“Only if we understand, will we care. Only if we care, will we help. Only if we help shall all be saved.” - Jane Goodall
[THE ZOO SCHOOL]
Gabby Black
Masters of Architecture Thesis

The Zoo School
Architecture has the opportunity to change the current zoo typology in order to better support their efforts in connecting education and conservation through community engagement.

Faculty Advisor
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Fall 2016 - Spring 2017
School of Architecture
Tulane University
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[ THESIS STATEMENT ]

Architecture has the opportunity to change the current zoo typology in order to better support their efforts in connecting education and conservation through community engagement.

[ ABSTRACT ]

This thesis intends to investigate the ethics of captivity for zoological purposes and whether or not it is successful in contributing to conservation as it claims to. By studying the effects that current projects have on animals and visitors alike, I hope to find a new way in which zoos can be beneficial to the environment by influencing and educating the public on conservation. Architecture, in the past, has shaped the way that captive animals live out their lives. Animal captivity can be traced back to hunter-gatherer domestication, Egyptian Pharaohs being buried with animals and gladiators violently battling animals to the death to entertain the viewers. Following these ancient practices, life for captive animals continued to be dismal. Countries around the world collected and bartered exotic animals through world fairs and menageries in order to boast their unique cultures to lesser societies. In the future, architecture has the potential to influence the welfare of animals as well as bring light to new ways of observing animals and their habitats. Whether the site is chosen within the state of Louisiana, or is non-site specific and is instead a network of worldwide zoological centers, this project aims to open a discussion about the ethics of captivity for the sake of animals’ betterment. Programmatically, observation components will work along side rehabilitation typologies to create a more natural and humane zoological model.
[INSPIRATION]

Reader Pavilion
Estonian Student Project

Heydar Aliyev Centre
Zaha Hadid

Center d’art Pariétal
Luxigon

Super 8
BIG Architects

Gallery of Penda
China Garden Expo

Prahan Hotel
Techne Architects

Paris Courthouse
Renzon Piano

San Francisco Science Academy
Renzon Piano

Cat House
Space Int’l
The Nueva School is a project that works to develop an educational landscape. The project’s main element is the living roof. It is organized by zones that are determined based on habitats, wildlife and its ecological function. The purpose of this roof is for students at the school to take part in cultivating the plants as well as incorporating the study of this urban habitat into their science classes. The roof has another significant purpose in providing and restoring habitats for local species that are critical to the Bay area’s biodiversity. The different zones are geared towards different communities like the Myrtle Silverspot Butterfly, migratory birds and several local bee species.
Biophile is an architecture collective that investigates the ways that biometrics, biophilia & materiality can work together. Celia created a primary school for her thesis that is biophilic in nature. Part of what is significant about biophilia is that the presence of nature and plant life helps people concentrate and learn. For this school, coral was researched and ultimately lead to the design based on its success in fitting a large density of nature into a small amount of space. The building acts as a large coral structure that sustains a range of plant life within and throughout its program. Containing the nature within allows constant user awareness of nature’s presence and its benefits in learning.
The architects of the St. Mary school created a threshold between indoor and outdoor learning with a simple shift of the building volumes. Though both the outdoor play area and the indoor classroom the same profile, these spaces differ in both their material expression and function. The use of brick for the classroom’s envelope creates a grounded structure where as the outdoor space uses wood cladding to create a strong sense of warmth while it functioned as an enclosed secret garden for the children. The space inside is punctured by a row of sky lights that let in ample sun light.
The concept of Zootopia is the first of its kind in the world. BIG Architects has created a zoo where the animals are as free as the site will allow while still keeping them captive. The design takes an innovative approach on the notion of captivity by turning the cage onto the visitor. Animals are free to roam within their habitat while people observe through passive strategies. A circular structure in the center allows people to congregate as well as reach an elevated view of the animals out beyond the building’s walls. From the center, people can take a self-guided ride through the animals’ habitats by pedaling mirrored spherical pods around the grounds. The idea behind the pods being that the animals are unaware of the peoples’ presence.

HOW TO REINVENT THE SAFARI ZOO

TRADITIONAL ZOO  ➔ MAJOR REINVENTION - THE SAFARI  ➔ ZOOTOPIA
ANIMAL ENCLOSURE TYPOLOGIES

Penguin Rock Enclosure  Panda Bamboo Cottages  Savannah Crater Lodges

Safari Crater Stable  Lion Hill Enclosure  Bear Lumber Enclosure
The new zoological park for St. Petersburg will be relocated from the historic site crowded within the city center into a site spanning some 300 hectares. The new park will consist of artificial islands that separate the exhibits based on climate. The concept behind this organization is the supercontinent, Pangea. The islands are connected using bridges. The bridge between the islands of Eurasia and North America, packed ice is imported from the Arctic Circle in order to form a bridge.
The Eden Project is located in a huge crater where people are reconnected with the natural world for the purpose of working towards a better future. Holding the title of the largest rainforest in captivity, the Eden Project biomes help the educational charity teach adults and children alike about plants, conservation and their role in their community. The design of the structure is modeled on the bubble and how it settles on a surface, in this case, a giant clay crater.
HUMID TROPICS + WARM TEMPERATE BIOMES PLAN

