Rainforest 2 Exhibit Master Plan
Size:
- 21,250 square feet

Viewing:
- Cantilever viewing
- Central Tunnel viewing

Exhibit Elements:
- Waterfall and swimming pools
- River stocked with live fish
- Log playgrounds for animal stimulation
- Mimicked forest floor
- Tree and rock perches to encourage climbing

Containment Method:
- Rock Wall
- Live Wire Fence
Cantilever Viewing

The Cantilever Viewing opportunity of the Rainforest 2 Exhibit is a unique experience in that it allows visitors a chance to "hover" over the exhibit, feeling as though they are within the environment. This opportunity also gives a top down view of the jaguars hunting for fish in the river.

With trees and vegetation around the viewing structure, onlookers feel as though they are peering into the exhibit through the tree canopy. In addition, the visitors are nearly at eye level of jaguars that are in the dead-tree perches.
The typical containment method of the Rainforest 2 Exhibit is a sixteen foot tall retaining wall structure with a gunite coating and planters to achieve a more natural, cliff wall appearance. To discourage the animals from attempting to climb the wall, a thick vegetative barrier with a livewire fence is placed up against it. In the event that the fence is bypassed, the wall is built at an outward angle, making it a difficult climbing surface.

All trees and perches within the exhibit are kept at least twenty feet from the wall, keeping it out of jumping distance for jaguars.
Central Viewing Tunnel

The Central Viewing Tunnel running through the middle of the exhibit gives visitors an up-close, eye-to-eye view of the jaguars and other animals. The tunnel also features a two sided underwater viewing, as jaguars have an affinity for water. Unique views looking straight, downward, or even upward at the animals are possible depending on if the jaguars are on the ground, in the water, or on a perch.

A temporary barrier can also be added on top of the tunnel to split the 21,250 square foot exhibit into two separate exhibits to aid in the Exhibit Rotation if the extra exhibit is ever needed. Because the wall would be on top of the structure, the visitors would be unaware of the separation of the two exhibits.
Boardwalk Viewing
"Our task must be to...embrace all living creatures and the whole of nature and its beauty."

-Albert Einstein
Zoos are an integral part in our education, from children to adults. They teach us about the flora and fauna from the far corners of the world. They help us better understand areas of the globe that are far different from our own. And, most importantly, they cause us to respect the world as a whole and understand our place in it.

The Cincinnati Zoo & Botanical Garden is one of the country's finest zoos, and has been dedicated to continually updating and bettering itself. In recent years it has done this by renovating various exhibits such as its Reptile House and Cat Canyon, and venturing into new plans such as the African project. I believe my designs for the South American project have followed the Cincinnati Zoo's plan of improving itself in many ways.

The Cincinnati Zoo's message of adventure, conservation, and education are important in creating a successful environment for both people and animals. Each one of these key aspects has been addressed in this project. A sense of adventure is created all around in the use of vegetation, views, topography, and sense of place to truly bring visitors into a South American environment. Winding paths lead them through dense rainforest, rocky mountain, and rolling grassland landscapes, with surprise and adventure around each turn. Conservation and education are closely linked as visitors experience various interesting and educational yet entertaining opportunities throughout the exhibits, ranging from slash-and-burn Clear Cut and Native Peoples Exhibits, to being in the canopy with the primates or looking at a Jaguar up close, in the eye. Put together, it makes the South American Exhibit a unique and fun experience for the visitors of the Cincinnati Zoo and Botanical Garden to enjoy.
"For if one link in nature’s chain might be lost, another might be lost, until the whole of things will vanish by piecemeal."

-Thomas Jefferson
Appendix

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http://true-wildlife.blogspot.com/2011/02/caiman.html

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http://cincinnatizoo.org/education/

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http://cincinnatizoo.org/support/

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Both images: http://www.lszoo.org/history.htm

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Both images: http://circusnospin.blogspot.com/2012/01/vintage-monkey-islands-los-angles-zoo.html

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http://cincinnatizoo.org/education/groups/

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http://omahazoo.wordpress.com/about/

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http://jhenn44.wordpress.com/2011/02/24/cincinnati-zoo/

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Circulatory Concept 3

Concept 3 is different from concepts 1 and 2 in that it directs the visitors through the entirety of the exhibit. This creates a designed sequence of events, which allows the visitor to experience the intended educational and entertainment value of the exhibits.

This type of circulation can be compared to writing a play, in which each scene is written to depict a certain event to the viewer, giving the overall play a particular feeling and overall message. This makes this the most design-intensive concept and has the most potential to instill the Cincinnati Zoo's message.
Expanded Conceptual Design
The Expanded Conceptual Design, taken primarily from Concept 3, is based on showing the visitors a full gradient of the biomes that South America has to offer, ranging from the rainforest canopy and Amazon River to the Andes Mountains and Pampas Grasslands.

