A Case Study:

The Realities and Complexities of Zoo Design for Elephants at Zoo Atlanta

Nevin Lash

Ursa International



Abstract

This paper involves a case study of a design process for an African Elephant Savanna Expansion at Zoo Atlanta. The author is the Exhibit Designer with Ursa International for the projects consulting Design Team. He discusses the realities and complexities involved in the design of a major elephant complex built to current AZA zoological standards. There is a brief summary of several new elephant exhibits evaluated during the early phases of planning. Three members of the design team were able to take what was learned and apply it to the new Elephant Savanna Expansion. That Plan is discussed and evaluated for elephant wellness. The narrative describes how the design was altered by the zoo administrations desire to increase visitor capacity and stay-time. That alternate design is described and evaluated in relation to wellness for the elephants and the implications that physical circulation patterns have in the design decisions. A final design is presented that incorporates the initial concepts circulation with the revised concepts operational goals to create a more well-rounded exhibit that fits the budget and elephant wellness aspects. The author begins with 10 ground rules for Exhibit Design for Elephants, to evaluate wellness for elephants, and ends with the evaluation of the exhibit discussed.

Keywords: African Elephant Habitat, Wellness, Exhibit Design, Visitor Circulation

Zoo Design for Elephants at Zoo Atlanta by Nevin Lash

As a Zoo-designer, I can start by recommending some ground rules for Elephant Wellness Exhibit Design. When evaluating the success of an exhibit, I use these 10 requirements for making sure we have provided the most we can for the wellness of our future Bio-community:

- 1. Elephant's Choice without human interference
- 2. Exercise walking, reaching, swimming, hill climbing
- 3. Exploration trunk manipulation & habitat usage
- 4. Proper Social Environment old and young (both sexes are still under discussion)
- 5. Safety Keepers and elephants (inside and out)
- 6. Shade from a variety of locations throughout the day, and other cooling, i.e. dusting
- 7. Water clean water from shallow to deep, muddy water and a fresh water source
- 8. A variety of healthy foods, smells, textures, substrates, browse and other forms of enrichment items to self-select.
- 9. Positive human interaction and physiological considerations for both keeper as well as zoo visitor. Allow for great flight distances, and positive reinforcement training.
- 10. A habitat with a view; long views, short views, high and low opportunities.

With these goals in mind, we can begin to judge the ability of zoo enclosures to promote wellness. This paper uses these goals for wellness in exhibit design, and uses a particular case study, Zoo Atlanta's new Elephant Savanna Expansion, to discuss the many influences brought to bear on the process of Exhibit Design. Using this example, we discuss some of the challenges we have in building the next generation of Elephant Enclosures for today's zoos and sanctuaries.

My story begins with a secret meeting at Zoo Atlanta on a chilly morning, in January 2014. The Zoo Director asked The Epsten Group and myself to prepare a feasibility study on the adaptive re-use of the Cyclorama (a historic Museum featuring a 360° painting of the burning of Atlanta during the Civil War) at the front door of the Zoo. He asked, "Is there anything we can do with this thing?" You mean this 4-story massive museum at the entry to your Zoo, this amazing gift by the City? We immediately could think of several things to recommend.

Zoo Design for Elephants at Zoo Atlanta

Secret meetings (with only top zoo executives; elephant department not included) continued through the next several weeks, with site visits and exploration of the 50,000 sq. ft. building. Epsten Group focused on the building, while my focus was on the property. The museum sits in a park without any property line demarcation. The Zoo, as a private entity, has a specific property boundary, but what land should come with the Cyclorama? We knew that taking any land in Grant Park would have political implications, but new land for the zoo could greatly expand its capability.





We ended up with three options: 1) minor land (50') around the building, plus the entry plaza adjoining the zoo, with views into the existing zoo; 2) an additional 1.5 acres in the rear that could adjoin the existing Savanna, adding more hoofstock; or 3) an additional three acres behind the building. We thought that 3 acres would be the most that the City would permit, and with that amount of land we could certainly create a new elephant exhibit. The Zoo was at a critical juncture with its elephant program, and this acquisition would give them what they needed to build an AZA-standards program. Additionally, the building and its 3-acres could replace the old admin-

istration building, and provide a multi-story, 1000-person ballroom and events center with views into a mixed species, elephant/giraffe/ rhino savanna panorama (take that Georgia Aquarium)! We would have to bring these options to City Hall, to let the Mayor decide.

