogs from San Diego Zoo was added. The red river hog is a handsome wild pig with a striking red coat, white eye rings and mane. It is found in the dense rainforests of Africa.



## Bigger Home For The Giraffes

To expand the space for the giraffes in Singapore Zoo, a section of the dry moat was filled with earth. In place of the moat, artificial timber posts were erected to demarcate the exhibit area. A fresh layer of sand was added and more trees planted to provide shade for the animals. A new restraint chute was installed in the yard and this allows for a more controlled environment for medical procedures to be carried out by the vets.



PHOTO: HEATH HOLDEN

## The Big Move

The animals in the Nepalese River Valley had to be re-housed from the East Loop of Night Safari to the West Loop so that the site could be released for construction of River Safari. The affected animals were Indian rhinoceroses, hog and axis deer, sambar, banteng and water buffalo.

Night Safari's team was kept busy conditioning the animals for the 'big move'. Crates were placed in the yards, and food was put inside the crates to condition the animals to move into them. The crate conditioning facilitated a smooth transfer of the animals, despite the large number. For the animals, the 'big move' meant bigger exercise yards and better holding facilities. Months of hard work were involved and the outcome, immensely rewarding.

## Keeping Boredom At Bay

Animals in captivity do not have to hunt for food, escape from predators or look for potential mates. Many suffer from problems associated with boredom such as overgrooming and feather plucking. Apart from behavioural problems, captive animals often have to deal with overgrown beaks and teeth.

The Zoology and Avian teams work hard to keep boredom at bay for their charges with enrichment activities designed to hone the natural instinct of the animals and to challenge their physical and mental capabilities. Many of the activities focus on food well-hidden to ensure that the animals get to work before they can enjoy their rewards. Toys and enrichment devices made from recycled materials are also used.



A warthog feeding from a suspended bamboo feeder filled with peanut butter.



Favourite treats suspended from a recycled container for our elephants to browse.



Enrichment toys are given to parrots to chew and wear down their bill.

PHOTO: HEATH HOLDEN



## Dragon Undergoes Treatment Meant For Humans

During the process of excavating the nest to lay her eggs, Yoko, the female Komodo dragon sustained a wound on the back and this soon became a large wound, exposing four vertebrae. Her wound was initially treated with Manuka honey but was slow to heal.

Specialists from the Plastic and Surgical Unit of the National University Hospital were consulted and it was decided that Vacuum Assisted Closure (VAC) treatment be used on Yoko. This treatment is applied on humans to hasten healing of chronic, open wounds and has never been used on animals. Yoko underwent the treatment regime for five months and the wound has almost healed completely. Soon, Yoko will be released into the Komodo dragon exhibit and reunited with her mate.



# RESCUE AND RELEASE

WRS is the official Rescued Wildlife Centre in Singapore. In the last three decades, its parks have cared for more than 10,000 rescued and donated animals. The quarantine facilities in Singapore Zoo were upgraded in 2006 to deal with the influx of rescued wildlife. In FY09/10, a new quarantine at Jurong Bird Park was built at a cost of \$250,000 to ensure that the best possible care is given to new arrivals, rescued and donated animals.

## Bulbuls and Doves

Jurong Bird Park received 1002 red-whiskered bulbuls, 554 zebra doves and 39 Oriental white eyes from the Agri-Food and Veterinary Authority (AVA) - one of the biggest donations ever. These birds were confiscated from a local unlicensed pet shop. After quarantine, some of these birds were added into Jurong Bird Park's collection while others were released into various parts of Singapore in conjunction with government agencies, to add to the native songbird populations.



Red-Whiskered Bulbul

## Pangolins In Peril

Singapore Zoo received a total of 354 donations, most of which were tortoises and turtles. More pangolins were rescued and brought in by members of the public. This could be due to the recent rapid development around the forested areas of Singapore where pangolins are being forced out of their habitat. It reiterates the urgent need for more to be done in the area of native wildlife conservation.



Zoo staff, Aimi and Sha rescued a pangolin from Mandai Lake Road. It was rehabilitated at the Wildlife Healthcare And Research Centre.

## Honey Buzzard Rescued

In January 2010, a member of the public alerted Jurong Bird Park to a distressed eastern honey buzzard on a beach. The bird was on a migratory route from its native home in North Asia to Southeast Asia.

The honey buzzard was brought back to the park and found to be suffering from crop stasis, a condition in which the crop (part of the oesophagus) becomes distended with fermenting food and fluid. Surgery was performed on the honey buzzard to remove the cooked chicken meat, onion and garlic lodged in its crop. It was tube-fed with a liquid diet and has since regained its health. The Hawk Show Team has been rehabilitating the bird in preparation for its release back into the wild.

PHOTOS: BJORN OLESEN

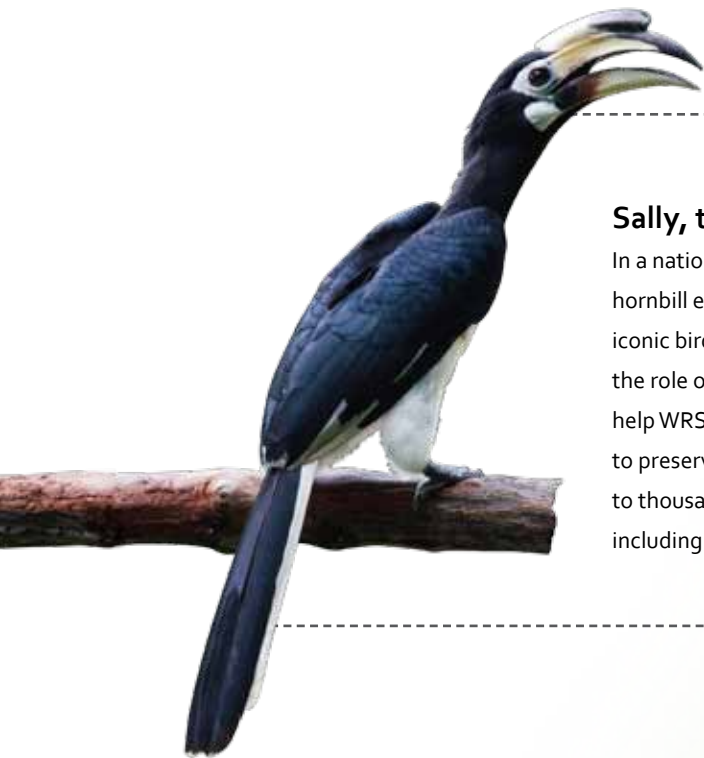




# WILDLIFE CONSERVATION & RESEARCH

It was a year of great achievements for WRS in the area of wildlife conservation and research. The launch of the Wildlife Reserves Singapore Conservation Fund (WRSCF) and the MOU with Wildlife Conservation Society, New York, on conservation collaborative efforts were giant steps taken by WRS to protect biodiversity in our backyard and in the region. The year also saw WRS supporting meaningful field conservation work and research projects undertaken by conservationists, scientists, students and internal staff members.