**Entrance Walk**
Primarily using native vegetation to imitate the South American rainforests, the Entrance Walk coming off of the Zoo’s Main Loop path brings the visitors into a new and distinct environment, separate from the rest of the Zoo.

**Indoor Rainforest**
The Indoor Rainforest gives the visitors the opportunity to view native vegetation of South America, which is not possible in outdoor exhibits. Possible animals include various birds, sloths, poison dart frogs, snakes, insects, piranhas, and giant river turtles. The location of the structure also offers erosion remediation.

**Canopy Walk**
The Canopy Walk gives visitors a unique view of the Amazon canopy and its inhabitants. Starting out at fifteen feet above grade, a canopy walk will lead visitors through various primate exhibits, such as the tamarin and spider monkey.

**Rainforest Exhibits**
After the Canopy walk, visitors are brought down to the ground level, experiencing a totally different part of the Amazon Rainforest. Possible animals in these exhibits include giant anteaters, jaguars, ocelots, capybaras, and tapirs.

**Clear Cut Exhibit**
Although it contains no animals, the Clear Cut Exhibit has a strong educational message on the effects of human activity on the Amazon Rainforest.

**River Exhibits**
The Amazon River rounds out the rest of the rainforest exhibits. Possible animals include caimans, giant river otters, and river turtles.

**Mountain Exhibit**
Modeled after the Andes Mountains, the Mountain Exhibit shows off a very different environment than the Amazon Rainforest. Possible animals include guanacos, Geoffroy’s cat, and rheas.

The final major biome, the Pampas, represents the grass and shrublands of South America. Possible animals include guanacos, maned wolves, Geoffroy’s cat, and rheas.
Conceptual Path Section

- Entrance Walk
- Indoor Rainforest (Upper Walk)
- Canopy Walk
- Rainforest Exhibits
- Clear Cut Exhibit
Master Plan
The final Master Plan, derived from the furthering of Concept 3, combines all of the pieces from the Inventory and Analysis with the preconceived idea of incorporating the three major biomes of South America. It begins with its entrance off of the Main Loop, adjacent to Manatee Springs. After entering the upper walk of the Indoor Rainforest, visitors make their way to a fifteen foot high Canopy Walk, where they experience numerous species of South American Primates at their natural eye level.

Once the Canopy Walk brings them down to ground level, visitors wind through a recreated rainforest, passing through several exhibits, including two Rainforest Exhibits and two River Exhibits. In addition, there is an educational Clear Cut Exhibit, constructed as a recreation of a slash-and-burn treatment of a rainforest environment.

After exiting the rainforest, visitors pass through a recreation of the Andes Mountains, which starts with an educational experience of South America’s native peoples, then moves into an exhibit.

Lastly, visitors move through the changing landscape into the Pampas region where they enter a viewing area surrounded by two exhibits. This is an extrapolation of Concept 1 and 2’s “in the round” exhibits. After these exhibits, visitors enter the lower walk of the Indoor Rainforest and exit toward the Zoo’s picnic grounds.

In following up on the site analysis:

1. The main entrance of the new South American Exhibit branches directly off of the Zoo’s Main Loop.

2. The erosion issues north of Manatee Springs have been taken care of by replacing the majority of the slope with the Indoor Rainforest structure.

3. The ravine north of the Animal Hospital has been planned as being a Mountain Exhibit. The existing terrain will save much work and money in the creation of a convincing mountain habitat.

4. The Zoo’s service road has been rerouted to connect with Duluth Avenue, allowing the South American Exhibit to flow easily into the Zoo’s campus.

5. Many topographical changes have been made throughout the site to create a more convincing South American landscape.
Biomes - Amazon Rainforest

Jaguar

Capybara

Giant Otter

Spectacled Caiman

Primates

Giant Anteater
The three major biomes represented in the final design are the rainforest (Amazon, canopy, ground, and river), Mountains (Andes), and grassland (Pampas). Each biome has specific plants used to recreate it and animals that are compatible with it.

- *Magnolia grandiflora*
- *Magnolia virginiana*
- *Magnolia macrophylla*
- *Ricinus communis*
- *Rhus typhina*
- *Bambusa vulgaris*
- *Catalpa speciosa*
- *Robinia pseudoacacia*
- *Fagus grandifolia*
Biomes - Andes Mountain

Guanaco

Rhea
Schizachyrium scoparium  Poa alpina
Biomes - Pampas Grasslands

Maned Wolf  Capybara  Giant Anteater

Guanaco  Rhea
Animal Facilities

The animal facility plan (right) consists of three entry points to underground tunnels for the Rainforest, Pampas, and Mountain exhibits. These tunnels lead to the Indoor Rainforest, which has indoor holding facilities. The Canopy Exhibit has direct access to the Indoor Rainforest and therefore does not need access to the tunnels, and the two River Exhibits have their own, separate, holding facility.