Fig. 19.2 / Phased construction

Fig. 19.2 / Eden Project Chefs
03

THESIS ESSAY
They were second-class. They were unworthy of respect. They were here for our use, our entertainment, and our pursuit for power. Animals were ours’ to control. This philosophy, though still present across the globe, is drastically shifting. The world’s collective outlook, in the coming decades, on the issues of animal captivity and conservation will determine the future of our existence. The relationship that humans have manifested between animals and ourselves has been a centuries-long experiment as to how we justify the inequitable treatment of those unlike us. The numerous ways in which our predecessors have gone about controlling non-human species has been a questionable display of our universal character.

There are countless zoos that hold value in humane practices, provide conservation funding and research, and make great strides in getting the public involved in environmental issues. But many zoos, often including those that claim to focus on these principles, fail to successfully make significant impacts. One can hope that, decades from now, zoos will cease to exist. As a global population, we should strive to reach that momentous goal. But in order to reach this milestone, zoos need to dwindle in the form of a success story.

Zoos as a social construct have their flaws. Captivity at its core is immoral. But the acceptance of their existence, and revolutionizing the way they work, can essentially lead to their disappearance. If the environment can be valued beyond its dwindling resources, and animals can eventually sustain their populations without the help or hindrance of the human population, then the work of the zoo will have done its part and will vanish.
THE PAST
[ANICENT BEGINNINGS]

Civilizations such as the Ancient Roman Empire, viewed animals as play-things. Exotic animals were often the most spectacular warfare trophies that simultaneously flaunted the Romans’ power over lesser societies. Gladiators fought these animals to the death. The Coliseum’s towering stonewalls and dark dungeons below kept the exotic where it belonged, at the mercy of the barbaric man. The Romans’ treatment of animals is an example of blatant denial of empathy towards animals.

At the other end of the spectrum were the societies who’s approaches to animal captivity were much more ethical. One such society, known as the Vedic Indians, believed in Jainism, a non-violent spiritual doctrine that forbade the killing of all creatures (Jones 23.) One of the most notable leaders, Emperor Chandragupta and his son, Asoka, passed early conservation laws and banned hunting for sport. His son, Asoka, was an early leader in animal rights movements through his founding of “pinjarapoles”. This translates to “cage protectors”, which were manifested through animal hospitals that promised care for the sick creatures and spiritual reward for the committed workers.
[MODEL MENAGERIES]

With the exception of outliers such as Emperor Chandragupta and his son, conservation and compassion towards animals is a relatively new focus in the lineage of the zoo. Before there was the zoo, there was the European elite class who coveted their status in society and yearned to express their grip on power. The menagerie, which translates to “the managed” in French, sparked the onset of centuries of animal captivity. The European Renaissance encouraged the popularity of the menagerie in conjunction with newfound interests in science, philosophy, and trade and conquest.

During the rise of industrialization in the 19th century, animal collections became less of a status symbol of the privatized elite individual, and began to manifest in the form of zoological parks within cityscapes.
One of the most notable examples of the early zoological park was London Zoo. The zoo was established in 1828, and soon after began to be viewed as a worldwide reputable institution. It became a place where science and spectacle merged to encourage scientific thought and debate. As the collections of zoos continued to grow, so too did the curator’s interest in the architectural elements. Similar to the motives behind displaying exotic animals, the outlandish architecture of zoos continued to be a symbol of power. Zoo landscapes of the 1700’s and 1800s were made up of pompous fantastical structures.

Also flourishing in America was the popularity of the circus and sideshow attractions. Phineas T. Barnum merged entertainment with showmanship, creating what he claimed to be a “mammoth travelling university of natural history”. The success of circuses and sideshows lead to zoo guests expecting lavish entertainment that zoo directors pandered to so that their zoos would stand out.
[ THE TOPIC OF CONSERVATION ]

At the end of the 19th century, zoological parks’ interest in conservation methods and scientific initiatives began to separate them from the traveling animal shows. The declining population of the American bison during this time led to a national discussion of conversation. Expansive enclosures were designed for large animals to roam. Breeding programs initiated an undertaking of reintroduction.

As the twentieth century dawned, directors began to realize the importance of allowing animals to live in enclosures more representative of their natural habitats. They wanted to establish in people a love for animals and plants to promote the science of biology.
THE HABITAT ZOO

Revolutionary thinking in zoo design emerged with the creation of the Tierpark by animal dealer, Carl Hagenbeck. This zoo put animals amongst other species from the same temporal habitats. This “habitat zoo”, has since become the industry standard amongst modern day zoos.