WRS will continue to focus on conservation and research projects with local and regional emphasis. It is important for Singaporeans to see the relevance of wildlife conservation in the local context and make connections. Most importantly, they must be empowered to make a positive difference. Through WRSCF and by providing platforms for conservation and research work, WRS is empowering them to do their part in protecting biodiversity.



**Sally, the oriental pied hornbill**

In a nationwide poll, Sally, the oriental pied hornbill emerged as Jurong Bird Park’s iconic bird. The new mascot will take on the role of conservation ambassador to help WRS spread the message on the need to preserve rainforests, which are home to thousands of plant and animal species, including the oriental pied hornbill.





# FIELD CONSERVATION PROJECTS

## Banded Leaf Monkey Population And Ecology In Singapore

The first project funded by WRSCF, through the Ah Meng Memorial Conservation Fund, is a study on Banded Leaf Monkey Population and Ecology in Singapore.

The banded langur, *Presbytis femoralis femoralis* is found in southern Peninsular Malaysia (Johore) and marginally on the island of Singapore. Very little is known about the species' status in Singapore. The banded leaf monkey was originally thought to be threatened with extinction.



Spearheaded by NUS postgraduate Andie Ang Hui Fang, under the guidance of Associate Professor Rudolf Meier and assisted by Mirza Rifqi Ismail from NParks, the research team uncovered important evidence that the population of banded leaf monkeys in Singapore is healthy and multiplying. Estimates from the study revealed a population of at least 40 individuals, more than the previous estimate of 10 to 15 individuals in the 1990s. Other novel findings included their breeding cycle and species of local plants consumed, some of which are rare and locally endangered. This information gathered will also be used to develop a management plan for conserving one of the last remaining primate species in Singapore.

## Civet Cat Population And Conflict Mitigation

The Common Palm Civet or "Toddy cat" (*Paradoxurus hermaphroditus*) is Singapore's last wild carnivore in urban areas.

NUS student Xu Wei Ting led a project to study the population of common palm civets in Siglap. The results of the study revealed that the species is highly adaptable to the urban environment and that the majority of residents are tolerant of the existence of the civets. However, some find the civets annoying by their mere presence or when they enter gardens to feed on fruit. The project team and WRS worked together on a public education programme to encourage residents to appreciate the presence of civets and to live alongside this little understood native species.

WRS also assisted with population surveys, health checks, tagging and release of civets brought in by the public and governmental organisations.

## Tonkin Snub-Nosed Monkey Field Work in Ha Giang

The critically endangered Tonkin snub-nosed monkey is found only in northwestern Vietnam. Sightings of this primate have become increasingly rare. Heavy poaching for food, traditional medicines and the destruction of habitat are impacting the population. Fewer than 250 of the primates are thought to exist.

WRS supported a study in Ha Giang, Vietnam by Hanoi University researcher Mr Le Khac Quyet, to gather behavioral and ecological data of the Tonkin snub-nosed monkey. The results obtained will be used in the development of a detailed conservation plan for this critically endangered species.



## Python Diet In Singapore

The reticulated python is a native reptile of Singapore. Urbanisation has driven many pythons out of forested areas and into the urban landscape. These reptiles are often regarded as dangerous pests and WRS receives many python donations every year due to human-python conflict. They are also perceived as a threat to other native species.

NUS student Anne Devan, with the assistance of our veterinary department, studied the diet and endoparasites of wild pythons in Singapore. It was found that the diet of wild pythons comprises mainly commensal rats. Wild pythons also host an apicomplexan parasite *Sarcocystis singaporensis*, which is known to affect rats of the *Rattus* genus in Southeast Asia.

The findings of the study demonstrate that pythons play a unique ecological role in controlling commensal rat populations. The intricate prey-predator relationship points to the conservation value of urban reticulated pythons as the natural predators of rats.



## Conservation Of Sumatran Elephants And Their Habitat Through Community Conservation Response Unit (CRU) In The Buffer Zone Of Gunung Leuser National Park, Sumatra

Deforestation has resulted in the loss of habitat for Sumatran elephants. Driven out of their forest homes, they now live near human settlements, where human-elephant conflict is increasingly common. Human persecution presents a major threat to the survival of the Sumatran elephant. Its population has dwindled by 35% in the last 15 years, to some 2,400 individuals only.

WRS supported a project by Flora and Fauna International to use the Conservation Response Unit model to link in-situ (field) and ex-situ (captive) elephant conservation. The process involves the use of the once neglected captive elephants and their mahouts to patrol the fringes of crop plantations and to drive away wild elephants that attempt to raid the crops. In this way, elephant-human conflict is mitigated and at the same time, job opportunities for the once neglected captive elephants and their mahouts are created.

## Living With Elephants: A Micro-Finance Model To Sustain Community Guarding In Human-Elephant Conflict Hotspots Around Way Kambas National Park, Sumatra

In another effort to help the Sumatran elephant, WRS partially funded a project by Wildlife Conservation Society to mitigate elephant-human conflict in Way Kambas National Park, Sumatra.

About 33 villages are located along the perimeter of Way Kambas National Park. Elephants travel from the national park to the villages to raid crops, and this occurred almost every night during the peak harvest season. Villagers suffered heavy economic losses and retaliated by shooting the elephants.

The Wildlife Conservation Society worked with villagers to develop fish farms along the elephants' routes. The fish farms not only serve as a physical deterrent for the elephants to enter the plantations but also provide a source of income for the villagers.



# RESEARCH PROJECTS AND SURVEYS

## Observations On Hornbills In Jurong Bird Park

The Avian team expanded their efforts in monitoring the hornbills, from one species (the oriental pied hornbill) to six species including the great pied, wrinkled, bar-pouched, tarctic and black hornbills.

