

elephants in different working environments including zoos.

The decision of the CZA to ban elephants from zoos, when seen in the overall context of wild and captive elephants in the country, appears to be illogical and goes contrary to the needs of elephant management in the country.

Instead of banning elephants from zoos, they need to be assisted in proper management of elephants. The SFD in West Bengal has been following since many years a model for collaborative management of captive elephants with the Alipore Zoological Garden, Kolkata. The adult zoo elephants are periodically shifted to North Bengal and kept in conditioning-cum-training camps before being put to use for patrolling in forests and Protected Areas. In exchange, the zoo is provided with elephant calves for display. This exchange considerably reduces the burden of the SFD on account of unproductive expenditure on

elephant calves before they attain maturity. The elephant calves, who are a great hit with the visitors, can be kept in enclosures with minimal or no restraints and pose no threat on account of *musth*. The SFD also provides the services of its experienced mahouts to help the zoo mahouts in honing up their skills. It is possible to think of many other models and management systems for improving the status of zoo elephants.

The CZA should not shy away from its responsibility of improving the condition of elephants in zoos and must not resort to the easy but highly illogical option of banning elephants from zoos.

ZooLex Tiergarten Schönbrunn - Rainforest House

See web version with large, attractive photos at <http://www.zoolex.org/zoolexcgi/view.py?id=1117>

*Hermann Fast, Michael Hollunder, Gaby Schwammer, Harald Schwammer (authors, all Tiergarten Schönbrunn)
Lauren Axtmann, Monika Fiby (editors for ZooLex)*



The opening of the Rainforest House marked the 250th anniversary of Schönbrunn Zoo. The aim of the project is to show visitors a cross-section of a mountain slope in Borneo's rainforest, including the Asian rainforests link to the ocean in the form of a simulated mangrove swamp. The primary goal of the exhibit is for the visitor to actually experience the rainforest, rather than merely viewing a display of plants and animals: the visitor should gauge an understanding of the complexity and diversity of the forest. This goes hand in hand with an effort to educate the public about ongoing threats to the rainforest and to promote conservation.

The outside of the Rainforest House has a domed structure, with a stepped glass roof. The roof also allows natural ventilation as in the summer the mechanical ventilation system is not enough. Based on dynamic simulation calculations, the air conditioning for the Rainforest House could be technically and economically optimized.

The Rainforest House provides a home for over 60 species of animal. Further attractions include a cascading waterfall and two tidal pools, simulating the ebb and flow of the ocean. Simulated weather conditions, including mist, as well as tropical thunderstorms, add to the experience. Visitors can explore the house over two levels. They cross bamboo bridges to find the bat cave and ascend

adventure steps to reach a viewing platform. The elevator, Panoramalift, provides stair-free access across both levels of the exhibit. Contrary to common practice for green house planning a north facing slope of previous bear exhibits was chosen for the rainforest house in order to avoid overheating from sun radiation. Originally, the structures of the bear enclosure were to be used as the basis on which to build the house, yet defects in their quality led to the construction of new foundations.

Roughly 150 of the most important species of tree found in the rainforest of Borneo were planted in the exhibit. An area growing cultivated plants, fruit trees and a paddy field - is the only part of the exhibit that does not conform to the strict geographical sourcing of the flora. Particular plants rarities to Borneo such as orchids and epiphytes - are grown in the upper floor of the exhibit. In contrast to the typical South American rainforests, the soils of Borneo's forests have higher humus content, a different layering profile and little drainage.

Summary continued on ZOOS' PRINT website www.zoosprint.org as well as ZOO LEX original <http://www.zoolex.org/zoolexcgi/view.py?id=1117>

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LOCATION:

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URL: <http://www.zoovienna.at>

ANIMALS:

Family:

Adrianichthyidae
Agamidae
Agamidae
Aplocheilidae
Bataguridae
Bataguridae
Bataguridae
Bufonidae
Cobitidae
Columbidae
Cyprinidae
Estrildidae
Estrildidae
Estrildidae
Estrildidae
Estrildidae
Gekkonidae
Gekkonidae
Gekkonidae
Gekkonidae
Gekkonidae
Geoemydidae
Gobidae
Gobidae
Gobidae
Microhylidae
Muscicapidae
Mustelidae
Obrinidae
Osphronemidae
Osphronemidae
Petauridae
Pittidae
Pteropodidae
Pteropodidae
Pteropodidae
Pythonidae
Rhacopharidae
Sesarmidae
Tetraodon
Toxotidae
Tragulidae
Tupaiidae
Zosteropidae
Zosteropidae

