ZooLex *News & design from November issue*

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NEW EXHIBIT PRESENTATION
M&T Bank's Rainforest Falls at Buffalo Zoo in the United States is an indoor exhibit dedicated to tropical South American animal species. Exhibits for caiman, ocelot, anteater, several monkey species, tortoises and small animal species are integrated into a walk-through aviary. It is noticeable that the visitor interpretation area is about as large as the visitor space for animal viewing and that the animal space off exhibit is about as large as the animal space.

ARTICLES ON ZOO DESIGN
This year, two international magazines published articles on zoo design: Topos - The International Review of Landscape Architecture and Urban Design no. 62 / 2008 - Botanical Gardens and Zoos www.topos.de

Journal of Landscape Architecture
vol. 5, issue 5, no. 20 in Summer 2008 - Zoological Parks www.lajournal.in

ARTICLE ON TRENDS IN ZOO DESIGN
We would like to thank Monika Fiby for making the following article available which was first published in Topos no. 62 / 2008: Trends in Zoo Design - Changing Needs in Keeping Wild Animals: http://www.zoolex.org/publication/fiby/zootrends08/fiby_topos62.html

ARTICLE ON ZOO MASTER PLANNING
We would like to thank Dr. Brij Kishor Gupta for making the following article available, which was first published in the journal of landscape architecture vol. 5, issue 5, no. 20. Dr. Brij Kishor Gupta, Adit Pal: Zoo Master Planning http://www.zoolex.org/publication/gupta/gupta_la20masterplanning.pdf

We keep working on ZooLex ...
The ZooLex Zoo Design Organization is a non-profit organization registered in Austria (ZVR-Zahl 933849053). ZooLex runs a professional zoo design website and distributes this newsletter. More information and contact: http://www.zoolex.org/about.html

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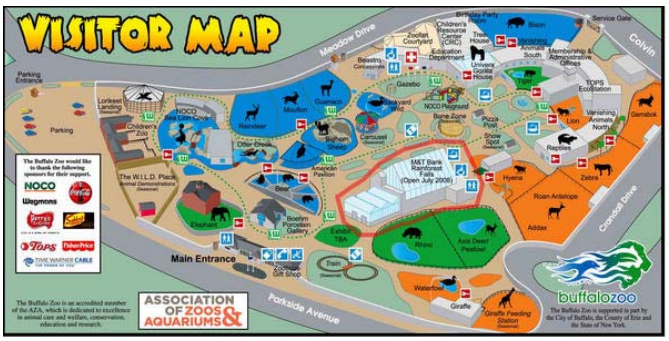
Buffalo Zoo
M&T Bank's Rainforest Falls
Monika Lange (author, PJA
Donna Fernandes (editor, director of Buffalo Zoo)
Monika Fiby (editor, ZooLex)

LOCATION:300 Parkside Ave , Buffalo, NY 14214, United States of AmericaPhone: (716)-837-3900
URL: http://www.buffalozoo.org



Overview © Buffalo Zoo, 2008

ANIMALS:

Species:	Common Name:	Capacity:
Dendrocygna bicolor	Fulvous Whistling Duck	
Cochlearius cochlearius	Boat-billed Heron	6-8
Alouatta caraya	Black Howler Monkey	5
Eunectes murinus	Green Anaconda	2
Cebus apella	Brown Capuchin Monkey	5
Saimiri sciureus	Squirrel Monkey	5
Pygocentrus nattereri	Red Piranha	
Paleosuchus palpebrosus	Cuvier's Dwarf Caiman	25
Dendrobates leucomelas	Yellow-banded Poison Dart Frog	
Eurypyga helias	Sunbittern	
Leopardus pardalis	Ocelot	1.1+offspring
Hydrochoerus hydrochaeris	Capybara	12
Momotus momota	Blue-crowned Mot Mot	
Myrmecophaga tridactyla	Giant Anteater	1.1+offspring
Tamandua tetradactyla	Tamandua	1.1+offspring
Desmodus rotundus	Common Vampire Bat	200
Pithecia pithecia	White-faced Saki Monkey	1.1+offspring
Podocnemi expansa	Giant South American River Turtle	15
Podocnemi unifilis	Yellow-spotted River Turtle	
Polychrus marmoratus	Monkey-tailed Anole	
Ramphastos swainsonii	Chesnut-mandibled Toucan	1.1+offspring
Scolopendra subspinipes	Orange-legged Jungle Centipedes	
Theraphosa blondi	Goliath Bird-eating Spider	
Ajaia ajaja	Roseate Spoonbill	10-15
Eudocimus ruber	Scarlet Ibis	10-15