Each hornbill nest is installed with two cameras, one inside and one outside, to monitor the breeding behaviours round-the-clock. A live web cam linked to Jurong Bird Park's website was also activated to allow the public a glimpse of the rarely-seen nesting behaviours.

Valuable data collated by NTU student Jessie Goh, revealed that both oriental pied and great pied hornbills exhibit cannibalistic behaviour. In the case of the former, cannibalism set in after the last chick was hatched whilst for the great pied hornbill, cannibalism was observed immediately after the first chick was hatched.

Other significant observations made were the nest sealing patterns exhibited by the hornbills. Each species seal their nests differently, and sealing materials used were largely dependent on the materials and food provided by the males.



## Breeding And Nesting Of Lesser Flamingos

Jurong Bird Park has not been able to breed the lesser flamingo even though it has an impressive breeding record for the greater flamingo. To trigger the nesting and breeding behaviour of the lesser flamingo, the Avian team and Temasek Polytechnic student, Isabel ChenYing placed artificial nest mounds with fake eggs in the birds' habitat. A pair eventually bred and one egg was produced. Unfortunately, the parents were inexperienced and the egg cracked after the third day. Nevertheless, the encouraging result yielded from this experiment laid the foundation for future successes in hatching and raising the lesser flamingo.

## Differences In The Breeding Behaviour Of King Penguins In Captivity And In The Wild

King penguins incubate their eggs for about 55 days, among the longest incubation periods in the avian world. Wei Han from Temasek Polytechnic compared the incubation duration of captive king penguins at the Jurong Bird Park and wild penguins. It was found that the king penguins take turns to incubate their eggs every 3 to 7 days while those in the wild take 6 to 18 days. One probable explanation is that captive penguins need not travel long distances to hunt and therefore able to shorten the changeover interval for egg incubation.

## Nutrition And Growth Of Captive Sunda Pangolins

Pangolins are notoriously difficult to keep in zoos because of their specialized natural diet of termites and ants. The Night Safari team has been working on improving the captive management programme for Sunda pangolins since 2005, with particular focus on the artificial diet.

Temasek Polytechnic student Gwen Wong and the Night Safari team studied the artificial diet used and recommended a reduction in the fat content. Crude fibre, obtained by grinding natural termite mounds into powder, was added to the artificial diet to replicate, as close as possible, the natural diet. The improved formula has proven to be effective in alleviating gastrointestinal tract problems in the pangolins.



## Ecological Role Of Malayan Tapirs As Seed Dispersal Agents

At Night Safari, NUS Research Fellow Ahimsa Campos-Arceiz investigated the effectiveness of Malayan tapirs in dispersing different types of fruits and seeds. The results showed that tapirs are good dispersers of small seeds and small or soft fruits but not large seeds and large, hard fruits like durian and elephant apple. Many Southeast Asian plant species depend on larger animals such as rhinos and elephants to disperse their seeds for continuity of the species. This study demonstrated the important ecological role played by different mammalian species in maintaining the health of Southeast Asian forest ecosystems.

## Effects Of Group-Based Enrichment On The Behaviour Of Squirrel Monkeys At Singapore Zoo

Enrichment activities are used to hone the natural instinct and maintain the mental well-being of the animals in WRS. NTU student Sharleen Han examined the effects of group-based versus single-use enrichment devices on a group of squirrel monkeys in Singapore Zoo. Results showed that group-based enrichment was able to reduce aggression because of reduced competition for access to the food enrichment. Group-based devices are therefore recommended to provide better enrichment and welfare for social primates like squirrel monkeys.

## Causes and Possible Treatments of Chronic Diarrhoea in an Individual Captive Guanaco (*Lama guanicoe*)

NTU student Poh Yu Min investigated the causes of chronic diarrhoea in a guanaco at the Singapore Zoo. The social behavior, rumination time, spatial use of exhibit and food intake of the affected guanaco and a healthy guanaco were observed and comparisons made. Through the research, several possible causes of chronic diarrhoea including dental, viral, bacterial and parasitic causes, as well as intestinal disorders such as enteritis and steatorrhoea (inability to digest fat in the gastro-intestinal tract) were eliminated. Behaviour patterns associated with chronic diarrhoea were established and the results will help the vets in diagnosing similar problems in guanacos in the future.



## Growth And Reproduction In Mice

Mice are an important food source for the reptiles and birds of prey in WRS. In an effort to improve the breeding and production of feeder mice, Soon Le Ying from Temasek Polytechnic studied factors affecting their growth rate and reproduction at the Night Safari. It was found that feeder mice with more births produced smaller litter sizes, and mice from larger litter sizes had a slower growth rate. The type of bedding provided for the mice was not a factor for growth rate and maximum weight gain. These results will help in the mice production in WRS.

## Wildlife Surveys In Singapore Zoo And Night Safari

Despite the infrastructure developments in Singapore Zoo and Night Safari, much of the surrounding forested areas have been retained, and these areas support a healthy population of local biodiversity. Surveys conducted on various taxa – amphibians, reptiles, dragonflies, butterflies and birds showed that Singapore Zoo and Night Safari grounds support a wide variety of species, including 102 bird species, many of which are endangered locally.

Birds that are rare elsewhere, such as the straw-headed bulbul, red-eyed bulbul, red-legged crane, oriental magpie robin and grey-headed fish eagle are doing well as the wild residents of Singapore Zoo and Night Safari.

WRS will continue to walk the talk and ensure that developments in the parks are carried out with minimum possible impact on the environment. The grounds of its parks will always serve as a great sanctuary for native wildlife to roam and fly free.

PHOTO: HEATH HOLDEN



## Study On The Ability Of Orang Utans And Chimpanzees To Solve Puzzles

Guest researcher Nick Mulcahy from the University of Queensland tested the ability of orang utans and chimpanzees in solving puzzles through the use of simple tools like “peanut-tube task”, “grapes out-of-reach task” and “mirror recognition”.

This research uncovered the cognitive abilities of the apes and reinforced the need to conserve them, and ensure sufficient mental stimulation when in captivity.

## National Cryogenic Tissue Bank

The National Cryogenic Tissue Bank was established by NUS in 2008 to preserve Singapore’s and Southeast Asia’s genetic heritage. In 2009, WRS provided over 90 tissue samples from more than 50 animal species to the National Cryogenic Tissue Bank. The selection of the animals was heavily focused on local and regional species, and also those with high conservation value such as the babirusa, Sunda pangolin, long-tailed macaque, Malayan tiger, Sumatran orang utan and king cobra.