With the addition of the new South American Exhibit, a new exhibit loop is added to the Zoo’s circulation in the northwest corner.

New Zoo Circulation
Because there are multiple exhibits for each biome (except for Mountain), a rotation schedule for the animals is possible. This involves allowing each of the animals to be in different exhibits from day to day. While each animal has its own "home" exhibit, they can spend time in others, which allows them to see different sights, smell different scents, and experience new habitats and even biomes. This more closely replicates the experiences that the animals would have in nature.

For example, the Giant Anteater naturally lives in both the Amazon Rainforest and the Pampas. This gives it 4 different exhibits that it could be in at any given time. It is likely that it would spend the majority of its time in its own home exhibit, then spend a day or two in a different exhibit. However, this schedule is up to the discretion of the Cincinnati Zoo.

While being very beneficial to the animals, exhibit rotation is also beneficial to the visitors. People who visit the Zoo multiple times throughout the year will always have a chance to see the animals in a different habitat and from different viewing opportunities.
The design of the exhibits is such that the biome layout on the site (above) corresponds to that of South America (right), with the Amazon Rainforest to the north, the Pampas grasslands to the south-east, and the Andes Mountains to the south and west.

Biome Layout
Typical Sign

Because the biome layout on the site corresponds to South America, there is an excellent educational opportunity in the use of the signage throughout the exhibits. A rough outline of the exhibit path is overlaid on a map of South America, showing visitors where they are in relation to the actual habitats that they are viewing. These signs are placed throughout the exhibits, which creates a more logical sequencing of events that are more closely related to South America for the visitors. This puts the exhibits within a larger picture, giving an expanded educational value to the overall experience.

Included on these signs are information about the surrounding biomes and habitats, including flora and fauna, as well as other relevant regional information such as history and culture.
Exhibit Design

In this iteration of the written report, I will only go in depth with three exhibits (River 1 & 2 and Rainforest 2). However, the ideas and design principles used in these three exhibits are carried throughout the entire project:

- Create a cohesive landscape, inside and outside of the exhibits, that shows the three major biomes
- Meet the needs of each species of animal, including biological and behavioral needs
- Make each viewing opportunity as interesting, engaging, entertaining, and educational as possible
Typical Paths

The environment in which visitors move through the exhibits is just as important as the exhibits themselves. By using the same vegetation inside and outside of exhibits, as well as similar topography and other aspects, the illusion of barriers between the visitors and animals is better upheld, giving a more natural experience. This technique is used throughout the three biomes and allows for a more cohesive landscape.

Typical Rainforest Path

Visitors walk along a ten foot wide, compacted gravel path flanked by swales on either side. Dense recreated rainforest, including bamboo, trees, and other vegetation, gives the feeling of enclosure and the illusion of coming across the animals in the wild without barriers. In addition, with framed views and a winding path, visitors feel as though they are wandering through a forest.
Typical Pampas Path

Similar to the Rainforest Path, the Pampas Path uses the grassland terrain to create the enclosure and sense of wandering to bring the visitors into the Pampas landscape.

Typical Mountain Path

The combination of constructed rockwork and mountain vegetation is used to recreate a mountain path experience.

Typical Boardwalk

Boardwalks allow visitors to fully enter into an aquatic or canopy environment. The eight foot wide walkway allows for two sided viewing, and also has gaps in its otherwise solid railings to allow visitors with a lower eye level to have full visibility of the exhibits and scenery. A similar construction is used for the Canopy Walk.
River 1 Exhibit

Primary Animal
Giant Otter

Secondary Animal
Spectacled Caiman
Giant Otter

Population:
- 5,000 in wild
- 60 in captivity worldwide

Size:
- 3 - 5 feet in length
- 50 - 70 lbs

Habitat:
- Seasonally flooding rivers
- River banks

Habits:
- Feeds primarily on fish
- Builds “campsites” from sticks, logs, rocks, grass, and mud
- Generally playful, existing in groups as large as 8 members
River 1 Exhibit Master Plan

- Sound Wall
- Log Playground
- Grass Plantings
- Flooded Rainforest
- Sun Rock Island
- Viewing

Design Process
Exhibit Size:
- 9,375 square feet

Viewing Opportunities:
- Underwater Viewing
- Boardwalk Viewing

Exhibit Elements:
- Pool mimicking flooded rainforest (stumps, logs) stocked with live fish
- Mimicked forest floor and river bank
- Island for sunning and eating fish
- Log playground for animal stimulation
- Movable sticks and logs

Containment Method:
- Rock Wall
- Live Wire Fence
Underwater Viewing
The underwater viewing portion of this exhibit gives visitors a unique perspective of the giant otters. In the setting of a flooded rainforest, a glass wall divides a recreated riverbed, with visitors on one side and the exhibit on the other. The vegetation and scenery used in and out of the exhibit also creates a cohesive landscape and gives the feeling of being in the same environment as the animal.

