Resilient Urbanism

How can resilience be designed and be discovered in the degraded urban landscape?
Investigation with the Bellwood Quarry in Atlanta, Georgia

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I would like to thank all those who have helped and support me to work through this thesis book. Especially, I would like to thank my thesis professor, Rod Barnett, who have make me to break my own limitation and view landscape architecture and design in a totally new way.

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The role of landscape in today’s current urban society has been reconsidered within the theory of landscape urbanism and ecological urbanism. Functioning as a high performance system, landscape is an infrastructure connected to all systems in the urban condition as well as the generator of the future city development process. Urbanization and globalization lead us to a more convenient life on one hand, but they also bring us numerous issues on the other hand. The grey infrastructure systems once revered also become problematic as healthier life styles are considered. How can landscape deal with the problems caused by the urban development? Facing a rapid change on both urban and natural aspects and even being part of the variation, landscape needs to be resilient and adaptive to a variety of social and environmental disturbances. A resilient landscape is a self-organizing system, a multi-direction network, and an adaptive changeable organism. A significant feature is the capacity to absorb disturbance, integrate it and evolve to a more open and complex level of operation.

This thesis research project explores the possibility for turning an abandoned quarry in Atlanta, GA, into a public park as well as functioning as a water preservation system. By retransforming the grey infrastructure into green infrastructure and public space the design generated from this enables people to interact with the ecosystem thus connecting the existing condition to the surrounding ecologies. The transformations of the urban infrastructure would increase the potential for human and nonhuman inhabitation. This project researches the possible ways to use the quarry and how to use it to create a program that is suitable for the site and surrounding environment. It experiments with multiple ways to change the abandoned quarry to a new city public center and to find the best way for an urban resilient landscape. Also, the development process could provide a catalyst for another pattern of afterlife for the quarry. The design doesn’t just provide service and facilities within the site but also opens new access to encourage people for a healthy lifestyle.

The project has two main parts: the first part of the research is attempting different design investigation to design resilience into the urban landscape system; the second part is trying to discover the existing resilience which is already there in the degraded urban landscape. The shifting of the research question from design to discover breaks the traditional line and gives a new way of landscape thinking in the role of urbanism.

Key words: resilient landscape, urbanism, network, connection, system, disturbance, infrastructure, brownfield redevelopment, quarry, informal settlement
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What is resilience?

In the world of complexity, everything is not a single object but a part of the whole system. Like the nerve cell in the nerve system, one change happens in one spot, causing changes and follow-ups that affect the whole system. Resilience is being adaptive to a point that can absorb disturbance at a great level of complexity. A resilient system can deal with different kinds of unpredictable disturbance by itself. The open ended result is one which does not mean the system will recover to the same situation that it used to be, but it engages the change within itself to the transformation process.

Resilience can barely be demonstrated without disturbance. Under the definition of science, disturbance is an unpredictable event that would happen randomly in a variety changing of time and space. In ecology, interference has the direct influence about the evolution process and always considered to be destructiveness. However, disturbance could be neutral even productive in the urban landscape systems. Landscape is not a plan that could be done when it is like the way being planned, but a process through the entire timeline, redesigned and reshaped by the producers and users. The flowing of energy and the exchange of the objects, caused by the disturbance, makes a great contribution to the variety and diversity of the landscape systems. With the subtle and gradual change as well as the sharp shifting, the dynamic system is accumulating to a great level of complexity and becoming more resilient to be capable for absorbing new disturbances. So the system is completely open and the development will never stop.

What is a resilient landscape?

Landscape are systems which interact in ways that enables them to adapt and change. The system contains the component of water, soil, people, sunshine, and other components in a certain way to be balanced with each other. A resilient system is a landscape performance system that is adaptive to changes. It is not a system that can avoid disturbance of the environment, but by using and absorbing elements and nutrition from the matrix, the new connections will grow to replace the previous ones, and then override the disturbance. The resilient landscape, which is part of the "ecological urbanism" and the extension, provides service as infrastructure. More importantly, it is the catalyst changing the way of future urban development, even the way people think about the development.