## Phylogeography And Evolution Of Carnivores In The Sunda Shelf: Felidae, Viverridae And Herpestidae

WRS is providing blood and hair samples of the binturong and different palm civet species to researchers from the Institute of Zoo and Wildlife Research and Muséum National d’Histoire Naturelle, Paris, France for phylogenetic analyses. The comparison of the phylogeography of the different species will help in the understanding of the impact of the paleobiogeography, and geographical or ecological barriers on the biodiversity of the region.

## Pyrrolidinone Transmission In Butterflies

Butterflies of different species were provided to NUS researcher Koh Teck Hui for a study investigating the transmission of chemicals (2-Py) from prey (butterflies) to spiders (predators) and subsequently onto spider webs. The results will provide in-depth understanding of prey-predator relationship between butterflies and spiders.



PHOTO: KHEW SIN KHOON

## Genetic Diversity Of The Genus *Naemorhedus* Species Using Microsatellite Markers

Blood samples, taken opportunistically, from gorals in WRS were provided to the Conservation Genome Resource Bank for Korean Wildlife for use in a study on genetic diversity of gorals. The results will be useful for the captive management of the goral, a threatened species of hoofed-stock.



# EDUCATE, ENGAGE, EMPOWER

Holding fast to the principal of constructive learning, WRS worked hard to provide opportunities for students as well as members of the public to discover the natural world through various platforms. By structuring programmes that focus on multiple intelligence, the essential elements of wildlife conservation were conveyed in deep and meaningful ways.

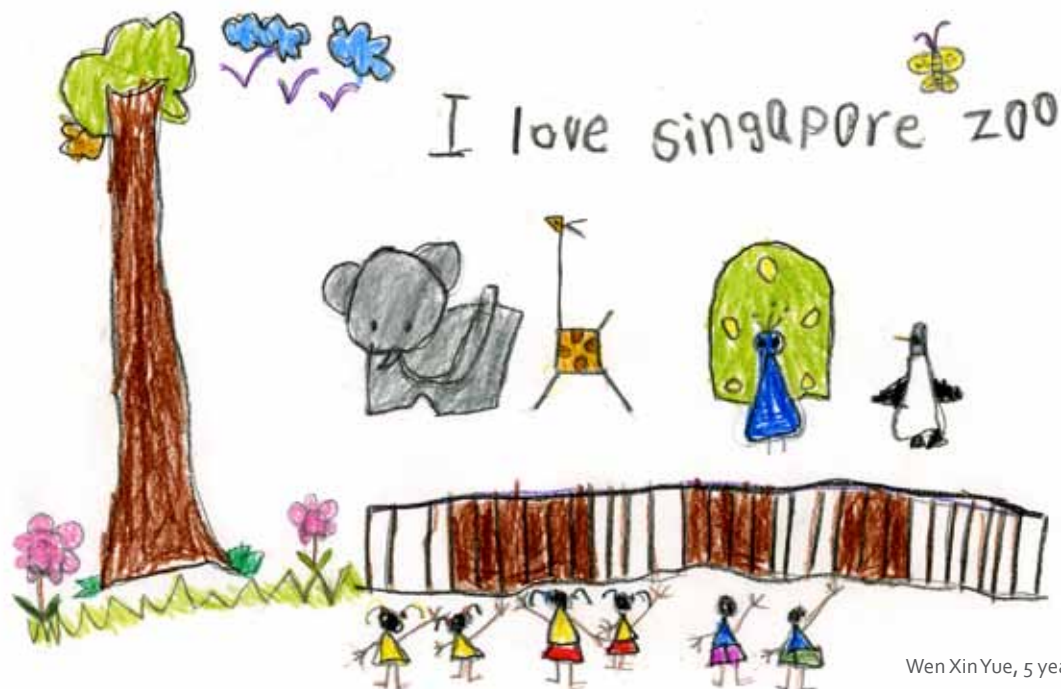
PHOTO: HEATH HOLDEN



*"Before I started volunteering at Singapore Zoo as a SPH Foundation Conservation Ambassador, I was very reserved, especially in the company of strangers. I would not approach anyone I did not know well, much less engage them and teach them. This all changed when I started volunteering. I made an effort to overcome this challenge and I was impressed by what I found out about myself - the only thing that was holding me back from trying was myself. From then on, I have strived to improve myself in as many ways as I can by trying out new experiences and learning through experimentation. I hope that my experience will encourage more youths to try out new things and learn more about themselves. We will never know what we can achieve unless we are willing to take the first step".*

**Soon Le Ying**

SPH Foundation Conservation Ambassador and torchbearer of the 2010 Youth Olympic Games



Wen Xin Yue, 5 years old







## Big Step Forward For Wildlife Education

For the first time, WRS was officially appointed by Ministry of Education as the curriculum developer and deliverer of Primary One outdoor education curriculum for 'Programme For Active Learning (PAL)'. The endorsement is a big step forward as it opens the door for WRS to educate students on nature awareness and wildlife conservation through the mainstream school curriculum.

The pilot outdoor education PAL was launched in MacPherson Primary School in March 2010. The curriculum is designed to inspire experiential learning and to motivate children to connect with the great outdoors. It is structured over a period of eight weeks with WRS Education Staff visiting the school to teach for six sessions and students making learning journeys to Jurong Bird Park and Singapore Zoo for two sessions. Once tested and refined, PAL outdoor education curriculum will be implemented nationwide by 2014 for all Primary One students.

## Going Digital

The concept of 'Learning On The Move' will soon redefine the learning experience of visitors to WRS parks and add another dimension to wildlife education. In an effort to engage the IT-savvy generation, digital trails activated from hand-held devices with GPS and multi-media applications will be developed to complement the other educational programmes offered by WRS. Industry partners will develop the application with the assistance from the Infocomm Development Authority (IDA). The digital trails, targeted at school groups, are slated to launch in September 2010. The mid-term plan is to offer digital trails to tourists and enhance their wildlife experience through a multi-lingual and multi-media platform.