DESCRIPTION: Established in 1875, the Buffalo Zoo is the third oldest zoo in the USA. Currently, the zoo is undergoing a major reconstruction with the help of a masterplan by PJA. The M&T Bank's Rainforest Falls Building was phase II of the $75-million overhaul, and with a $16-million budget the biggest project in the zoo's redesign.

The goal for the new building was to create a year-round attraction that would generate attendance for the zoo even in the icy-cold Buffalo winters. The building includes a separate greenhouse enabling the horticulture staff to maintain the vegetation in the exhibit and also to provide plants for other areas in the zoo.

Interpretive hall - The interpretive hall is part of the lobby that welcomes the visitors to the Rainforest Falls building. © Buffalo Zoo, 2008

The building design employs a new roof technology used for the first time in a USA zoo. Two layers of plastic membranes form pillows that are constantly kept inflated by low-flow pumps. The membranes are made of EFTE (Ethylene Tetrafluoro-Ethylene) which is a better insulator then glass but also allows UV light to pass through. The UV light is not only beneficial for plant growth, it is also crucial for the mammals, birds, and reptiles in the exhibit. The production of vitamins like vitamin D is dependent on full-spectrum sunlight. The membrane roof will diminish the reliance on nutritional supplements that are usually necessary for animals kept permanently indoors.
The building is located off the central zoo plaza. Visitors enter through the lobby and an interpretive hall that introduces the visitor to the rainforest. Signage, a short documentary video, and 3-D interactive displays talk about the day-and-night cycle and the seasons in the rainforest, inform about the different survival strategies of plants and animals, and tell the story of the landscape represented in the exhibit.

View: The exhibit hall is densely planted. The scarlet ibis found a favorite spot on top of the netting of the ocelot enclosure (upper right). Parts of the river are visible as well as the giant anteater exhibit in the lower right corner. © PJA, 2008

The rainforest hall is anchored by a rockwork plateau 7.6 m (25 feet) high, which is modeled after the mysterious tepui mountains in Venezuela. The plateaus of these table-top mountains are isolated by the sheer rockwalls surrounding them and are home to specialized endemic species of plants and animals. The frequent rain that feeds their watery eco-systems washes down the cliffs in waterfalls hundreds of meters high. The highest of these waterfalls, and the highest free-falling waterfall worldwide, is Angel Falls with 979 m (3,212 feet). Angel Falls was the inspiration for the waterfall in the center of the rockwork wall. The waterfall feeds a river snaking through the exhibit. Exposed sandbanks with overhanging roots signal that this is the dry season where the water dropped and laid bare the surrounding landscape that is now inhabited by land animals.

