PARADISE CREEK NATURE PARK

Sustainable Playground Designs

Global Sustainability, Spring 2013 Prof. Phoebe Crisman Workshop Leader: Rachel Stevens Team members: Chandler Moore, Jennifer Natyzak, Hannah Heile, Thomas Wheet, Alison Dietze

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ABSTRACT

Paradise Creek Nature Park (PCNP) is an urban park that includes about 11 acres of wetland restoration and an area designated by the US Navy as safe haven for wildlife. The wildlife has been preserved and the park established, now the park needs visitors. A playground is a great attraction to bring together families and community members from around the region. Sustainably built play structures will support the goals of PCNP and create a fun and interesting experience for children and families. The focus of the PCNP is to educate the community about sustainable practices that individuals can implement within their own neighborhood, while enjoying the environment.

As students of the University of Virginia's Global Sustainability course in the Paradise Creek Nature Park workshop, we created a portfolio of industrial and natural structures which may serve to inspire or supply design concepts. We hope this array of options is beneficial to the park because the park leaders may prioritize the most important aspects of the playground by a range of economic, resource, and aesthetic factors.

This collection of playground structures and concepts gathered over the last semester has been organized into Industrial and Natural designs. These designs are both aspects important to an urban park located in a highly industrial area. Information and citations of design objects is listed and available for reference. We hope this collection will provide Paradise Creek Nature Park with the means to pursue a creative, sustainable playground area to attract and impress visitors.

1. INTRODUCTION

Approximately 2.5 hours from Charlottesville in Portsmouth, VA, Paradise Creek Natural Park is an urban park that includes about 11 acres of wetland restoration. In the area adjacent to the park, the US Navy designated the area to become a safe haven for wildlife. The wildlife has been preserved and the park established, now the park needs visitors. The park partnered with the Elizabeth River Project, a group devoted to restoring the Elizabeth River, a tributary into the Chesapeake Bay. Many state and local environmental and revitalization organizations and supporters work with PCNP to help raise over \$12 million in funds. \$75,000 was invested in oyster reef revitalization placed in the creek, a project pursued by Portsmouth locals and a boy scout troop. A grant of \$25,000 from the Virginia Dept. of Conservation and Recreation Chesapeake Bay Watershed was spent to establish a treatment center for runoff, called a "rain garden." More community groups and volunteers have stepped up to work with the park. The hard work and hope stakeholders would be fulfilled with a large influx of visitors. An engaging curriculum may attract the public and increase attendance numbers. Bringing more people to the park would be a fantastic pay off for those who invested time and money in the park, but would also benefit the general public to spread ideas of sustainability.

Paradise Creek Nature Park is in need of a playground that is fun, safe, and sustainable. A playground would attract families and provide entertainment to visiting school groups. To match the sustainable and ecological goals of the park, the playground should be designed with sustainability in mind. To emphasize conservation, the design materials may be repurposed and/or healthy for the environment. A playground that is environmentally friendly and aesthetically pleasing will create a unique and appealing atmosphere for visitors.

Our goal as a team is to produce multiple options and concepts of playground structures. Paradise Creek Park leaders may implement these designs or utilize them for further brainstorming. There will be two main design categories with numerous design options for the Park to examine, including Industrial and Natural Designs. Industrial designs will include case studies of repurposed industrial materials, such as tires and drainage pipes. Natural Designs utilize ecology and living features, such as plant sculptures and using preexisting topographical features ("the mound").

2. NATURAL DESIGNS

The first option that we will explore in the construction of a playground for the Elizabeth River Project is centered on the use of natural designs. Natural designs are ones in which essences of nature are used and molded into a fun and enjoyable environment for both children and parents alike. We will explore various different types of natural designs that can be implemented either simultaneously or independently of one another.

2.1 Log Formations

The first variation on natural designs explored is one of log formations for children's play. Figure 1, illustrated below, shows a general depiction of a finalized log formation in a playground/park area.



Figure 1: Depiction of a typical log structure formation implemented in a playground. The images were adapted from Hastings School Playground Design, found at hastingsplayground.blogspot.com(1).