## Learning Chinese Amongst Feathered Jewels

Primary One and Two students who have had an enriching time learning Chinese in Singapore Zoo can now look forward to a similar learning experience amongst the feathered jewels in Jurong Bird Park. Story books featuring bird celebrities, and activity booklets were developed by the same panel of teacher-authors to extend learning Chinese in Jurong Bird Park to Primary Three and Four students. Many primary schools have stamped their endorsement and listed the resource pack as recommended supplementary reading materials.

## Volunteering For Wildlife

To spread the conservation message far and wide, WRS leveraged on a diverse group of volunteers to intensify its efforts in public education campaigns and outreach sessions. Ranger stations, manned by student volunteers, on tigers, climate change, native wildlife and bats were set up to coincide with the Year of the Tiger celebrations, Earth Day, National Day and Halloween Horrors respectively.

Students who preferred to take a hands-on approach in contributing to wildlife conservation opted for volunteer attachment to the Avian Department. A structured programme was developed for these volunteers so that they could optimize the learning opportunity. Their duties included cleaning of avian facilities, food preparation and feeding, making behavioural and environmental enrichment observations and performing other tasks related to bird husbandry.

The volunteer community at Jurong Bird Park was given another boost with the launch of the Docent Programme in April 2009. The programme, which involves adult volunteers, has been in place at Singapore Zoo and Night Safari for the past 11 years and its extension to Jurong Bird Park meant total integration of the volunteer community in WRS and opportunities for cross-park volunteering. WRS has about 200 docents and the number is set to increase.

PHOTO: HEATH HOLDEN



During the National Day holidays, five students from Hwa Chong Institution took on the role of wildlife ambassadors to put together an interactive station to educate Zoo and Night Safari visitors on pangolins.

Rachel Kam, one of the team members, has this to say "It was a really meaningful experience that allowed us to learn more about pangolins as we did the research for the exhibition. Along the way, we also learnt many things about holding a good exhibition such as being more personal and interactive. I personally enjoyed the experience very much as I learnt a lot from it and like sharing with others the conservation message".

## Cultivating A Learning Culture

WRS recognizes the importance of inspiring staff to embrace its green ethos, not just at the workplace but also on a personal level. Education is an effective way of cultivating ownership, while sharing with like-minded people is a great motivator to achieve common goals. Monthly WOW (Windows On Wildlife) talks were used as a platform for the staff to share their areas of expertise or study trip experiences with fellow colleagues. Visiting researchers, conservationists and zoo counterparts were also invited to share their research findings, conservation and zoo-related knowledge with WRS staff.

PHOTO: HEATH HOLDEN



Dr Robert Cook, Executive Vice President of Living Institutions, Wildlife Conservation Society, talking about conservation during a WOW talk.



# DELIVERING GREAT WILDLIFE EXPERIENCES

WRS strives to inspire visitors to discover and protect biodiversity through meaningful wildlife experiences. Such experiences have to be interactive and engaging, so that visitors are motivated to make repeat visits to WRS parks, where user-friendly facilities and great customer service are norms rather than exceptions, and where the line between fun and learning blurs – visitors often learn without knowing that they are being taught.

Cultivating a service culture that focuses on treating every visitor as an important guest enables WRS to lead the industry in customer satisfaction. It achieved a score of 68.2 in the 2009 Customer Satisfaction Index, above the industry average of 67.9 and the national average of 68.

## *Breaking the ice with Pinky*

One girl got a chance to get up close and personal with Pinky the penguin in its icy enclosure at Jurong BirdPark. Chong Chin Wen, 11, had this unique opportunity last Saturday after winning a competition in The Straits Times' Little Red Dot magazine for children.

She was among 40 people who attended a two-day penguin camp at the park. Everyone else touched the penguins from behind a waist-high barrier in the area behind the penguin exhibit.

The Primary 5 student from Fairfield Methodist School (Primary) was all smiles after the experience. "It was very exciting. The feathers were smooth and soft," she said.