Common interests in conservation and science lead to the success of the safari park. Zoos during the latter part of the 20th century began extending their parks to include larger habitats that in turn relayed the message of a higher level of environmental respect. The wildlife park anticipated that the reformation of animal habitats would lead to more natural behavior by the animals. Their objective was to change visitors’ expectations when it came to animal behavior. Rather than visiting a zoo to experience animal performances, zoo directors hoped to engrain in their guests the significance of observational entertainment.
Far more successful than London or Berlin zoos, safari parks fulfilled a human longing to enter a kingdom of animals, to get close to the lion in his den, to enter a domain where nature rules” (Jones 25.) The sizeable acreage, though an improvement from the past, coupled with trash cans, prescribed routes, and gift shops kept the safari park from achieving complete authenticity. Many zoological parks and aquaria have accepted their role as environmental stewards, rather than the entertainment portal that they once were.
THE PRESENT
[THE PROBLEM WITH TODAY’S ZOOS]

The progress that zoos of the 21st century have made in conservation and education efforts have been monumental in the historic narrative of animal captivity. However, more than any other species on the planet, humans have brought about detrimental change to our natural world. As a global community, our ability to create and think has lead to a modern world of great discoveries and new technologies. But while we rapidly advanced, we did so with reckless abandon. More so than ever, it is up to the human species to reevaluate what our role on this planet necessitates. The topic of global warming and conservation are leading the discussion in how we will continue to advance without further degrading our environment.

The zoo has an important role in the future of our planet. Although many see the zoo as an annual destination to occupy young children, its’ role reaches far beyond entertaining rambunctious school groups. The zoo has the potential to impact huge demographics that can play an increasingly important role in our future. Throughout the last century, the typology for the zoo has both, in some ways stayed stagnant, while simultaneously taking great strides in becoming increasingly more important to our environment’s survival.
Architecture has the opportunity to create a more conducive environment for animals to feel safe, sane, and content. Countless studies have shown the effects that visitors’ presence has on a captive animal’s wellbeing. It’s no surprise that the prospect of a stranger staring into your bedroom window day in and day out might put you on edge; it might affect your psychological behavior. Captive animals around the world are expressing signs of zoochosis – psychological problems brought on by captivity.
The zoo’s success is due largely in part, by the role that architecture and design play in its formation. When the zoo of an ancient society is compared to one that has been advancing in the past 30 years, the most noteworthy difference is the structures in which animals are held captive. The humane treatment of animals is what makes a modern zoo successful and respected by its critics and visitors. But even in 2016, zoos continue to keep animals that are known to need space, companionship, and enrichment confined to spaces unfit for a healthy existence. A few noteworthy zoos are working to reverse this issue.
The oldest zoo in America, Philadelphia Zoo has been through decades of change. In the recent years, the board of directors have been bringing about new ideas that have made for higher attendance, but also more humane experiences for the animals. Their most recent expansion was Zoo 360, a network of enclosed mesh tubes that criss-cross above the pedestrian pathways. Here, 21 different species are given scheduled time throughout the day to explore the pathways, leading to new experiences and discoveries for themselves and their observers. Zoo 360 is an innovative approach to animal enclosures and is beginning to inspire other zoos.
A leader in the field of innovative & humane zoo design, San Diego Zoo has been inspiring generations of animal enthusiasts. San Diego, one of the largest zoos in the country, has designed enclosures that are suited to the roaming requirements that their animals need. The cheetah run is a long expanse of grass where their resident cheetahs can chase a toy from end to end. A main attraction among visitors, the run help guests both understand the importance of appropriate space allocation for animals as well as the astounding speed of a cheetah. San Diego Zoo’s enclosures are among the best, their Bonobo enclosure is diverse in its landscape and levels of exploration.
One such example of a zoo that is expected to have a great impact on our understanding of the zoo of the future is Zootopia. Designed by Bjarke Ingels Group, Zootopia is flipping the script of the former zoo. The very simple concept behind this project is putting people in captivity. The zoo has an outer border; the animals are still within the confines of captivity. But what sets Zootopia a part from other proposals is the mission to create as free of an environment as possible for the animals. They have also chosen to only select social animals that can cohabitate with other species, giving them the option to have larger territories. Putting the animal’s needs first, they have designed open enclosures that have camouflaged viewing areas for the visitors. The project is also designed to safely immerse the guest within the animal’s habitat. Traveling within mirrored pods, guests are able to bike, float and zip-line through the enclosures. In this way, people can get a close encounter while the animal goes about its business unaware of human presence.

This zoo proposal is one of the most convincing zoos presently. It is pushing the boundaries of what the relationship between humans and wild animals can mean. By making the animals needs the primary concern, they are able to create a humane and free enclosure. As visitors’ wants come second, the project allows for a new perspective that may hopefully influence visitors’ understanding of animals. Despite the seemingly successful proposal, Zootopia seems to avoid addressing a more profound issue that zoos still have yet to solve - education.
There will be one long tunnel across all 5 continents, starting and ending at the Expo Pavilion. The view is amazing.
Though many zoos today are pushing the importance of conservation on their visitors and donors, alike, there has yet to be a zoo that’s number one goal in conservation successfully addresses the issue of visitor education. Almost every zoo in 2016 will flaunt its conservation and education initiatives. In a recent survey conducted by the Wild Cat Conservation Legal Aid Society, “visitors who rush from exhibit to exhibit report not having learned anything at the zoo that they didn’t already know. Critics have pointed out serious methodological flaws in studies that claim to show that zoos successfully educate visitors on important animal-related and conservation issues” (King.)