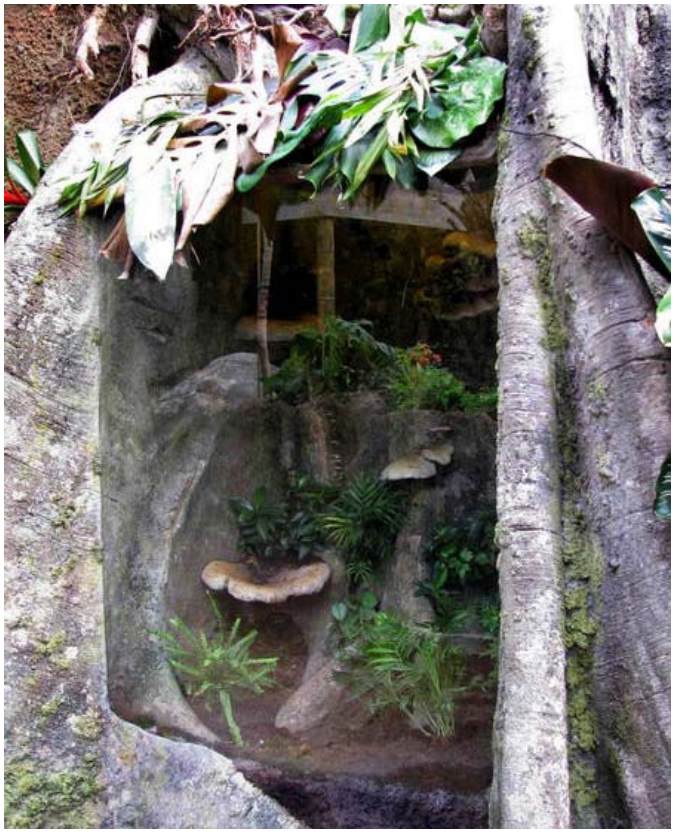
The landscape is planted with numerous tropical plants giving it a lush jungle atmosphere. The live plants as well as the artificial perching trees blend with a rainforest mural that covers the walls up to the windows and the roof.

On the side of the hall where the visitors enter the loop path from the lobby, a wooden house on stilts overlooks the exhibit. The river bank at the foot of the stilts is the favorite place of the family of capybaras that shares the river with ducks, turtles, and a group of dwarf caimans. The visitor path leads first past the enclosure of the ocelots with its glass viewing window and netting on top, and then on to the enclosure shared by a giant anteater and red-footed tortoises. Two artificial termite mounds have removable tubes that can be filled with anteater treats for the animals to exercise their long and sticky tongue.

Here and at other locations in the hall, the visitors will find jewel case exhibits tucked into hollow tree stumps, a pile of driftwood, or a fallen tree. They display colorful poison dart frogs, centipedes, lizards, and tarantulas.

In front of the waterfall, the visitors have to make a decision: enter the cave under the rockwork plateau or cross the wobbly bridge. In the darkened cave, between stalagmites and stalactites, piranhas and giant anacondas share a tannin-stained pool and vampire bats hang out in crevices. The cave also allows visitors to experience the sound of the crashing waterfall and the wet spray.

Out of the cave or over the bridge with the hopeful caimans underneath, the visitors find capuchins, squirrel monkeys, and howler monkeys in the trees of a netted enclosure. Birds including blue-crowned mot mots, boat-billed herons, scarlet ibis, and roseate spoonbills like to perch on the netting of the different



Hidden Frogs - A jewel case exhibit is tucked into the roots of an artificial buttress tree displaying poison dart frogs. © PJA, 2008

exhibits and the live and artificial trees that dot the hall. The entire hall is a free-flight aviary where the visitors can experience the birds without any barriers. The last of the netted enclosures is another mixed-species exhibit for the smaller cousin of the giant anteater, the tamandua, a pair of toucans, and of the white-faced saki monkeys.

At the end of the loop, stairs (or an elevator) lead the visitors up to the balcony of the stilt house. A planter with carnivorous plants, which are typical for the nutrient-leached high plateaus of the tepui mountains, is tucked away here, and the deck offers a finale view of the entire exhibit. Leaving the exhibit hall, the visitors exits the lobby past the gift shop and the interpretive hall.

SIZE: The building has a total of 2,475 m² (26,644 sf) with a 21096 sf footprint. The animal exhibits, including the visitor pathways in the free-flight building, take up 825 m² (8,885 sf). The interpretive hall/exhibit is 72 m² (781sf). The animal holdings are 705 m² (7,596 sf) over several levels. The integrated greenhouse for plant growing is 335 m² (3,610 sf).