ST PHOTO: MUGILAN RAJASEGERAN



Straits Times, 16 June 2009

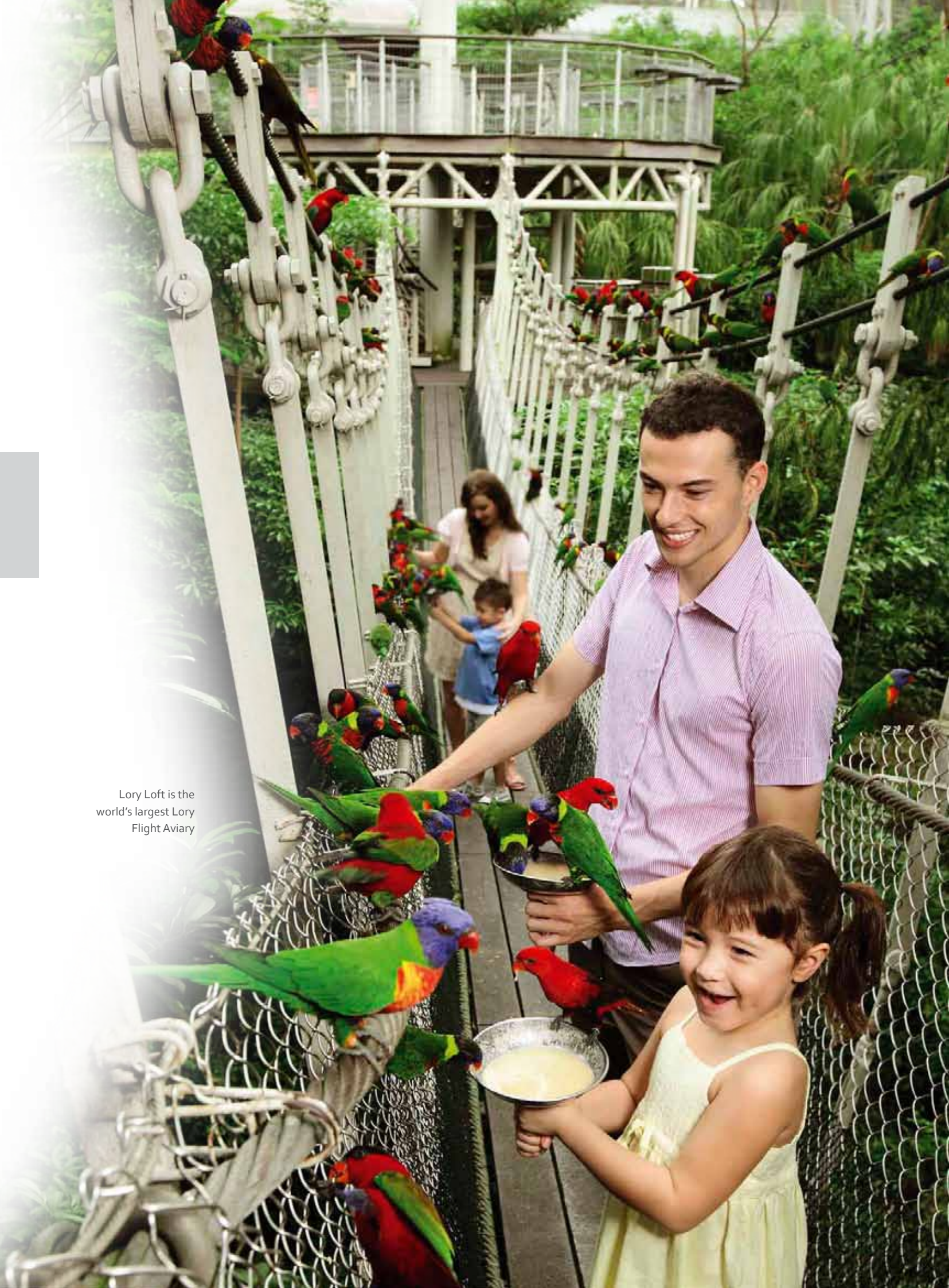
## **Fun camp**

**"I thank Jurong BirdPark and ST's Little Red Dot."**

MISS CHONG CHIN-WEN: "I recently won a contest organised by The Straits Times' magazine for children, Little Red Dot, and Jurong BirdPark, and attended a camp. I would like to thank the Jurong BirdPark's coordinators, Faith, Maggie and Fiza, for being so cheerful and patient, and the team from ST's Little Red Dot for making the camp possible. I hope there will be more exciting events like this in future and I will have the opportunity to attend such events."

Straits Times, 19 June 2009

Lory Loft is the world's largest Lory Flight Aviary





Feeding Frenzy at Jurong Bird Park is just one of the many interactive platforms used to connect visitors with the natural world.



about the charismatic African animals. 'Feeding Frenzy' allows visitors to zoom around the Park in a buggy for a close encounter with the ostriches, cassowaries, flamingos, sun conures and crowned pigeons. The tour ends with a visit to the Breeding and Research Centre to observe how the Avian team incubates eggs and hand-raise chicks.

## Birthday Boon

From October 2009, WRS introduced a Birthday Badge programme to WOW visitors who choose to celebrate their special day at any one of the parks. The birthday celebrants are given complimentary admission and a birthday badge, the latter signals to WRS ground staff to accord special treats such as a free scoop of ice cream, discounts at F&B and retail outlets and birthday wishes.



Visitors wearing this birthday badge are accorded special treats.

## Food and Falconry

To improve Jurong Bird Park's F&B offerings, the footprint of the entrance retail shop was reduced and the available space converted to Hawk Café. This new F&B outlet serves popular local fare such as kaya toast, chicken rice, beef and shrimp wonton noodles. Hawk Café, being located at the entrance, is non-gated and therefore enjoys patronage from non-park visitors from Jurong industrial and residential areas. To enrich the dining experience, the café features a falconry theme, with displays of falconry equipment and nuggets of interesting information on birds of prey scattered around, even on place mats. Diners learn about the ancient art of falconry and the majestic birds of prey while feasting on the delicious local fare.



The newly-opened Hawk Café serves kaya toast, chicken rice and other local fare.

## Feather Run

In celebration of Earth Day, Jurong Bird Park launched its first Feather Run for children. The event encourages children to take a fascinating journey through the avian world, enjoy the outdoors and keep fit. With 4600 birds representing 380 species around the Park, Feather Run allowed the young participants to explore different sections of the Park, inspiring them to appreciate the diversity in the colourful world of birds.

## Hollywood Dinos – The Live Experience

Dinosaurs hold a timeless fascination for children, and birds are thought to have evolved from dinosaurs – these were two compelling reasons for Jurong Bird Park to hold Hollywood Dinos, a travelling exhibition that employs state-of-the-art technology in animatronics and engineering to showcase life-size dinosaurs. Brought to Jurong Bird Park by WorldBizz Pte Limited, Hollywood Dinos provided visitors with an opportunity to discover the prehistoric life of dinosaurs through fun and entertainment. The event held from 12 December 2009 to 18 February 2010, attracted over 100,000 visitors.



## Training To Stay On Top

Motivated and well-trained staff, clear-cut processes and benchmark standards are the bedrock of any successful organization. Over the past two years, WRS has cultivated an internal culture of learning, and a sense of ownership and professionalism among its staff members. Each WRS staff fulfilled an average of 2.9 training places or 42.6 training hours, about 20% more than the previous year. The human faces behind the well-cared-for animals and grounds in WRS parks are the reasons the attractions continue to garner accolades and reach new heights in industry service standards.

Five training modules were organized for WRS front-liners to sharpen competence in different areas so that they are able to engage visitors at a higher level. All service staff underwent training in Managing Cultural Difference, Early Childhood Management, Managing Guests' Safety and Grooming and Deportment.

Additionally, service leaders who lead and set standards at visitor touch points also underwent a Service Leadership Training module.

## Wildlife Travel & Tours – A New Tour Agency

In September 2009, WRS set up a tour agency named Wildlife Travel & Tours to provide one-stop leisure attraction offerings to tourists. This new business unit not only value-adds to customer services but also creates a channel for WRS to cross-sell its three attractions and to integrate value chain for better revenue generation.

For a start, Wildlife Travel & Tours operates from one of the retail outlets in Night Safari, which has the highest tourist visitorship among the three parks. Counters at Singapore Zoo and Jurong Bird Park will also be set up in the future.