Let's now go back in time to 1986, when CLRR, Inc. (with me as the Project Manager) was contracted to renovate the old Atlanta Zoo into Zoo Atlanta. The zoo had a terrible reputation as one of the ten worst zoos in the country, and the City finally decided to do something about it. They hired a new zoo director (Dr. Terry Maple), and he selected the young firm from Philadelphia, in joint partner-ship with a local Architect and an Engineering firm in Atlanta, to develop a new Master Plan. With a budget of \$18 million, the team set out to develop the first three phases of Zoo Atlanta, turning the zoo into a modern facility. That story has been told many times, but I





Zoo Design for Elephants at Zoo Atlanta

want the reader to have some context. The third-phase of the renovation involved the East African Savanna animals, and the zoo was able to expand into the park by about 6 acres, and a new exhibit sequence called Maasai Mara, was born. At this time, (the mammal curator was a young guy named Tony Vecchio), CLRR did their best to create a set of exhibits for elephants; black rhino; giraffe with zebra, antelope, and ground birds; across from a lion exhibit; as well as some visitor services facilities for restrooms and snacks, on a 9-acre footprint for around \$6.5 million. The exhibit opened in 1998 to great success, completing the initial 3-phase transformation of Zoo Atlanta, and receiving AAZPA Exhibit Awards for both their West African Gorilla exhibit and the East African Savanna.

Fast-forward to July 2014, the Mayor announces, "The Cyclorama (painting and locomotive) will move to the Atlanta History Center, and by the way, we are giving the Zoo the empty building plus 3 acres of parkland and 2 acres of building site." The Zoo braced for a neighborhood rebellion. It turned out that the neighborhood was more concerned about moving their cherished Civil War painting out of Grant Park, that they barely noticed the Zoo was taking over precious parkland. Community voices directed to the zoo were more positive in nature – that the zoo could use more land, and they would put the building to good use. The zoo had previously been chastised for encroaching into the Park in the past – but now it was fine. Now, there were worse things going on! Our Civil War Monument was moving to the HISTORY Center! The ruckus settled down quickly as the story came to light that the History Center, with their eye on the painting, had a \$10 million building already designed and ready for construction, and that the Zoo had a new vision for the great Cyclorama.

For the design team, we were given the go-ahead to design an ultimate new elephant enclosure (see fig.1) in a site where we could connect easily to both giraffe/hoofstock areas as well as the rhino habitat for an expanded Savanna exhibit. This expansion was unforeseen during the last Master Planning effort, and would now significantly change the current Master Plan (i.e., elephants were planned in the opposite corner of the zoo grounds). Changing the Master Plan was not a problem for the design team, but in Atlanta, to get a building permit, you have to have Urban Design Commission approval, which requires that the project be based on an approved Master Plan.





The exhibit that we designed combined the existing giraffe Savanna with the expansion land to create one, large (4-acre) multi-species (giraffe, zebra, waterbuck, warthog, white rhino and cow elephants) lower terrace habitat, with a smaller bull yard and paddocks in the upper terrace and can be interconnected. The proposed barn sat on the perimeter service road in the expanded area, and visitors would access it only by V.I.P. programs. Because we were working in "secret" during the early stages, we knew that the day would come when the zoo's animal department and our design team would need to come to consensus, and our design would either sink or float. I knew I was asking a lot to have a mix-species elephant/giraffe habitat, but we had to dream big.

Zoo Design for Elephants at Zoo Atlanta

As the design progressed, we finally meet with zoo staff in the open. The zoos elephant manager, Nate Elgard, had done his homework. He walked into our first meeting saying, "There will be no giraffes in the new elephant habitat, and we need a 19,000 sq. ft. elephant barn for 7 elephants, including 2 bulls." This was 9,000 sq. ft. more than I had budgeted during our secret meetings, so we started off pretty far apart. The design couldn't move forward until we had consensus on an acceptable barn size. The design team had built-in fees to tour other recent elephant exhibits to see how other zoos approached the next generation of elephant exhibits. We decided to go to Dallas, Cleveland, North Carolina and Birmingham. With that tour agreed upon, Nate, Epsten architect Pete Choquette, and I set off to look at these recent elephant facilities to prepare our re-design of the project.