The viewing area is made of the main path, which bisects the main viewing area from the stadium seating viewing. The main viewing is a sunken walkway, which creates an effective separation from passing visitors. The stadium seating on the other hand gives visitors a place to sit and rest while watching animals swim past the viewing glass.

While this exhibit’s primary animal is the giant otter, the underwater viewing is still an effective, unique opportunity when the spectacled caiman is inhabiting it.
Moving from the underwater viewing, visitors rise above the water line onto a boardwalk. This gives them a complete experience of the rainforest river environment.

The exhibit is constructed to mimic a flooded rainforest riverbed, with a dense forest mixed with grasses, rocks, and logs. Activities that the visitors could see the otters doing are playing on the log structure, sunning, swimming, fishing, and eating. In the foreground, a small rocky island sticks out of the water, which could be a popular spot for the animals to eat the live fish that are in the pool.

The typical containment of this exhibit (below) is a concrete retaining wall with a gunite facing. For additional protection, there is also a live-wire fence at the top. As a screen, there is a thick bamboo and vegetative planting in front of the barrier.
Boardwalk Viewing
River 2 Exhibit

Primary Animal

Spectacled Caiman

Secondary Animal

Giant Otter
Spectacled Caiman

**Population:**
- Over 1 million

**Size:**
- 6.5 - 8.5 feet in length
- 300 - 600 lbs

**Habitat:**
- Seasonally flooding rivers
- River banks

**Habits:**
- Feeds on many animals, including insects, crustaceans, mollusks, fish, and snails
- Being cold-blooded, caimans use sun and shade to regulate their body temperature
River 2 Exhibit Master Plan
Exhibit Size:
- 10,000 square feet

Viewing Opportunities:
- Boardwalk Viewing

Exhibit Elements:
- Pool mimicking flooded rainforest (stumps, logs) stocked with live fish
- Mimicked forest floor and river bank
- Electrically heated sunning rock
- Movable sticks and logs

Containment Method:
- Rock Wall
- Live Wire Fence
Boardwalk Viewing
The boardwalk stretches along the entire length of the River 2 Exhibit, allowing visitors a full view. The boardwalk sits just two feet above the water's surface, putting them at the ground level of the majority of the exhibit. The construction and position of the boardwalk gives the feeling of being within the caiman's environment.

The exhibit itself is similar to the River 1 Exhibit, in that it is a mimicked flooded rainforest, with a pool and recreated riverbank. At the center of the exhibit is a large sunning rock. In cool weather, the rock is electrically heated. Otherwise, the caimans can use the rock to sun and regulate body temperature. This keeps it a constant central feature of the exhibit. Live fish also inhabit the pool for the caimans to catch.

The containment barrier is very similar to that of River 1's, with a concrete retaining wall and vegetative screen.
River 1 & 2 Exhibits
Primary Animals:

- Giant Otter
- Spectacled Caiman

Landscape Cohesion

One example of how this design has achieved a cohesive landscape is with the two River Exhibits. The landscape aspects include:

- Three separate water features appear as a single system
- Same vegetation and landscape conditions used in and out of exhibits
- Hidden barriers and holding facilities
River 1 & 2 Boardwalk Viewing
With the boardwalks placed on top of the containment walls, visitors are unable to see the exhibit barriers. With the River 1 & 2 Boardwalk Viewing, the two River Exhibits flow freely under the platform, giving the illusion of there being only a single exhibit. A similar technique is used on the River 2 boardwalk (below), except that the unseen barrier is between the exhibit and a scenic river.

With no visible barriers between the two exhibit pools and the scenic river, the three water features appear to be a single system. This, combined with similar landscape aspects and vegetation used in and out of exhibits, the total landscape appears to flow as a single, cohesive environment.
Rainforest 2 Exhibit

Primary Animal

Jaguar

Secondary Animals

Capybara

Giant Anteater
Jaguar

**Population:**
- 12,000 in wild

**Size:**
- 4 - 6.5 feet in length
- 2 - 3 feet tall
- 120 - 220 lbs

**Habitat:**
- Dense rainforest
- Rivers

**Habits:**
- Feeds on a variety of animals, including fish
- Has an affinity for water
- Skilled climber