ADOPTER/DONOR - FY 09/10

JURONG BIRD PARK

Aetos Security Management Pte Ltd	White-Bellied Sea Eagle, Norman
Canon Singapore Pte Ltd	Scarlet Macaw, Ippey
Goodwood Park Hotel Limited	Brahminy Kite, Ronnie II
Hong Leong Foundation	Flamingos (24) at All Star Birdshow
Lady Yuen Peng McNeice	Bali Mynah Exhibit
Lee Foundation Singapore	Penguin Expedition
M1 Limited	White Bellied Sea Eagle
MVCI Asia Pacific Pte Ltd	Sulphur Crested Cockatoo, Sassy
OCBC Limited	Heliconia Walk
Singapore Technologies Aerospace Ltd	King of the Skies Show
SMRT Corporation Ltd	Great-Pied Hornbill Exhibit
Solid Gold PETS (S.E.A) Pte Ltd	German Pointers, Batman & Robin
SPH Foundation Ltd	Birds N Buddies Show
SPH Foundation Ltd	Carribbean Flamingo Exhibit
Sutera Harbour Resort	Lesser Birds of Paradise
Thai Airways International Public Co. Ltd	JBP Panorail Trains
The Shaw Foundation Pte	Fly Past Macaws
Unilever Singapore Pte Ltd	Harris Hawk, Angel
United Overseas Bank Limited	Dino Descendants

NIGHT SAFARI

Ang Mo Kio Police Division	Free Ranging Axis Deer
Bedok Police Division	Giant Flying Squirrel
Changi General Hospital	Free Ranging Axis Deer
Chemical Industries (Far East) Ltd	Malayan Tiger Viewing Shelter
Coca-Cola Singapore Beverage Pte Ltd	Asian Golden Cat
Goodwood Park Hotel Limited	Fishing Cat Trail
Haw Par Healthcare Limited	Tiger Exhibit
International Researchers Club	Kinkajou Exhibit
JTB Pte Ltd	Sambar Deer Exhibit
JTB Pte Ltd	Elephant Habitat
Khoo Teck Puat Foundation	Fishing Cat Trail
M1 Limited	Giraffe Habitat
Martin Storey	Babirusa Habitat
Mitsubishi Pencil Co Pte Ltd	Asian Greater One-Horned Rhino Exhibit
Mr & Mrs Lim Soo Peng	Red-Crowned Cranes
Network for Electronic Transfers (S) Pte Ltd	Free Ranging Axis Deer
Singapore Petroleum Company Limited	Lion Exhibit
Singapore Prison Service	Forest Eagle Owl & White Bellied Sea Eagle
Singapore Refining Company Pte Ltd	Marshbird Habitat
Singapore Telecom Mobile Pte Ltd	Ankole Exhibit
Sony Ericsson Mobile Communications Intl AB	Free Ranging Axis Deer
Standard Chartered Bank	Otter Exhibit on Leopard Trail
StarHub Mobile Pte Ltd	Serval Segment - Creatures of the Night Show
Thai Beverage PLC	Chawang Exhibit
The Shaw Foundation Pte	Slow Loris Exhibit
Unilever Singapore Pte Ltd	Tarsier Habitat
United Overseas Bank Limited	'Creatures of the Night' Show