Where can architecture play a role in steering education efforts in a more substantial direction? After-school programs, summer camps, and overnight group tours have the ability to teach children and adults alike about why animals need to be taken seriously in the discussion of conservation and global warming. But with all of the accompanying research and surveys, it’s clear that these events aren’t working. A new educational model needs to be proposed to better address zoos’ missions to educate. If we continue to push for conservation without instilling in visitors the importance of their role, nothing will change.
ANIMAL ENCLOSURE

- LOOKING AWAY [X17]
- LOOKING TOWARDS [X5]
THE FUTURE
THE ZOO OF THE FUTURE

The zoo that will be most successful in the years to come will be a place that addresses the needs of animals first, and the wants of people second. For a zoo to exist in the future it must have an innovative platform – one that boasts conservation and education foremost. Unlike zoos that are presently pushing these missions along with others such as entertainment, the zoo in the future will be designed on these two principles alone. Its purpose is to educate in order to sustain a more prosperous natural world. Situated in what is currently Audubon Zoo, this zoo will be invaluable in connecting the communities of New Orleans to the greater natural context.

ZOO PRIORITIES

The design of animal enclosures will be instrumental in how the future generations of these species develop and grow. Giving animals a safe space, a place to escape the stress of visitors’ presence is the first objective. Enclosures where animals can roam, climb, burrow, and hide will be designed to fit each individual’s needs. To keep animals comfortable and relaxed in their makeshift habitats, it will be imperative that their enclosures camouflage the hundreds of guests that will inevitably pass by on a daily basis.
The guests should not be looking for animals to react to their presence; observation should be appreciated while viewing animals that interact with each other through natural behavior. The enclosures for each animal will be as natural as possible. Rather than retreating each night into a concrete cell, animals will be given the opportunity to remain outdoors in a sheltered habitat that is more similar to their natural choice of rest.

Though visitors are a main focus in creating a more purposeful zoo experience, their role in the zoo will be minor in comparison to other programs. Though observation will be the main experience, new technologies will allow visitors to better understand their impact on the environment. Through virtual reality and live 360-camera footage, visitors will be more engaged in activity as opposed to zoos interactive boards of the past.

The major component of the “Zoo of the Future” that is unlike zoos of the past will be a k-12 school. Designed to educate the youth of the community on their role in contributing to conservation will begin at their arrival. Assigned an animal within the zoo, this student will report, research, observe, and partake in caring for this animal. Within the curriculum of the school, students will take part in classroom education as well as “field work” in which they choose a concentration such as science, art, math, business and finance, marketing and so one. Working on projects throughout the zoo will teach them exactly how they play a role in affecting the future of their environment. This engagement will lead to family members, friends, and community members alike to further take interest in the zoo and its efforts. The school itself will partially wrap around the zoo to act as a functioning interstitial space between the community members and the inner workings of the zoo.
The final programmatic element, which will also wrap partially around the zoo, is a resident initiative. Members of the New Orleans community who are in search of work, such as refugees, transient populations, the homeless, or students can apply to work with the zoo in promoting conservation. For the first year, the residents will be provided housing and living expenses in return for their trusted work around the zoo. This work may be helping in the education department, interacting with guests, or assisting in day-to-day husbandry activity.
After a year of service, these residents will be given the option to travel abroad to the zoo’s “outposts.” These outposts may be located in different regions around the world. Here, scientists and researchers associated with the zoo will lead the residents in fieldwork. Fieldwork may include defending animals from poaching, deforestation, and fragmentation, or research and observation of specific species of interest. With a second year of experience under their belts, the residents will be given the option to continue working alongside the zoo in a paid position or moving on to other endeavors with newfound experience on their resumes.
CONCLUSION

A zoo of the future is a dramatically different model than one of the past. Representing innovative thinking and new technologies which come with human advancements, a zoo may become one of the greatest influencers of our survival in the future. The existence of zoos is fundamentally immoral in holding thousands of species captive against their will. But if a zoo can represent the world’s understanding of the environment and our role in making positive change, then maybe this unique way of working can justify our optimistically motivated actions.

A zoo of the future isn’t a success without becoming a center for change. For a zoo to be an innovative epicenter in conservation, architecture and design must be incorporated. To reimagine the way a zoo is designed and built means introducing new forms of programming and design elements scaled to the needs of non-human species.
AUDUBON PARK + ZOO
NEW ORLEANS, LOUISIANA

“When one tugs at a single thing in nature, he finds it attached to the rest of the world.” - John Muir
Audubon Park + Zoo
Park Area: 350 acres // Zoo Area: 58 acres

Founded in 1916, Audubon Zoo was an after affect of the World Fair. After countries had brought their most prized native species to exhibit to the world, the majority decided that it would not be worth the effort to transport them home. Thus, the animals left on the site became the first collection of Audubon Zoo.