These climbing logs offer various advantages when implemented in a playground setting. The stacked log structure gives space above and below the formation for creative play by the children. In our consideration of log formations for the Elizabeth River Project, we intend to use indigenous trees to the area in order to seamlessly tie in the beauty of the surrounding nature to the manmade "natural" playground design. The construction of this unit is as simple as finding fallen trees in the surrounding woods, stripping them of any hazardous or sharp edges, and interlaying them over one another to produce a similar structure to that in Figure 1.

The usability of logs doesn't stop at interlaced climbing logs; they can also be implemented in a seating fashion. Log seating uses smoothed down logs to create seating and tables. In the context of the playground, the children have the freedom to rearrange these logs however they see fit, where the only limiting reagent is their imagination. A general depiction of logs used as seating is shown below in Figure 2.



Figure 2: Image of logs utilized as both seating and tables for creative play by children. Image adapted from http://hastingsplayground.blogspot.com (1).

Clearly, the uses of logs as seating and tables is only limited to the imagination when viewing Figure 2. In this figure, the child has set up both a tea party, and possibly a game of lava where the logs are the only safe places to step.

2.2 Garden Formations

Gardens are a great way to improve the aesthetics of a park. They add to the overall charm and allow the community to get involved by letting people plant and maintain the plants. Furthermore, they can be very diverse in their design and content and help connect different aspects of the park. The gardens will be located within the networks of paths so they are easily accessible to all people and can be viewed from many angles of the park. An example of one such garden is shown below in Figure 3.



Figure 3: Picture illustrating the connection between gardens and art. Image adopted from: http://www.dailymail.co.uk/tvshowbiz/article-2002261/Animals-sculpted-plants-display-China.html (2)

Shown in Figure 3 is a garden in China where they have created animals out of plants. These are the kind of innovative ideas that intertwine nature and art as one (2).

2.3 Climbing Formations: Rocks and Stairs

As with most children, the adventure of traveling on the edge of disaster at great heights offers immense amount of enjoyment, much to their parent's distress. Implementation of climbing structures will ensure that children don't grow bored of the playground structures. For the Elizabeth River Project, we focused on two main materials for the construction of climbing units. The first material we considered was the use of large rock formations, or possibly concrete formations that are molded in a way to resemble rocks. One project that we will attempt to duplicate in rock climbing formations is the design of Stone's Throw Playground, depicted below in Figure 4.



Figure 4: Picture of Stone's Throw Playground that constructed concrete structures in the form of giant porous rocks. Image adapted from http://www.landezine.com/index.php/2011/02/stones-throw-playground-by-archicolture/ (3).

When the architects Marco Antonini, Roberto Capecci and Raffaella Sini constructed Stone's Throw Playground in Sonoma Valley, California, they were set out to create garden art through allegories. In other words, they took the simple construct of a rock, and expanded its reach to the point that the rock itself became the entirety of the landscape, thereby altering the mood and feel of the playground. The aliveness of the concrete rock structures allows for a wonderland of creativity in the mind of an adventurous youth.

Another viable climbing structure that we are considering for the Elizabeth River Project is the use of stairs. Though stairs are conventionally less dangerous climbing units than rocks, with proper design they can still give users a feeling of being lost in a mountainous outdoor play area. One design that we are using as the basis for climbing structures is the Teardrop Park in New York City, depicted below in Figure 5.



Figure 5: Depiction of Teardrop Park in New York City, that utilizes stairs as climbing structures to create a playground. Image adopted from: http://www.nytimes.com/imagepages/2004/09/30/nyregion/30park.ready.html (4) and http://mentalfloss.com/article/22756/10-unusual-playgrounds-around-world (5)

This park in New York City uses natural elements to create an innovative space. One of the most striking features is the rock mound and slide. This not only creates a slide without the stereotypical playground structure, but a place to climb is created with these rock outcroppings. The rock stairs are organically laid into the larger boulders of the rock mound. The materials necessary for this construction include rocks, concrete, and a large central slide.