We first saw Dallas Zoo's "Giant's of the Savanna" project (opened in 2010). Here we would see if combining elephants with giraffe

was feasible. We immediately saw the value of a lightweight metal barn for cost efficiency, with roll-up doors, a large herd room, bollard walls, big sand floors, "Big Ass" fans, radiant heaters and a 5-ton bridge crane. In the habitat we learned about overhead feeding stations for public "demonstration" areas, as well as keeper lookout stations in the rear of the habitat. We also talked to Karen Gibson, elephant manager, about combining giraffe and elephant. Unfortunately, we weren't there during their one-day-a-week mixed savanna, but just talking to Karen, I knew it was possible for us to attempt it. It would take time and effort – and the pay-off would be extraordinary.

At Dallas, their Barn was not on view to the public. Around the backside of the habitat they used heavy cable barriers with an added mesh layer to keep the Antelope in the enclosure. At the visitor side there was an amazing 180° wide-open view over a huge water moat and pool. Sitting under a tree in a director's chair was Alan Roocroft (Elephant whisperer from San Diego), the man apparently behind the magic at Dallas! Alan was training several staff on their new-ish exhibit and getting good results. We learned that to succeed in creating these more complex exhibits, money needs to be set aside for training of staff, and that training takes time.

That night we flew to Cleveland, and landed in a snowstorm. We got an in-depth tour and visit of their big elephant collection, with everyone inside. At Cleveland we learned that you can do an 'on grade crossing' of elephants and visitors, but you may have to tolerate some pathway bottle-necks (they are exciting to watch!), and you better invest in high-end technology and premium design/construction to pull it off – and they do and they did. Nate was not comfortable with the management complexity that this visitor crossing required every-time an elephant would shift.

Inside the Elephant Barn (which allowed visitor viewing) we looked forward to seeing how they





















managed the cable barrier on front of the stalls. To our surprise, the cables were electrified. In their already cramped stalls, this reduced the footprint further. Nate had strong feelings about allowing un-escorted visitors to potentially touch an Elephant inside and this hotwire solution was not acceptable. That meant a no-go for cable barriers in our barn. The rest of their barn was dramatic for its extra large everything – from their containment systems, to their extensive air handling systems, hot wire systems, filtration systems, custom built drinkers, and huge hay-loft.

There was a lot to like at Cleveland's outdoor elephant habitats. It could have been the nice coating of new snow or the pale yellow cable barriers outlining a gracious pair of open habitats. We can imagine a pretty comfortable life for the Elephants of Cleveland. The habitat had large pools for open viewing, large rectangular shade structures for the Elephants, several large existing oaks (hotwired off) to provide afternoon shade as well as themed visitor huts and trellises for the visitors. We learned that the Cleveland model of 'Elephant Crossing' is feasible, but for us, it wouldn't improve well-being for our elephants enough to counteract the increase in staff efforts and potential safety issues.

A week or two later we went to North Carolina where Guy Lichty was kind enough to give us the VIP treatment. After studying the plan layout, we went out to the site to view reality, which is even more impressive. Their 7-acre habitat (10 overall) has wide-open viewing with a combination dry moat and a huge pool with underwater barrier along the visitor side, and an 8' cable rail in the distant edge of forest. There are several large, enrichment structures to scratch on, and certainly enough room to roam. At the elephant visitor center (themed as a helicopter hanger), we got to observe the operation of their elephant shift from habitat to habitat, set up as a demonstration for guests. The shift appeared to be an easy and safe interface with the elephants, keepers and guests. It provides lots of flexibility and uses for individual or groups of elephants.

Then we drove back to the Barn. There is no public visitor access. One of Guy's first comments to me was, "We wish we had visitor access to the barn, for a variety of reasons: like winter, rain, and educational value." North Carolina Zoo typically does not have behind-the-scenes viewing. Period. But should we at Zoo Atlanta give access or not? We were hearing mixed opinions.

The hilly terrain, wide-open views, hidden moats and distant viewing, makes this place a great example of seamless habitat design. North Carolina Zoo Staff were fully engaged in not only the design process but in fabricating the containment systems, purchasing and installing landscape

Zoo Design for Elephants at Zoo Atlanta

plant material and soils, and developing and coordinating the production of all graphics and interactives. At the Elephant Exhibit they created an interactive game for children to learn about life on the savanna in a fun way. At North Carolina we learned that we don't have nearly enough acreage to do it right – 10 acres minimum – and we have less than 5. We do have the opportunity to greatly improve conditions for the Elephants at Zoo Atlanta.