The zoo today spans 58 acres. They have been accredited by the AZA for the last 27 years and have continually presented magnificent work in the field of conservation and community involvement. Adjacent to the zoo, lies the remaining 292 acres of Audubon Park. Along the Mississippi River, it provides both locals and tourists alike, natural spaces for leisure activities.

Though the entire park boasts an expansive live oak canopy, and beatiful, enchanting spaces that act as an escape from the surrounding urban context, Audubon Zoo offers something different. Walking through the entrance, you are immediately met with sounds unlike anything the typical city dweller is accustomed to. Excited whooping cranes, curious siamangs, and chatty birds create a wildly unexpected symphony.

This is a space that teaches its’ observers the ways of the natural world. To understand the importance of conservation and sustainability, one must witness the ways of the world as they would at Audubon Zoo. A school within Audubon Zoo would allow students to reside within a natural space on a daily basis. Under a protective and vibrant canopy, students would analyze and observe the animals of Audubon Zoo. These species become their classmates, together, students and animals would inhabit a space unlike any other school or zoo in the world.
UPTOWN NEIGHBORHOOD
LOUISIANA

POPULATION: 4.65 million
AREA: 50,000 sq mi

UNITED STATES OF AMERICA

POPULATION: 318.9 million
AREA: 3,796,742 sq mi

NEW ORLEANS

AUDUBON ZOO

POPULATION: 2,000 animals
AREA: 58 acres

NEW ORLEANS

POPULATION: 378,715
AREA: 350 sq mi
### AUDUBON ZOO PROGRAM

#### ANIMAL EXHIBITS

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<tr>
<td>LOUISIANA SWAMP</td>
<td>210,500 sq ft</td>
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<tr>
<td>AFRICAN SAVANNA</td>
<td>242,500 sq ft</td>
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<td>JAGUAR JUNGLE</td>
<td>72,680 sq ft</td>
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<td>SOUTH AMERICAN PAMPAS</td>
<td>189,000 sq ft</td>
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<td>WORLD OF PRIMATES</td>
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<td>ASIA</td>
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<td>GIRAFFE OVERLOOK</td>
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<td>SEA LIONS</td>
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<td>AVIARY</td>
<td>5,988 sq ft</td>
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<td>REPTILE HOUSE</td>
<td>11,542 sq ft</td>
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<td>FROGS!</td>
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#### HUSBANDRY SUPPORT

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#### DINING

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<td>HAAGAN DAZS</td>
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<td>FLAMINGO CAFE</td>
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<td>SNACK SHACK</td>
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#### ATTRACTIONS

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<td>MONKEY HILL</td>
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<td>KAMBA KOURSE</td>
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<td>WATOTO WALK</td>
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<td>CAROUSEL</td>
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#### EVENT SPACE

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<td>25,070 sq ft</td>
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#### PARKING

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<th>Area</th>
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<tr>
<td>260,000 sq ft</td>
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</table>

#### TOTAL ZOO AREA

58 acres (2,526,000 sq ft)
AFRICAN SAVANNA EXHIBIT

SEA LION EXHIBIT (under renovation)

MANDRILL EXHIBIT
“Zoos are like icebergs. The obvious is above the water, but a lot of good is hidden under the surface.”

ANDREAS KAUFMANN
WILDLIFE BIOLOGIST WHO SERVES ON THE WAZA BOARD OF DIRECTORS: TED TALK
ZOO SCHOOL USER GROUPS

STUDENTS

VISITORS
Bjarke has, again, set out to design a project that goes beyond the realm of typical contemporary architecture. The program for Zootopia is unlike any other zoo in the world. Using the majority of the site as open space for animals to roam, he allows the zoo to feel as naturally expansive as possible. The entry structure, a circular visitor center, houses ticketing, retail, dining, and support. The rest of the site is almost purely based on the animals’ needs. Each habitat is divided by natural barriers such as water and changes in elevation. The habitats have different viewing areas that take up minimal square footage and act as a the main visitor programming.
“We are pleased to embark on an exciting journey to discover ideas and opportunities that we will be able to transfer back into the urban jungle.” - Bjarke Ingels
The Eden Project is nestled within a large crater that was once seen as useless. Now, the charity serves many users through its multiple forms of education and sustainable programming. The rainforest biome houses the largest indoor rainforest in the world and paired with the Mediterranean biome, they set the record for most scaffolding used in a single project in the world. Surrounded by the expansive outdoor gardens, the biomes sit adjacent to the Core. The Core, designed based on Fibonacci’s sequence, is the project’s center for education. All materials used in its construction are sustainable, leading the discussion amongst younger generations about our environmental impact.