2.4 Path Construction

Within the playground, our group wants to incorporate a network of pathways in a small portion of the available land. We hope that these paths can be used by children to play on, as well as serving as a means for all visitors to walk around and view the handicap-accessible gardens. The paths themselves will mirror the existing pathways that run throughout the rest of the park. The path's interconnectedness allows for various routes around the gardens and other playground "equipment" to be taken. Also, similarities between the paths in the playground and those that run throughout the entire park will aid visitor's ability to orient them while in the Paradise Nature Park. It will be as if they can walk, run, or play in a life-sized map of the complete park.

In regards to the material of the paths, we want something that will keep the Park's themes of sustainability and eco-friendliness in mind. After speaking to several quarries, our group has decided that some form of crushed stone is best. Specifically, we were told that Brown #8 was the best material for this project. The rocks are small enough that they can't cause any real damage if thrown—a key concern when thinking of all things that could possibly happen with a large number of kids playing at once—and its color would go along with the natural look we seek. However, it would also make sense for the Park to use the same company and material as they did for the series of paths running through the park. We will leave that decision up to them. Shown below in Figure 6 is a pathway construction known as Brown 8, which is one of the materials considered by us for the Elizabeth River Project.



Figure 6: Depection of Brown 8, a material used in pathway construction. Image adapted from: http://yaymicro.com/stock-image/textured-background-of-beige-and-brown-gravel-chips/1485204 (6)

We anticipate the construction of the pathways using Brown 8 will follow a pattern illustrated bellow in Figure 7. As noted in this figure, the amount of pathways throughout the Paradise Creek Nature Park will be extensive and encompass most of the park.



Figure 7: Diagram of the anticipated pathways that will permeate throughout Paradise Creek Nature Park. Image adapted from: http://www.paradisecreekpark.org/PDFs/PCNP-Map12-20-12.pdf (7)

2.5 Topographical Playground Constructions

The use of various landscape structures and elevations leads to a heightened awareness of your surroundings, along with a more enjoyable progression through the park. Shown below in Figure 8 is the BUGA Garden Show Playground, and is an example of topographical playground construction.



Figure 8: Images of the BUGA Garden Show Playground. Image adopted from: http://bartlettyear1architecture.blogspot.com/2010/03/playground-design-by-rainer-schmidt.html (8)

Rainer Schmidt Landschaftsarchitekten's construction in Figure 8 uses both grass and tartan. This idea of using manipulated open space to create a landscape that kids can explore could be implemented in either a section or the entire playground area. By simply changing the topography the types of play are innumerable. The materials used are grass, dirt and possibly tires or rubber soles of sneakers (8).

2.6 Wildzones

Wild zones are designated areas lacking significant structures which encourage children to be creative and involved in imaginative play. This may integrate plants that are fun the play amongst and have a plethora of materials which are stackable, buildable, and touchable. This includes stones for stacking, sticks for arranging, mud for splashing, and branches for exploring. Figure 9 below is a collection of plants and examples of wild zones which are used in other parks.



An interesting design of stepping stone and texture of moss will create a great exploration for imaginative minds. Adapted from: http://inspirationgreen.co m/moss-art.html (9)



3. INDUSTRIAL DESIGN

The use of natural design in a playground setting is clearly appropriate and effective. However, we feel that the addition of certain industrial materials in the design scheme will further enhance the appeal of the park. Therefore, we considered multiple different industrial remnant materials that can be easily constructed into playground materials.

3.1 Drainage Pipes

The incorporation of tunnels made from large pipes creates spaces for kids to hide in the shade and a special connection between topographical divides. Figure 10, shown below, illustrates a park that has utilized leftover drainage pipes as playground construction materials.



Figure 10: Images showing the use of leftover industrial drainage pipes as playground construction materials. Images adapted from: http://hastingsplayground.blogspot.com (1) and http://www.millerdesignllc.com/wp-content/uploads/2012/10//ph-2-20.jpg (10)

These tunnels would be equally as fun if they were free standing, allowing for the exterior to potentially be painted with chalk board paint allowing the kids a space to draw and create art without having to have the typical black paved recreation area in playgrounds.