Next on our list was Birmingham, just 2 hours down the road from Atlanta. Their elephant exhibit has a nice combination of North Carolina and Dallas with the open viewing habitat and the most perfect 4-bull stall Barn we had seen. Birmingham has huge sand stalls with a transfer chute of bollards in front of the stalls. This allows direct elephant/keeper access and circulation. It also has several large outdoor paddocks, and one, isolation suite. Their habitat is spacious (4 acres) with all natural vegetation at some level of destruction. Soils were muddy, deadfall was strewn everywhere and the bulls loved it. Lots of activity was evident and the elephants looked wonderful. As we learned at the Jacksonville Elephant Conference, bulls typically live on their own or with other bulls in the wild. Having an all-bull zoo habitat makes the most sense as a strategy, instead of each zoo building for both cows and bulls. Currently, zoos force the bulls to live with cows all life-long, with occasional separations by keepers. Is this wellness for elephants?

Our multi-zoo site visits were eye opening for all of us. It provided us time as a design team to learn from each other, and to build our understanding of the scope of this project. We saw many forms that our 'program' can take by seeing the similarities and differences from each Zoo, and how these components align with our team's philosophy of elephant exhibit design.

Our design process could now take off. We knew what we believed were the best parts of each design. Between Nate, his staff, and myself we traded Barn layouts back and forth from sublime to ridiculous, with refinements to a final agreement. We landed on a perfect elephant barn, and it was 19,000 sq. ft.! The designed barn could hold up to seven (2.5) elephants. It had a large herd-room, three cow stalls (all with keeper access halls), and two large bull stalls. Bull stalls were connected across the hall to cow stalls, all with access to outdoor paddocks. This included an Elephant Restraint Device (ERD) chute that led to two, interconnected habitats. Our hillside location allowed us to terrace into the hill, with a 10' high claybank separation between the two habitats. This provides a super deep exhibit vista, with flexibility to move elephants to either level, and to move giraffe and rhino into either habitat as well (fig.2). Visitors can see elephants from the Cyclorama viewing terraces, and we also designed a special visitor path that wraps around *Zoo Design for Elephants at Zoo Atlanta*













one side only of the habitat, giving the elephants maximum acreage. This provides panoramic and long views into different portions of the savanna habitat. We all agreed to give visitors access to the first floor of the elephant barn, just in case the elephants are inside. The view in the barn would be from the ground (a 'respectful' orientation to promote wellness). At that point, visitors would have to turn around and return the way they came. While not ideal but acceptable, this cul-de-sac path would allow the visitors to review what they had seen, and with a new perspective, help them absorb what they learned about the state of elephants in the wild. If we had chosen a visitor loop, it would have to cross elephant pathways, and therefore required either an elaborate bridge (like Denver) or on-grade crossings (like Cleveland) or a wooden ramp (like Oklahoma City). This would be an additional scope of work, never envisioned in the concept plan, and thus not in our budget (or so I thought).



fig. 4: Visitor Circulation Diagram, Schematic Site Exhibit Plan

The zoo staff loved the plan and the approach and encouraged us along. We had a visitor-accessible barn, with an easy to manage elephant exhibit without visitor interference. Our final Schematic Design Exhibit Plan was approved and we were on to Design Development. But there still was that nagging Master Plan. The zoo brought back Torre Design Consortium to update their Master Plan to include our elephant exhibit layout. When he saw the visitor circulation, he noted the cul-de-sac visitor path – and convinced Zoo Atlanta's CEO that there needed to be a loop, as loops keep visitors moving and increase their stay-time. "Length of Path = More Revenue," was his argument. Elephant management or the budget was not considered; revenue was highest priority, not wellness. From that point forward, the Loop was to be.

fig. 5: Visitor Circulation Diagram, Schematic Site Exhibit Plan with possible loop



I returned from a week vacation in Belize to "We want to add a visitor loop, and it goes right through the middle of the exhibit!" Our Schematic Design had been complete, but now we had to look at the implications of this little squiggly magic marker line going through the middle of the exhibit (fig. 3). Having some respect for budget and the laws of physics, my first responses was to just say NO. But as we "serve at the pleasure" of our clients, I had to show a better option.