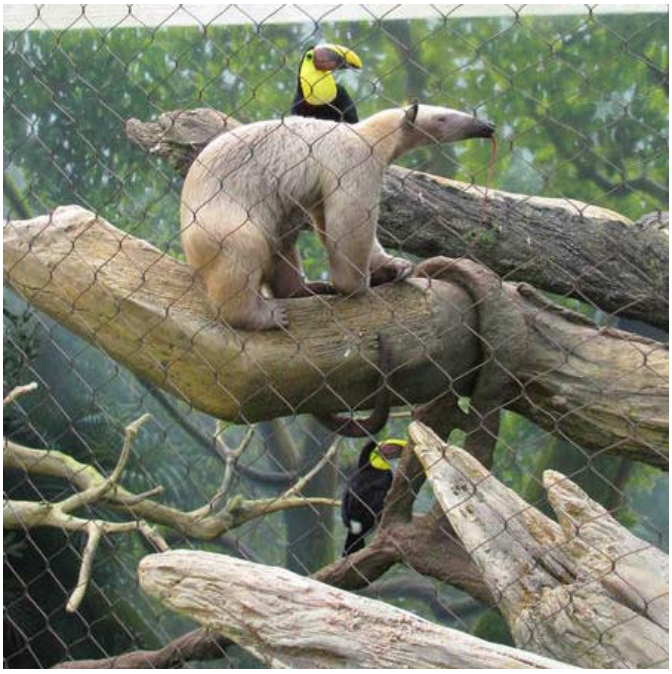
COSTS: USD 16,000,000
OPENING DATE: 8 September 2008

DESIGN: Beginning: May 2004·
Architect of Record: Foit Albert Associates, Buffalo, NY
Exhibit Design: PJA Architects + Landscape Architects, P.S., Seattle, WA
LSS Design: TJP, Inc., Imperial Beach, CA
Structural Engineers: Jansen/Kiener Consulting Engineers, Buffalo, NY
Mechanical Engineers: M/E Engineering P.C., Buffalo, NY
Interpretive Design: Hadley Exhibit Inc., Buffalo, NY

CONSTRUCTION: Beginning: October 2006
General Contractor: Manning Squires Hennig Co, Inc., Batavia, NY
Rockwork: Carved Rock, LLC, Seattle, WA
Membrane Roof: Structurflex LLC, Kansas City, MS
Mural: David Rock, Santa Fe, NW

PLANTS: The goal of the plantings are to create a lush rainforest. Many of the plants are Venezuelan in origin, but to increase the plant palette, other species were chosen too, as many of the plants native to the Pan Tepui region are not in cultivation. The plants were located in the exhibit in their correct habitats – wetland plants near the water, forest plants with forest animals, etc.

FEATURES DEDICATED TO ANIMALS: The enclosures provide several enrichment items. The giant anteater enclosure has two artificial termite mounds with removable tubes that can be stocked with food and treats. Several tubes are also hidden in the ground. In the toucan exhibit, the artificial trees have nesting caves for the birds. Animal drinkers are hidden in tree stumps or behind termite mounds. A tube leads directly into the piranha and anaconda tank for fish to be fed to the animals. Throughout the exhibit several heat lamps are provided for the turtle/tortoises and dwarf caimans to bask. All of the animals, with exception of those in the jewel cases



Toucans and Tamandua - Toucans and a pair of lively tamanduas share this exhibit. The tamandua demonstrates his long and sticky tongue. © PJA, 2008.

and the piranhas, have holdings that are not visible for the visitors. One complex of holdings is hidden behind the waterfall rockwork, and the other one is located at the entry side of the building and camouflaged partly by the stilt house. The holdings are arranged in two stories, with the holding for ground-dwelling animals on the lower floor and the holdings for the tree-dwelling animals and birds on the upper floor. Two separate holdings are located directly adjacent to the ocelot and the tamandua exhibits.