Species:

Oryzias javanicus
Bronchocela cristatella
Gonocephalus grandis
Aplocheilus panchax
Callagur borneoensis
Heosemys spinosa
Orlitia borneensis
Bufo melanostictus
Botio macranthus
Streptopelia chinensis
Balantiocheilus melanopterus
Erythrura prasina
Lonchura malacca
Lonchura pallida
Padda oryzivora
Gekko gekko
Hemidactylus frenatus
Lepidodactylus lugubris
Ptychozoon kuhli
Cuora amboinensis
Periopthalmus novemradiatus
Pseudoapocryptes elongatus
Stigmatogobius sadanundio
Kaloula pulchra
Copsychus malabaricus
Aonyx cinerea
Aretaon aperrimus
Osphronemus goramy
Trichogaster leeri
Petaurus breviceps
Pitta sordida
Cynopterus titthaecheilus
Pteroptus giganteus
Pteroptus vampyrus
Python mollerus bivittatus
Rhacophorus reinwardtii
Sesarma
Tetraodon biocellatus
Toxotes microlepis
Tragulus javanicus
Tupaia belangeri
Zosterops consobrinorum
Zosterops palpebrosus

Common Name:

Javanese ricefish
Green crested lizard
Great angle headed lizard
Blue panchax
Painted terrapin
Spiny turtle
Malaysian giant turtle
Common indian toad
Clown loach
Spotted dove
Shark minnow
Pin-tailed parrotfinch
Tricoloured Munia
Pale-headed Munia
Java sparrow
Tokay gecko
Common house gecko
Mourning gecko
Kuhl's flying gecko
Southeast-asian box turtle
Mudskipper
Goby
Knight goby
Asian painted frog
White-rumped shama
Asian short-clawed otter
Thorny stick insect
Giant Gourami
Pearl gourami
Sugar glider
Hooded pitta
Indonesian short nosed fruit bat
Indian flying fox
Large flying fox
Burmese python
Green flying frog
Terrestrial mangrove crabs
Eyespot pufferfish
Smallscale archerfish
Java mouse-deer
Northern tree shrew
Pale-bellied white-eye
Oriental white-eye

KEY WORDS:

tropical rainforest, mangrove, Borneo

DESCRIPTION:

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Visitors can explore the house over two levels. They cross bamboo bridges to find the bat cave and ascend adventure steps to reach a viewing platform. The elevator, Panoramalift, provides stair-free access across both levels of the exhibit.

Contrary to common practice for green house planning a north facing slope of previous bear exhibits was chosen for the rainforest house in order to avoid overheating from sun radiation. Originally, the structures of the bear enclosure were to be used as the basis on which to build the house, yet defects in their quality led to the construction of new foundations.

SIZE: Space allocation in square meters:
COSTS: EUR 14,750,000
OPENING DATE: July 2002
DESIGN: Beginning: 1997

- Planning: ARGE Architects Edelbacher & Hartmann, Auhofstrasse 94/7, A-1130 Wien
- Planning: Architekt Neversal, Maurer Lange Gasse 134, A - 1238 Wien
- Technical Planning: Techn. Buero Schmidt-Reuter, Hegelgasse 21, 1010 Wien



Site Plan ©Tiergarten Schönbrunn, 2002

use	indoors		outdoors		total exhibit
	accessible	total	accessible	total	
animals					
visitors					
others					
total		1,100			1,100

- Statics: ARGE Kollitsch & Stanek, Pribek, Fröhlich & Locher
- Zoological Concept: Harald Schwammer, Tiergarten Schönbrunn
- Zoodidactic Concept: Gaby Schwammer, Tiergarten Sch?nbrunn
- Technical Concept: Hermann Fast, Tiergarten Schönbrunn

CONSTRUCTION: Beginning: September 1999

- Plants: Groeneveld & Nieuwkoop, Netherlands
- Plants: Torsanlorenzo, Italy

PLANTS:
The Rainforest House attempts to recreate ecosystems found within tropical rainforests, as far as is possible within the constraints of a glasshouse with UV translucent glass. Roughly 200 individual plants from Borneo were planted in the Rainforest House. Others, among them them up to 8m tall trees, which also exist in Borneo were sourced from European nurseries. As the young trees grow, the bigger trees are cut back. All large plants came from two European nurseries, some rarities from the botanical institute on Borneo.