To accomplish the Loop, we would maintain visitors on the ground (there wasn't enough room or budget for the ramps or boardwalk), and create a Cleveland-style crossing at the cow access point. The elephants would have to be monitored in order to let one group of animals move from one habitat to another or to the barn. Visitors would have to stop and bottleneck on the path until all people doors are closed, animal doors are opened, the animals move through, the animal doors close, and then people doors open and they can move along. This was un-acceptable for so many reasons – aside from the safety and logistics, it would restrict animal and visitor movements; it would put people in the middle of the panorama view from the Cyclorama; it would eat up potential animal habitat; and of course it would cost more. But the biggest issue was that keepers would decide for the elephants when it's time to move and to where, instead of keeping the whole system open and letting elephants decide where to go. Isn't that the most important ground rules for Wellness - giving the elephants choice and freedom to explore, exercise and experience new places on THEIR schedule (or as much of their schedule as we can allow)?

There was another possibility. We could cross over the top of the elephants like they do at Oklahoma City Zoo. To do that, you need to Zoo Design for Elephants at Zoo Atlanta

take the people up an 8% ramp to a height of a minimum of 24 ft above the elephant floor before you cross over top. This resulted in a 450 LF ramp just to get up. We would need room for the ramps to extend around the entire exhibit (we weren't going to allow visitors through the middle of the habitat - that was TOO much).

The "Revised" Plan (fig. 4) resulted in an exhibit with:

- 1. visitors (with their potential airborne debris) standing above the Shifting and Paddock space below;
- 2. encircled elephants, with visitors at different levels while in Habitat;
- reduced elephant area due to additional walkways with 15' setbacks, and new central viewing node (10% of total reduction in elephant area);
- 4. cross-viewing and back-of-house viewing from new ramps, walkways and Cyclorama decks;
- 5. reduced buffer-landscape as a backdrop;
- additional construction costs involved in building a massive ramp and length of path that needed additional interpretive and activity areas, restrooms, snacks and shade.

Once we started down this track, the design now evolved to include a revised Barn that moved visitors from the first floor to the third floor, where we would provide an indoor viewing/interpretive room overlooking the massive nave of the Elephant Cathedral. Visitors could also walk along an outdoor balcony that runs halfway down the length of the barn to a covered overlook of the habitats.

Then the visitor ramp down continues to the far perimeter of the exhibit (along the service road) to provide great views of the bull yard and his waterfall and pond. Down the trail, the visitors pass by a transfer where Giraffes enter the bull yard through a series of gates and chutes. Finally, we arrive at a "Boma Camp" located in the center of the exhibit, with views of both elephant habitats and the giraffe/hoofstock savanna exhibit. This central node is themed as an African traditional hut, with secondary huts to provide restrooms and beverages in a camp setting.

From there, visitors would return to the "old zoo" at a very busy, expanded Giraffe feeding platform with more views of the elephant pool and cow demonstration area. This route results in an 1800 LF loop. It is a long walk for our guests, and may be too long. It is also a very different type of exhibit for Zoo Atlanta, with continuous viewing along all sides, and little area left for buffer landscapes. We still maintain a 15 ft setback from the elephants that gives keepers a lot of training opportunities and access to the elephants. This was a much bigger visitor experience than we had agreed on originally. However, visitors encircling elephants and viewing from the third floor balcony of the barn is not best for elephant wellness.



The Budget still needed to be addressed. We commissioned another Construction Cost Estimate, only to find that, as expected, the additional "Loop Concept" added another \$3+ million of costs! Even with extensive value-engineering efforts, we could not offer a solution that maintained the Loop and the Budget at the same time. Something had to give.

In summary, how does wellness affect exhibit design? When is it necessary to change one's business planning (need for a loop path) in exchange for Animal Wellness considerations (visitors on all sides, from all levels). Did Zoo Atlanta make the right choice in assessing a revised exhibit design? Does the psychological issue of being surrounded contribute to a feeling of distress? In the Manitoba standards for polar bears there is a requirement to limit visitor/human interfaces to 180 degrees – should that be considered for elephants too?

POST SCRIPT (Since the Elephant Conference)

At the time of this lecture – we were waiting for the Zoo to decide which way it would go. Several Zoo Atlanta staff attended the Jacksonville Elephant Conference, and I like to think that my presentation clearly represented the original concept plan as beneficial to elephant wellness, and the loop concept less so.