**SITE**
- 32 acres
- Formerly an unused crater-like pit

**PROGRAM**
- Rainforest Biome: 170,250 sq ft
- Mediterranean Biome: 70,400 sq ft
- Outdoor Gardens: 1,150,000 sq ft
- Core: 34,000 sq ft
- Visitor Center: 38,000 sq ft
- Foundation Building: 19,250 sq ft

**EMPLOYEES**
- 600 staff members
- 95% local recruits
- 75% previously unemployed
The Nueva School renovation was designed to educate younger generations in innovative ways while instilling in them a desire to lead in environmental stewardship. Three buildings are situated amongst a varied collection of outdoor green spaces. The program of the buildings consists of classrooms, a library and a student center.

Above these three buildings, are roofs that act as habitats for local flora and fauna. The green roofs are also a vital part of the science curriculum.

Located on the site of a former parking lot, the Nueva School now holds a vital role in benefiting the local and regional ecosystem.
OUTDOOR GREEN SPACE
CLASSROOMS (7)
LIBRARY/MEDIA
SCIENCE LABS
CAFETERIA/KITCHEN
ADMIN.

“Learn by Doing. Learn by Caring.” - Nueva School
USER GROUP PROGRAM BREAKDOWN

STUDENTS

SCHOOL PROGRAM
CLASSROOMS
SCIENCE LABS
KITCHEN + CAFETERIA
ART STUDIOS
MEDIA CENTER
AUDITORIUM
ADMINISTRATION
SUPPORT

TOTAL : 385,000 sf

DAILY VISITORS

VISITOR CENTER
TICKETING
IN SITU IMMERSION
EX SITU IMMERSION
AUDITORIUM
SUPPORT

TOTAL : 80,000 sf

K-12 CURRICULUM
10 : 1 STUDENT TEACHER RATIO
2 CLASSROOMS PER GRADE
26 CLASSROOMS
300 STUDENTS
USER GROUP PROGRAM WITHIN THE SITE

- SCHOOL
- VISITOR CENTER
06

PROPOSAL
THE ZOO SCHOOL

INSPIRING THE ENVIRONMENTAL STEWARDS OF THE FUTURE

GABBY BLACK | DSGN 5200 | AMMAR ELOUEINI | SPRING 2017
Architecture has the opportunity to change the current zoo typology in order to better support their efforts in connecting education and conservation through community engagement.

Though animal captivity is largely seen as an immoral concept, zoos have more recently begun to veer away from the purpose of entertainment and almost entirely towards a focus on becoming centers for environmental conservation. Today, most of the zoos in America are accredited by the AZA (Association of Zoos and Aquariums), which is an organization that holds them to high standards of practice, ranging from patron safety to the welfare of the animals. And although there are countless zoos throughout the world that do not value the welfare of animals, it is safe to assume that the zoos that are accredited by the AZA are humane in their practices. These zoos are all contributing to species survival plans that encourage breeding of endangered species with the intention of reintroducing them into the wild. Although reintroduction projects have been successful, they often fail because the animals are put back into habitats that are increasingly being compromised by deforestation and environmental degradation. The mission statements of most zoos state that they work to encourage conservation through educating and entertaining their guests. But from the research that has been conducted, zoos are not successful in instilling a desire to contribute to conservation work amongst the general public. This is due largely to the fact that most visitors come to reconnect with nature, and see wild animals, rather than take part in global change.

This thesis tests the idea that zoos could benefit from the additional programming of a school that would encourage students to understand the importance of the environment at a young age. By incorporating a typical school curriculum with the everyday happenings of zoos, it is expected that they will begin to understand their role in the world and the importance of conservation. To observe animals on a daily basis, and contribute to the work that zoos conduct, students would begin to build a repertoire of important skills such as independence, responsibility, and empathy. I chose to test this thesis through the addition of a school at Audubon Zoo. Within the zoo, a viable site was chosen due to its adjacency to the zoo entry and the main pathway that divides the zoo, as well as its open space and dense canyons that would contribute to passive strategies of heating and cooling. Natural materials are chosen; southern pine is used for a glulam structure, while cypress is used for both exterior siding and decking. An overhanging roof covers outdoor walkways and gathering spaces, while expansive windows frame classroom views of the bonobo enclosure. The orientation of the classrooms towards one another allows students to collaborate and take part in multidisciplinary study.

The project is designed to house a permanent family of bonobos, one of our closest relatives, sharing 98.7% of our DNA. An endangered species from Central Africa, their presence allow for discussion about world issues as well as conservation within the school and the greater community. The enclosure far exceeds the recommended square footage by the AZA and thus allows for a growing population. Students throughout the day would interact with the bonobos in a variety of ways. Science classes might collect stool samples, or observe and collect data on bonobo behavior. A cooking class might prepare meals for students while also preparing meals and studying the diet for the bonobos. Digital media and art classes might collaborate on projects such as creating infographics, videos, or promotional material for the zoo. Students from different classes may come together to present to zoo visitors passing by about what they are learning and how everyone can contribute to environmental causes.
### AZA-ACCREDITED ZOOS BY THE NUMBERS