3.2 Tire Playground Constructions

For more than a century, tires have been a reusable commodity in our culture. However with today's innovative and creative designs and surplus of tires, there are even more options to explore. Beyond the classic tire swing is a new world of novel designs which are sustainably sourced from reclaimed tires and aesthetic. Figure 11 and 12 below show two different implementations.



Figure 11: This bike stand is made from tires evenly spaced apart and secured in sediment or concrete. This is a clever way to encourage bicycle usage, emphasizing green transportation and physical activity.

Materials: tires, concrete/solid sediments for base Image addopted from Upcycle Sally at: http://upcyclesally.com/2012/11/tired-of-tires/ (11)



Figure 12: Pictures illustrating the use of old bike tires in a garden-like manner. Image adopted from Upcycle Sally at: http://upcyclesally.com/2012/11/tired-of-tires/ (11)

Tires make great makeshift pots for flowers and plants. This may serve to add flowers to the park and encourage community involvement with families as an activity or public event. Gardening is a great activity for children and parents alike to learn about nature while getting dirty, hands on experience. Utilizing old tires as pots or raised garden beds is a relatively inexpensive and resourceful way to designate planting areas. A coat of paint adds even more character to the pots. The materials necessary for this project are old tires, paint, soil, and plants and seeds (Sources: http://www.letthechildrenplay.net/2010_03_01_archive.html (12) and http://www.studiogblog.com/reap/kitchen/diy-recycled-tire-garden-planters/ (13)).



This St. Kilda Adventure Playground, illustrated in Figure 13 (left and bottom), in Port Phillip takes pride in making a playground facility from what society deems "junk." A touch of bright paint adds appeal which blends the material with the cheery hues of other equipment. In the middle picture to the right, an oversized tire has been repurposed as a large climbing area. In the bottom picture smaller tires have been connected to form a climbing ladder. Images below from Patapsco Valley State Park Tire Playground in Catonsville, MD also suggest various designs of tire arrangements to form climbing structures. *Materials: tires, paints, chains or material to firmly connect tires to form*

structure

Parks: St. Kilda Adventure Playground, Port Phillips, Australia; Patapsco Valley State Park Tire Playground in Catonsville, MD Source: City of Port Phillips http://www.portphillip.vic.gov.au/adventure_playgrounds.htm (14)





Large climbing structures may require more tires but guarantee lots of fun. The sprawling structure to the left (Figure 14) is from a Japanese playground and allows children to climb the stable arms and move about the twisting base. The tire climbing wall is in California's Berkley Adventure Playground and was featured recently in the Huffington Post. Materials: tires, chains/attachment method Parks: Park in Tokyo, Japan; Berkley Adventure Playground in Berkley, CA

Sources: Treehugger

http://www.treehugger.com/sustainable-product-design/reus ed-tires-make-a-squid-like-playground-for-refugee-children. html (15); HuffPost Parents http://www.huffingtonpost.com /darell-hammond/playgrounds_b_1452620.html (16)

3.3 Reusing Large-Scale Industrial Supplies

Integrating the industry of the Portsmouth area may be a useful method to support the local industries, reuse materials that would otherwise be discarded, and create a connection within the community. In an area with many tankers, large-scale ships, crates for importing and exporting, these large scale materials may likely be available. For example in Figures 15-17 below, playgrounds are composed of deconstructed industrial objects.



In the Netherlands, a deconstructed windmill serves as a fantastic adventure for playground visitors. Instead of becoming scrap, this entire windmill was repurposed for this facility. Source: http://www.treehugger.com/urban-design /recycled-windmill-playground-2012-architecte n.html (17)



Shipping containers were transformed into a play structure in this image to the left. Phooey Architects who emphasize a zero-waste initiative designed this creative play place. Source: http://inhabitat.com/skinn ers-playground-kidscape-ma de-from-shipping-containers/ (18)



In an African village, Dutch designers salvaged an ambulance to create the centerpiece for a playground facility designed with disabled children in mind. The integration of classic playground features with a reclaimed piece make this playground one of a kind. Source: http://inhabitat.com/scrapped-ambula nce-transformed-into-an-inspiring-playgroundfor-disabled-malawian-children/ (19)

3.4 Concrete Structures

Large climbable statues are a fun and entertaining way to engage children and interest adults. A design of a species native to the Elizabeth River, such as a heron, bass, raccoon, etc. would serve to educate visitors of a larger than life native species. Toadstools, or leaves, are also a feasible approach to add interest to a smaller area, and are pictured below in Figures 18 and 19 respectively. The concrete used to cast these structures is a low-impact material and may even be repurposed.