FEATURES DEDICATED TO KEEPERS: The new building provides the keepers with two preparation kitchens, one at each end of the building and associated with the two holding complexes.

FEATURES DEDICATED TO VISITORS:
INTERPRETATION: As visitors enter the building, they walk through the lobby and into a "Visitor Center" that places the visitor in the setting of a mock national park called Rainforest Falls National Park. The center features graphics and fun interactive components to help visitors explore the topics of: the medicinal value of rainforests, rainforest plant diversity, tepuis, daily and seasonal changes in the rainforest, as well as diet specializations of rainforest animals. These components are located on walls and counter surfaces throughout the space.
Finding Cures: As they look to the right, zoo patrons first encounter interpretive components about the medicinal value of rainforests. The vertical wall surface highlights the method for finding natural substances and turning them into medicines, quinine as a successful rainforest medicine for malaria and a potential future pain medication derived from the poison of a dart frog. The counter below features two oversized medicine bottles that spin to reveal a series of successful medicines derived from the rainforest and potential medicines of the future. There is also a comic book that takes visitors through the amazing history of quinine, and a maze game for visitors to play that challenges them to get a ball through the maze of successes and pitfalls that arise during the process of developing a new medicine.
Creative Plants: Visitors then explore the specializations necessary for rainforest plants to survive. The wall displays a graphic representation of a rainforest alongside touchable half models of a zebra plant (epiphyte), strangler fig (strangler), kapok (buttress tree), cecropia (fragrant fruiting plant), marsh pitcher (carnivorous plant), and a Swiss cheese plant (climber). The counter has a series of six lift-and-drop interactives that challenge patrons to answer questions about which plants have specific adaptations.

Tabletop Mountains: As visitors walk across the room to the other side, they encounter graphic components about the geography and history of tepuis on the vertical surface. The counter has a touchable model of Auyan tepui, the site of Angel Falls. With the push of a button, a path depicting the trail hikers can take to reach Angel Falls and the top of Auyan tepui lights up using LED lights. To the right of the model there is a short traveler's journal that visitors can read to understand more about the breathtaking trek up Auyan tepui.

Rainforest Cycles: Daily and seasonal changes in the rainforest are highlighted by the next set of interactive components. The vertical surface features two changing billboard-style graphic elements. Visitors simply push a button to get one to change from a graphic representation of the rainforest during the day to a graphic of the rainforest at night. Another button allows the second small changing billboard to switch from a depiction of the rainy season to one of the dry season. The counter has a series of buttons that, when pushed, give visitors a flavor for the sounds of the rainforest during the day and night as well as during the rainy and dry seasons. There is also a wooden frog and stick. When the stick is run over the ridges along the back of the frog, it makes the sound of a frog.
Rainforest Buffet: The graphic and interactive components along the wall directly to the left as one enters the Visitor Center focus on diet specializations of rainforest animals. The wall has a series of seven menus. Visitors can slide the menus up to reveal pictures of the animals that would consume the menu items. The counter has a series of seven wooden bowls with covers. When the covers are lifted, visitors can see typical foods for specific groupings of animals such as carnivores, omnivores, frugivores and sanguivores. The wall across the room from the entrance to this space has a 52-inch monitor featuring a short continuous loop video that introduces people to the exhibit and region of the world represented by this rainforest exhibit.

As patrons walk through the exit to the Visitor Center, they encounter a graphic element showing the layers of a typical rainforest. Buttons corresponding to each layer can be pushed to light up a particular layer of interest.

The Buffalo Zoo's Art Director and Curator of Education along with Hadley Exhibits designed all interpretive components.

MANAGEMENT: Holding space is available on two levels with shift doors that access the exhibit. All other animals have designated holding spaces to which they are trained to enter as needed.

RESEARCH: Group interactive behaviors of the mixed primates exhibit are being studied by a University student. Other projects will follow.

CONSERVATION: Virtually all of the species kept in this exhibit are part of AZA TAG, SSP, PMP conservation management programs. Collection planning was done in cooperation with AZA conservation programs.