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zoos</td>
<td>137</td>
</tr>
<tr>
<td>Aquariums</td>
<td>48</td>
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<tr>
<td>Animals</td>
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<tr>
<td>Species</td>
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<tr>
<td>Total Spending</td>
<td>$160 mil</td>
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<tr>
<td>Taxon Advisory Groups (TAG)</td>
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<tr>
<td>Species Survival Plan Programs</td>
<td>+450</td>
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### AUDUBON ZOO BY THE NUMBERS

<table>
<thead>
<tr>
<th>Statistic</th>
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</thead>
<tbody>
<tr>
<td>YearFounded</td>
<td>1916</td>
</tr>
<tr>
<td>Acres</td>
<td>58</td>
</tr>
<tr>
<td>Animals</td>
<td>2,000</td>
</tr>
<tr>
<td>Staff Members</td>
<td>600</td>
</tr>
<tr>
<td>Years of Continuous Accreditation</td>
<td>27</td>
</tr>
<tr>
<td>School Group Visits Annually</td>
<td>3,275</td>
</tr>
</tbody>
</table>

### ZOO RELATED TERMS TO KNOW

- **In Situ**: conservation work carried out in the field (animals remain in natural habitat)
- **Ex Situ**: off-site conservation work (e.g., projects within a zoo)
- **Enrichment**: an animal husbandry practice that enhances the quality of captive animal care by providing the environmental stimuli that is optimal for their psychological and physiological well-being
- **Conservation**: preservation, protection, or restoration of the natural environment, natural ecosystems, vegetation, and wildlife
- **Studbook**: a comprehensive record of the lineage of wild animals bred in captivity
- **Reintroduction**: the deliberate release of a species into the wild, from captivity or other areas where the animal survives

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**Abbreviations:**
- **A.Z.A.**: Association of Zoos & Aquariums
- **W.A.Z.A.**: World Association of Zoos & Aquariums
ZOO SCHOOL USER GROUPS

BONOBO

Pan paniscus

IN THE WILD

PLACES: Democratic Republic of the Congo (Congo Basin)

HABITAT: Forest

POPULATION: 10,000 - 50,000

HEIGHT: 28 - 35 in

WEIGHT: 68 - 86 lbs

STATUS: Endangered

THREATS:
- Poaching (Bush meat trade / Pets / Traditional medicine)
- Civil Warfare
- Habitat Loss
  - Growing human population
  - Slash & burn agriculture
  - Commercial logging

"Bonobos are fascinating creatures and little understood. They have the only great ape society led by females, with a sophisticated social structure that encourages cooperation and peace."

-Dr. Richard Carroll
WWF Vice President, Africa Program

STUDENTS

IN THE CLASSROOM

140 STUDENTS

14 CLASSES

10:1 STUDENT TEACHER RATIO

6-12 GRADES

CITYWIDE ENROLLMENT

CURRICULUM
- Science (Biology, Chemistry, Physics, Anatomy)
- History
- Math
- English
- Language (Spanish, French)
- Art
- Music
- Digital Media
- Culinary Arts

SPACE REQUIREMENT PER STUDENT

NEW ORLEANS SCHOOLS AND GREEN SPACES
ZOO SCHOOL VISIBILITY + MATERIALITY

ZOO ENCLOSURE STRATEGIES

STEEL MESH SCREEN
- Anti-Climb
- High Security
- Good Visibility
- Small Aperture (1/4"
- Low Maintenance

BALD CYPRESS
- Locally Sourced
- Rot & Termite Resistant
- Longevity
- Sustainable
- Carbon Neutral

SOUTHERN PINE
- Locally Sourced
- Abundant
- Longevity
- Sustainable
- Carbon Neutral

ALUMINUM STANDING SEAM ROOF
- 50 Year Lifetime
- Durability
- Solar Heating Protection
- Rust Resistant
- Low Maintenance

MATERIALITY
**BONOBO ENCLOSURE REQUIREMENTS**

**MINIMUM AMOUNT OF OUTDOOR SPACE REQUIRED FOR A SMALL GROUP OF BONOBOs (1-6)**

**SPACE PROVIDED WITHIN THE ZOO SCHOOL ENCLOSURE FOR 6 BONOBOs**

"It is important to note that there is no empirical evidence that the provision of too much space is detrimental to bonobos, as they tend to use preferred areas of their environment (Ross et al. 2009). As such, provision of space far exceeding these guidelines is not only acceptable but recommended under the premise that it provides more choices for the bonobos."

AZA Bonobo Care Manual 2010

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**BONOBO OUTDOOR ENCLOSURE FOOTPRINT**

The maximum horizontal distance that a bonobo can jump is 20 feet.

An outdoor exhibit barrier of 17 feet has proven adequate to contain bonobos.

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**BONOBO CONTAINMENT STRATEGIES**
ZOO SCHOOL SITE ANALYSIS

USER GROUP INTERACTION
The school encourages guests all the zoo to circulate throughout the building. Students attending the school will test their knowledge of the material learned by interacting with the public as they venture throughout.

INDOOR + OUTDOOR
In order to further the concepts of conservation and environmental concern, it is important that all classrooms have immediate access to outdoor spaces for learning, interaction and reflection. Close to half of the building’s footprint is covered outdoor space.