In the end, the zoo had reached its comfort level with the budget of the project, and we were given direction to remove the ramps, pathways, third-floor elephant viewing, to maintain the project budget, i.e. return to the approved schematic layout. I think that this was the right choice, even if the zoo didn't originally see its merit. I feel that while the ramped overlook experience would offer something that the zoo does not currently offer, the operational cost, capital cost, and potential safety costs are too great for this project. We will never know if the extensive path system and encircling elephants at this scale, was detrimental to their wellbeing.

Since given the OK to pursue the original cul-de-sac path system, we decided to revisit the concept and attempt to improve visitor staytime by adding additional species and experiences. Meerkats were originally eliminated in this project, but now they were immediately targeted as a potential new and popular exhibit. Hooded vultures could be added at limited costs, and contribute to the Species Survival Plan for this critically endangered species. The new plan now offers a generous visitor area in front of the barn that gives a very long view of the habitats. Additional features include an overhead feeder, and interactive discovery wall, where the visitors can observe, close-up, some behaviors that make elephant exhibits some of the most popular exhibits at any zoo. Now the visitor will not just come to the barn and turn around, but they can rest, view, get a beverage and learn directly from zookeepers in the barn and outside – all in an African-themed 'cool-spot' filled with unique animals from the savanna, and ones that need our help. And isn't this in the definition of Wellness – to care for animals and to save animals from extinction. We have a new direction, and wellness will be the priority.

The new Zoo Atlanta Savanna Expansion addresses my list of desired behaviors of a successful wellness exhibit:

- 1. Animal's Choice without human interference
 - We can open the entire elephant area to the herd without monitoring gates, or close down to separate enclosures with enough buffer between groups. It wasn't the best scheme for animal choices as we separated out the giraffe, but adding white rhino is still possible.
- 2. Exercise walking, reaching, swimming, hill climbing
 - a. There will be lots of exercise opportunities in the 450 ft wide habitat with reaching, swimming and hill climbing available
 the hillside location insures this.



- 3. Exploration trunk manipulation & habitat usage
 - a. We will begin with one Interactive wall with treats at the demonstration wall, and overhead feeder. Over time, more can be added. The 15' wide setback will give the keepers the ability to enrich the elephants habitat with novel items at will.
- 4. Proper Social Environment both sexes and old and young
 - a. The Herd will be formed with two females that have lived their lives together, and two additional females and a male, that have lived together forever as well. Bringing that group together will be the key to a harmonious social group. The outstanding question remain -
- 5. Safety keepers and elephants (inside and out)
 - a. We have a 15' wide setback from the perimeter fencing –and with a 7' trunk, the keepers have 5' of safe area around the entire enclosure in which to interact with the elephants in the habitat, and same in the barn and paddocks.

- 6. Shade from a variety of sources throughout the day, and other cooling, i.e. dusting
 - At this point I'm relying on existing vegetation to shade areas into elephant habitat, and also large fabric umbrella "trees". There will be sand for dusting.
- 7. Water clean water from shallow to deep, muddy water and a fresh water source
 - a. We have two waterfalls, one of which flows along the front of the exhibit as a shallow stream to explore, and ends into a large central pool, the other just a soaking pond with waterfall.
- 8. A variety of healthy foods, smells, textures, substrates and browse
 - a. The elephants will be on a variety of substrates from grass, sand, and clay, as well as lots of deadfall to play with, and eat.
- 9. Positive human interaction and physiological considerations for both keeper as well as zoo visitor.
 - a. We allow for positive reinforcement training around exhibit perimeter and provide great flight distances to facilitate the training.
 - b. We maintain a lower viewing aspect from the visitors to the elephants, except at the cyclorama that would have an overview.
 - c. There are no visitor and elephant crossing, and only a visitor / rhino crossing which will offer periodic and experimental opportunities for inter-species interactions in safe conditions.
 - d. Keepers have an overlook balcony and office area in the barn to observe the elephants (as well as future cameras).
- 10. A habitat with a view; long views, short views, high and low opportunities.
 - a. This is a very long exhibit (for Zoo Atlanta) and when both habitats are joined, the opportunities for interesting viewpoints are extensive. The terraced exhibit and the cyclorama multi-floor balconies offer a variety of observation points for both elephants and visitors.