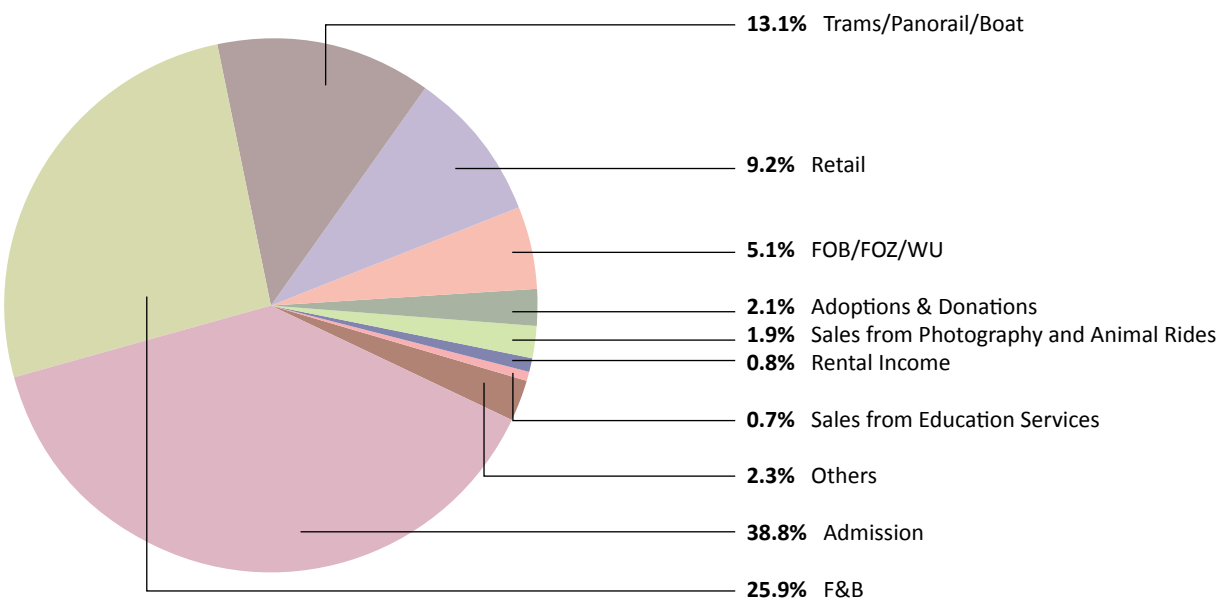
SINGAPORE ZOO

Abbott Laboratories (S) Pte Ltd	Giraffe, Growie
Abbott Laboratories (S) Pte Ltd	Zoolympix 2009
American Express International, Inc	White Tiger Conservation Panels
Asia Pacific Breweries (S) Pte Ltd	White Tiger, Jippie
Australian International School	Orang Utan, Banjo
Borneo Motors (S) Pte Ltd	Cheetah Exhibit
Canon Singapore Pte Ltd	RFKW - Kidz Playground
Cheng Kim Loke Foundation	Malayan Tapir Exhibit
Ms Christina Ong	Orang Utan, Binte
Ms Christina Ong	Orang Utan, Saloma
Coca-Cola Singapore Beverage Pte Ltd	White Tiger, Omar
ED & F Man Asia Pte Ltd	Sugar Cane Plant
Galborg Pte Ltd	Chimpanzee, Nkosi
General Motors Overseas Dist. Corp.of Singapore	Agile Gibbon, Gangsa
Haw Par Corporation Ltd	Leopard Exhibit
Henkel Singapore Pte Ltd	Chimpanzee, Gangga
Hewlett-Packard Singapore (Sales) Pte. Ltd.	Douc Langur Exhibit
Hong Leong Foundation	Fragile Forest Exhibit
Ian Peter Windle	Cannon Ball Tree
Ms Kay Kuok	Elephant, Aprila
Kentucky Fried Chicken Management Pte Ltd	Zebra Exhibit
Lady Yuen Peng McNeice	Malayan Tapir Exhibit
Lee Foundation Singapore	Orang Utan, Chomel
M1 Limited	Amhara Stone Village Exhibit
Malayan Motors	Jaguar Exhibit
Mr & Mrs Stree Govindan Naidu	Chimpanzee, Rah
MW Medical Pte Ltd	Chimpanzee, Togo
National Trades Union Congress (NTUC)	Otter Exhibit
Nokia Siemens Networks Singapore Pte Ltd	Earth Day 2009
OCBC Limited	Wild Animal Carousel
Primary Industries Pte Ltd	Babirusa Exhibit
RedDot Publishing Inc Pte Ltd	White Handed Gibbon, Bahtera
Renesas Semiconductor Singapore Pte Ltd	Pelican Exhibit
Righteous International Subscription Services	Goeldi Marmoset Exhibit
Singapore Petroleum Company Limited	Lion Exhibit
Singapore Technologies Aerospace Ltd	Sealion Show
SMRT Corporation Ltd	Cotton-Top Tamarin Exhibit
SPH Foundation Ltd	Inuka the Polar Bear
SPH Foundation Ltd	Proboscis Monkey at SPH Conservation Centre
SPH Foundation Ltd	SPH Foundation Conservation Ambassadors
StarHub Cable Vision Ltd	Douc Langur Exhibit
StarHub Cable Vision Ltd	'Rainforest Fights Back' Show
StarHub Mobile Pte Ltd	Red Langur Exhibit
State Bank of India (Singapore)	Asian Elephant, Gambir
The Shaw Foundation Pte	Manatee Exhibit
The Shaw Foundation Pte	The Shaw Foundation Amphitheatre
Tipex Pte Ltd	Flamingo Exhibit
Tourism NT	Safari Jeep at the Australian's Outback Exhibit
Unilever Singapore Pte Ltd	Squirrel Monkey Exhibit
Wuthelam Holdings Pte Ltd	Rabbit Exhibit

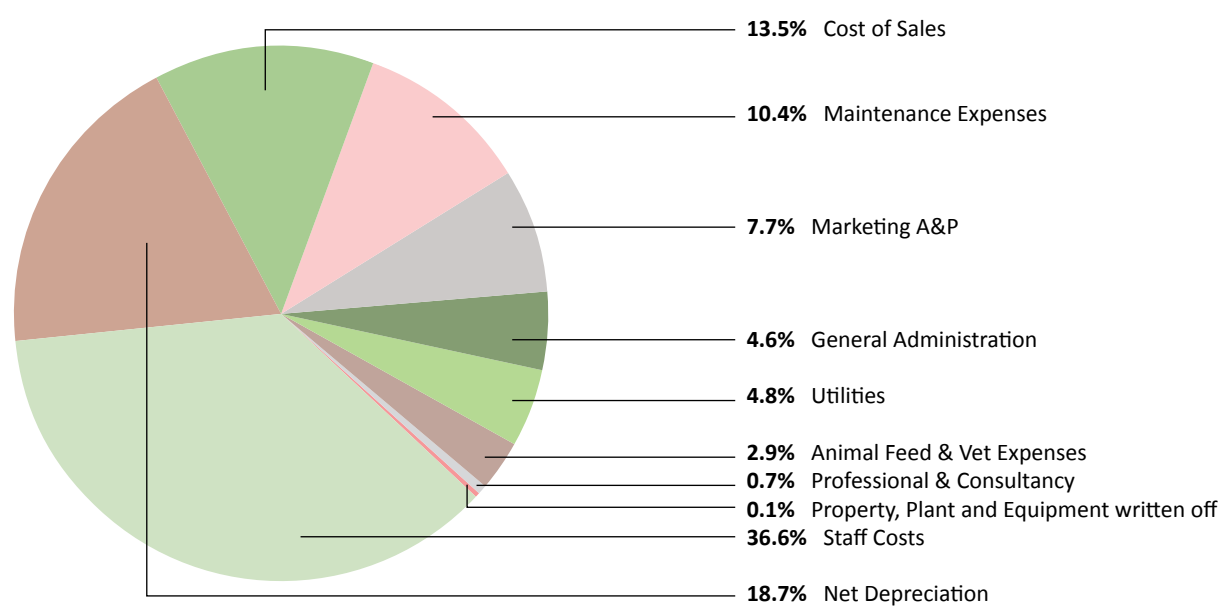


# FINANCIAL AND ATTENDANCE INFORMATION

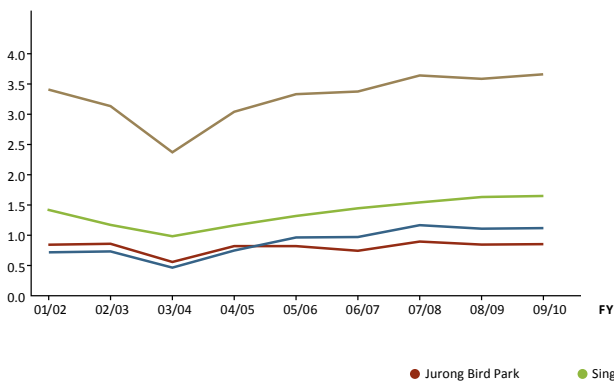
Total Revenue FY 09/10 \$95M



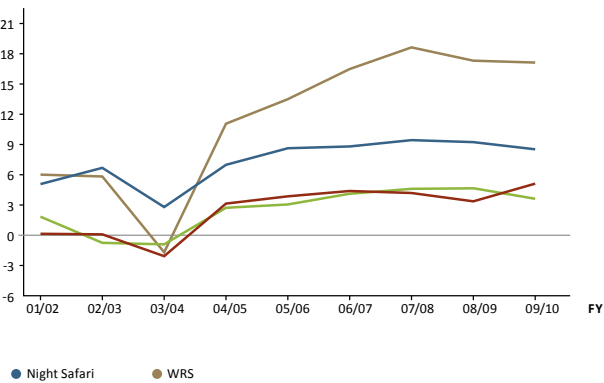
Total Expenses FY 09/10 \$85.5M



Total Visitors (in million)



NPAT (\$ in million)







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