BARRIER SYSTEM
The inner courtyard, that acts as an outdoor enclosure for the group of bonobos, is contained by a system of windows and high security mesh screens. The windows and screens form a continuous fifteen-foot wall that bonobos cannot climb.

SCHOOL FOOTPRINT
The mass is extracted from the square footage required to accommodate 160 students in accordance to requirements set by the Orleans Parish School Board’s School Facilities Master Plan.

BONOBO COURTYARD
To allow for natural light to adequately light all spaces within the school, a courtyard is created. This space doubles as an enclosure for a small group of bonobos.

RAISED CLASSROOMS
Because the initial mass was reduced by the creation of the courtyard, a new space is raised on stilts above the courtyard. This move doubles as protection for the bonobos from the elements.

SINUATE AROUND OAKS
The circular mass is pushed and pulled in order to avoid needing to remove the historic live oaks that surround it. Tufts within the enclosure were removed to keep Bonobos from accessing.

GLULAM STRUCTURE
The building is raised three feet above the ground to meet New Orleans foundation requirements. A glulam structure is used to further encourage sustainable practices amongst the community.
07 SOURCES

Baxter wrote this book in partial satisfaction of the requirements for the degree of her Masters of Architecture thesis at the University of California at Berkeley. Her thesis delves into every stage in the creation of the Aquarium. Beginning with the inception, she looks to investigate the marine scientists who had the idea for a public aquarium at Monterey. The next stage of implementation examines the phases of creating the planning committee who selected the design team and refined the program requirements. She writes about her research on the architectural design and follows with a section that discusses the family behind the project conception, The Packard’s and how they held a pivotal role in their participation. Baxter includes the “battles with reality” that includes budget and the public authorities. Her thesis concludes with the opening day of the aquarium and what it has since accomplished.


Writing for the Royal Commission on the Historical Monuments of England, Guillery examines the array of architectural typologies used throughout the London Zoo. The buildings of London Zoo became a subject of concern when the Zoological Society of London announced the closure of the zoo due to financial instability, only second to the concern for the future of the animals. The buildings are an unusual collection of forms that display the history of animal captivity spanning some 170 years. The Royal Commission took to recording these buildings in the fear that significant changes may alter them once the zoo was closed. The portrait the Guillery’s photos paint is of The London Zoo in 1992, whether or not the zoo came to a close. This publication was intended to satisfy a broad range of interests, not just for architectural records. Since its’ opening in 1827, the London Zoo has been built and rebuilt continuously ever since. But even with these changes, almost all of their architectural records of change survive. The publication concludes with a thorough illustration of the master plan.


Nature in Fragments is based on a symposium given in 2000 at the American Museum of Natural History that aimed to include the importance of including biodiversity into the discussion of urban sprawl. The conversation that is widely discussed is based on anti-sprawl initiatives such as “smart-growth” and “new urbanism” that looks to create a more sustainable human environment. Their hope during this symposium was to integrate biodiversity into the conversation that often neglects to include topics such as ecological issues and the effects that sprawl can have on species and natural communities and ecosystems. The authors argue that sprawl is one of the main factors in producing threats to the environment such as degradation, pollution, habitat loss, fragmentation, invasive species, and global climate change.

Jones and Wills use this book to compare parks around the world and their different purposes. They state that the underlying goal of any open green space is to provide people with optimism and adventure. People's senses of what a park entails is an embodiment of their memories of parks they've visited throughout their lifetime. Some may see a park as wooded forest, others may think of an amusement park that they visited frequently during their childhood. Despite all of the different parks that one may know, the park is our invention.


Aldersey provides an illustrative account of bio-mimicry's affects on modern architecture throughout Zoomorphic. He references innovative projects that date back to 8000 BC, leading up to present day. Architectural projects have incorporated animalistic design in countless ways and Aldersey takes the reader on an explicit journey through its transformation. He explains how the contemporary world of design and technology has further advanced architectural forms further than it was every conceivable in the past. With the aid of computer technology, designs can be extremely organic and fluid in their form. This technique in architectural design often leads to buildings that resemble animalistic forms and features.


Scharf uses his knowledge of photography and microscopes to provide "a visual experience of this new imagery". Through his use of scanning electron microscopes (SEM), his photography reveals imagery of insects, plants and inanimate objects at a microscopic scale. His more natural approach allows the subjects to remain alive and untreated unlike past techniques that used a coating of gold alloy. His photography lacks color because they are illuminated with electrons rather than light. He begins the visual book with a history of the microscope and an illustrated explanation of how the SEM works. He delves into his techniques used in creating his photography as well as technical details that helped achieve his level of mastery in this collection of microscopic photography. His photography collection is broken up into three sections. He begins with insects and discusses first a brief description of the vast number of variable species amongst them. Scharf concludes the book with a collection of SEM photos of plants and inanimate objects such as aspirin tablets.
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02 – PRECEDENT + CASE STUDIES

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