Figure 18: Images of the Central Park Zoo in NY, bringing the wildlife to the playground in the Safari Playground. Image adapted from: http://www.centralparknyc.org/visit/things-to-see/reservoir/safari-playground.html (20)



Figure 19: Images of toadstools that are great in a park and may inspire park visitors to have some of their own. Images adapted from http://www.greetliving.co.uk/product/concrete-toadstools/ (21) and http://flowersandweeds.blogspot.com/2010/08/concrete-leaf-casting-first-attempt.html (22)

4. CONCLUSION

We have researched possible playground ideas and coordinated that information into case studies. These case studies include pictures of the structures and the material that will be used in order to create them. We are still unsure about the exact cost of the park structures, who would donate the recycled material, and what the exact layout of the park would be. However, we have created the case studies so that Robin can mix and match different aspects of the parks. We will assess our success based on how happy Robin is with our results and how many aspects of what we presented are adapted into the actual playground.

4.1 Future Work

In the future the ERP will have to select the features of the park and where everything will be located within the park. They will have to ask local industries to donate building supplies or buy the supplies themselves. Furthermore, they will have to find people to construct the playground maybe pulling from volunteers in the community. They will have to use their knowledge of the local area to find the best deals and receive recycled materials from the local industries. The ERP will have to work on the playground constantly to maintain the structures and to cater to any change of needs that the community may have.

4.2 Lessons Learned

We've learned that the community's influence on the environment can only be encouraged through the implementation of a sustainable park that promotes awareness and good citizenship. We found that the specific needs of the park were hard to identify due to its distance, and therefore the best that we could do was come up with a surplus of ideas. Also, it became apparent that there are many different types of sustainable ideas that can be constructed rather simply with minimal environmental degradation. Many of these sustainable ideas come from retrofitting old materials, using wastes that simply come from nature, and finally utilizing old industrial materials.

APPENDICES

5.1 Bibliography

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5.2 Bill of Materials

- Natural Design
 - Dead Trees/Logs
 - Flowers for Garden
 - Concrete (Rocks)
 - Stairs/Large Slide
 - Brown 8 Pathway Material
 - o Grass/Sod
 - o Tartan
 - \circ Stones
- Industrial Design
 - Drainage Pipes
 - o Tires
 - o Paint
 - \circ Chains
 - Leftover industrial construction wastes

5.3 Costs and Budget

Type of Material	Amount Needed (Units vary)	Cost per Amount (\$/amount)	Total Material Cost (\$)	Revenue Left after Material Cost (\$) (Initial = \$50k)
Dead Trees/Logs	10	0	0	50,000
Flowers/Plants	300 units (25)	3.33/unit (25)	1,000	49,000
Concrete	10,000 (kg)	0.04 (23)	400	48,600
Large Slide	(1 slide)	(1 slide)	~600 (24)	48,000
Pathway Material (Limestone)	10,000 sq.ft.	1/sq.ft.	10,000	38,000
Pathway Material (Shredded Bark Mulch)	~4000 sq.ft. (for 1,000 feet long and 4 feet wide) (25)	015 ⁽²⁵⁾ (Cost depends heavily on vendors)	0-700	37,300
Grass	10,000	.50/sq.ft. ⁽²⁵⁾	5,000	32,300
Stones (concrete seating)	20 stones (25)	100/stone (25)	2,000	30,000
Stones (standing)	13 stones (25)	15/stone (25)	195	29,805
Tires	1 ton	310/ton (26)	310	29,495
Paint	100 gallons	~10/gallon	1,000	28,495

Based off a preliminary assessment of each type of material, their quantity needed, and the cost associated with each, we determined that each different unit designed in the body of this work can be constructed and still remain under budget.

5.4 Acknowledgements

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