On deciding the separate areas of exhibit, the display of several typical plant communities found in Borneo was attempted. Bamboos, palms and shore plants, as well as mangrove swamps and flora from the depth of the rainforest are presented. In total,



Mangrove swamp ©Monika Fiby, 2009



Turtle pond ©Monika Fiby, 2009

roughly 150 of the most important species of tree found in the rainforest of Borneo were planted in the exhibit. An area growing cultivated plants? fruit trees and a paddy field - is the only part of the exhibit that does not conform to the strict geographical sourcing of the flora. Particular plants? rarities to Borneo such as orchids and epiphytes - are grown in the upper floor of the exhibit.

In contrast to the typical South American rainforests, the soils of Borneo's forests have higher humus content, a different layering profile and little drainage. It was decided that the soils of the Rainforest House should replicate those of Borneo. The majority of the soil in Borneo is acidic: to replicate this, harsh chemicals were required. But experience shows that the species typically found in these acidic soils are well adapted to the high pH of 6.8.

FEATURES DEDICATED TO ANIMALS:

A pair of Asian otters occupies a simulated mountain stream habitat within the house, but also has access to an outside area, which can be used during periods of warmer outdoor weather. The exit is closed with a plastic flap that other animals in the rainforest house cannot open.

The waterfall provides birds with an area to drink as well as bathe. The glasshouse provides a perfectly

transparent view of the outside world. To prevent birds crashing into the glass, a green pattern was attached to the vertical side walls.

A mezzanine level that is inaccessible for visitors serves as a retreat for any roaming animals. All animals use their environment day and night. There are no night quarters.

Deionised water is produced, which is further processed to the right temperature and level of sterilisation as is required for different areas, such as the terrapin pond and the snake enclosures. Water from the various ponds is re-circulated.

FEATURES DEDICATED TO KEEPERS:

Most of the floor in the bat cave is a few centimeter deep water basin. This prevents smell from bat guano and facilitates cleaning.

A door in the side wall allows vehicle access for maintenance purposes.

FEATURES DEDICATED TO VISITORS:

Temperature and humidity level in the building are announced at the entrance to the rainforest house. From there, a pathway leads from an aquaterrarium to simulated coastal mangrove swamps of Borneo. The visitor crosses a bamboo bridge. A pair of Asian dwarf otters lives in a simulated mountain stream. From between two rock faces, the path leads to two pools, simulating tidal rhythms of the ocean. Here, mudskippers, rice gobies and red crabs live amongst the mangrove tree roots. Past the Panoramalift, the path leads the visitor underground through a bat cave, under the waterfall and then back to the entrance.



Panorama Lift ©Monika Fiby, 2009

In the western part of the house, visitors can watch as keepers prepare food for the animals in the kitchens. Then, on through a giant tree stump, visitors are led to the snake enclosures. To reach the upper level of the house, visitors begin their ascent of the wooden adventure steps. Their construction style required an authorisation as playground equipment. A small tree-house half-way up the steps provides views of the free-flying birds in the house. The steps lead onto the pathway of the upper level of the house. The path leads to an information centre, juice bar with some benches and toilets, as well as a viewing station with seating.

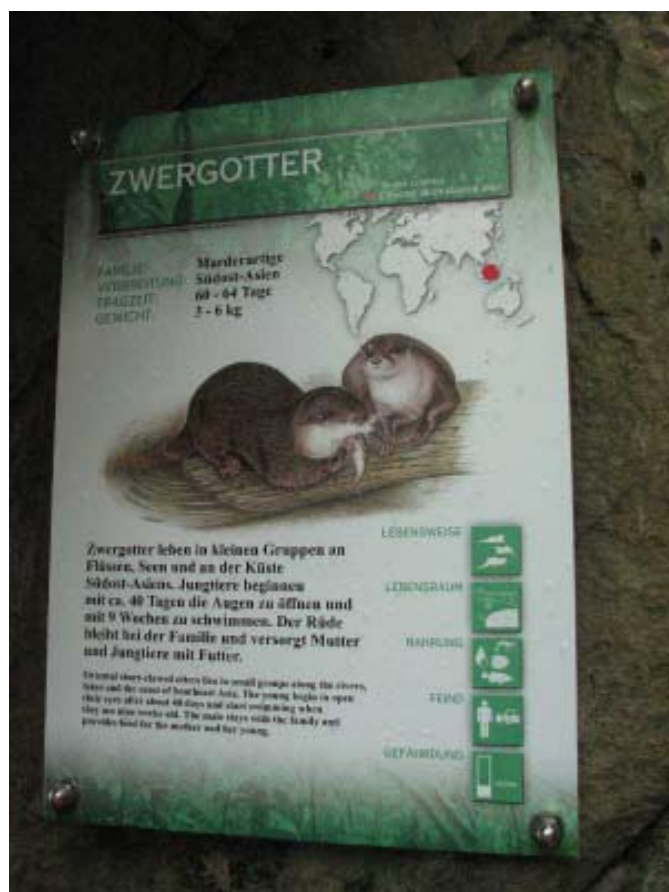
INTERPRETATION:

Maps of the whole complex are located at all 3 entrances. These also inform the visitor of the special climate.

In a rainforest Information Centre, visitors learn about the rainforest inhabitants and topics such as "rainforests controlling the weather" and "rainforests in danger". A "sniff station" allows various fragrances of the rainforest to be experienced. Trained volunteers are stationed at the Information Centre on busy days, pointing out the unique features of the rainforest exhibit to visitors. Specialist tours on rainforests are also popular.



Snakes overhead ©Monika Fiby, 2009



Information plaques ©Monika Fiby, 2009



Pied imperial pigeon in the Regenwaldhaus
©Monika Fiby, 2009

MANAGEMENT:

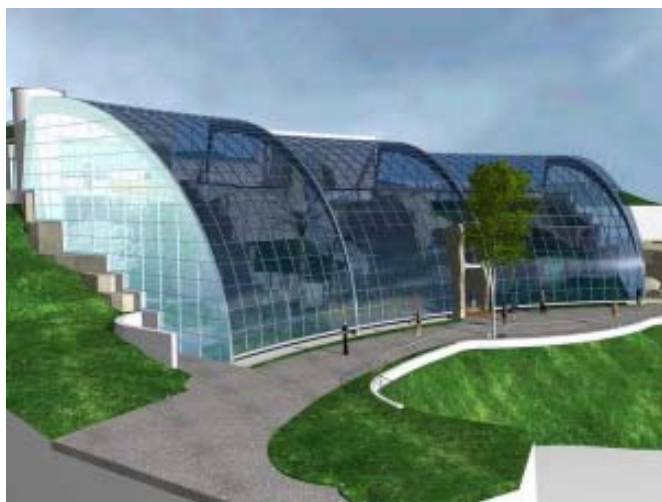
The first months of business for the Rainforest House have shown the design of technical facilities of the exhibit (heating, ventilation and water processing etc.) to be appropriate. Both air conditioning and water circulation are automatically controlled. Natural ventilation through windows in the glass roof is supervised by staff.

CONSERVATION:

Drinking water is saved by re-circulating and biological treatment. Electricity for cooling and air conditioning is saved by the north exposition of the building and the option of natural ventilation through mechanical windows.



Overview ©Tiergarten Schönbrunn, 2009



Picture Views ©Tiergarten Schönbrunn, 2009



Entrance (3) ©Monika Fiby, 2009



Pied imperial pigeon in the Regenwaldhaus (1)
©Monika Fiby, 2009



Embarking on the journey around the ground floor
(4) ©Monika Fiby, 2009



Outside view of Rainforest House (2) ©Monika Fiby,
Fiby,



Outdoor otter enclosure (6) ©Monika Fiby, 2009



Roof glass panels (8) Fiby, 2009



Fish overhead (14) ©Monika Fiby, 2009



Keepers' kitchen (16) ©Monika Fiby, 2009



Upper level seating area (19) ©Monika Fiby, 2009



Exhibits in the rock face (17) ©Monika Fiby, 2009



Education exhibit (20) Fiby, 2009



Wooden adventure steps (18) ©Monika Fiby, 2009



Education signs (21) ©Monika Fiby, 2009



Sniff station (22) ©Monika Fiby, 2009



Rope bridge (24) ©Monika Fiby, 2009



Products of the rainforest (23) ©Monika Fiby, 2009



Exit (25) ©Monika Fiby, 2009



Tidal pools (10) ©Monika Fiby, 2009



Bat cave (13) ©Monika Fiby, 2009



Service door (9) ©Monika Fiby, 2009