Self-organizing system

A tree, for example, is a self-organizing system. It is connected to its surrounding environment, and it uses the resources in order to grow. When a branch is cut off, new branches will grow around the previous one. It is adaptive, evolutionary to erosion, and connected to all the resources that to support its growth, such as water, soil, and sunshine. A resilient landscape system is also a self-organizing system, which can be self-building and self-constructed in an organized way. Like the "stick in the sand", landscape could be the starting point to improve the environment and other elements into self-organizing systems.

http://civicexplorer.wordpress.com/tag/stockholm-resilience-centre/
Chapter 2

Theoretical framework and Rationale
Rationale

After the trend of sustainable, what could landscape achieve more has been a significant issue for the research currently. Obviously, just being sustainable is not enough for the incoming changing future. Landscape role in dealing with the issue is underwhelmed.

The change of the world is inevitable no matter how rapidly or gradually the transform is. Facing the environment change like the global warming; the economic change like the increasing of the informal settlement; the social change like the recognition of the esteem of the space, all of these seems to call for landscape being productive, highly performed, and especially being able to deal with the unpredictable disturbance to a balanced system.

Therefore, the study of the resilient landscape is quite provocative to find a therapy for the statement mentioned above.

The research project is trying to achieve the goal of finding new opinions of landscape thinking dealing with the issue by using a theoretical framework to generate the whole process and help to smooth the decision making successions.

Theoretical framework

An oak tree is a good example of a vertically connected system. The root can absorb water and nutrients from the soil underground; the branches and leaves can get sunshine and carbon dioxide from the air to photosynthesis. The advantage of this kind of model is that if parts of the root system or the branches are cut, the whole system is still working as they can get compensation from the newly grown ones. But if the main trunk is cut or damaged seriously, the whole system is disturbed and may not recover from the disturbance at all. This is the disadvantage of the main vertical connection model. The main characteristic of this kind of model is: disturbance cannot easily happen to the system, but when it does, is hard for the system to re-operate again or at least it will take a long period time to recover from the disturbance.

The “lawn grass”, on the other hand, is connected to each other in a more horizontal way. When the disturbance such as a loss of a piece of the lawn comes, it may not affect the whole condition very seriously. The grass can still connect through the pathway surrounding of the lost piece. But the lack of connections to other height and layer could easily cause disturbance by the change in environment. Comparing the “tree” model to the “lawn grass model” shows how the models are different and opposite, and how the simplicity of the system can easily cause disturbance as well as the relatively easy recovery.

A resilient system should have both the advantages of the two previous models, but at the same time it should avoid the disadvantages as much as possible. The structure of the resilient system is more like a three dimensional network, which is a perfect combination of the “tree” and the “lawn” model. It has the multi-dimensional connection to itself and other systems. The vertical and horizontal network could make the system able to absorb disturbance in a certain way.
Chapter 3

Introduction of Atlanta
Atlanta is the capital city of the state of Georgia, with a population of 420,000. The metropolitan Atlanta contains both the Fulton County on the west and a small amount of Dekalb County on the east. The city was established in 1847 at the intersection of two railroads and the city rose from the ashes of the civil war. The current Atlanta city is not only the biggest city of the southeast U.S., but also a primary transportation hub, including highway, railway and air plane. Geographically, Atlanta is covered by rolling hills and has high dense tree coverage.

Atlanta belongs to the watershed and river basin of the Chattahoochee River. Generally speaking, the east side of the city is historic and upper middle class while the west side of the city contains more former warehouse and factories that are being turned into houses. Atlanta consists of the downtown area, the midtown area, and the east high-density districts. The urbanized core of the city is around the intersection of the highway and along Peach Tree Road, which is the origin of the Atlanta’s landmark skyline. The downtown area, much of which is occupied by the government, mainly consists of office space and the majority of the tourist attractions of the city are located here. The midtown area, which is denser, is the district of art, culture and education institutions. The famous Piedmont Park and the Beltline are also in the midtown area. All of these are surrounded by suburban single-family neighborhoods, dense forest and rolling hills.
The maps of the state of Georgia give a general background of Atlanta city, including the aspects of transportation, elevation, geology, demographic and hydrology. With the help of the mapping process, there is a better understanding of the natural and social systems of the city and the state it’s in.

By experiencing and analyzing the living condition of the city, signs of some kind of resilience existing. As one of the cities with the highest tree canopy coverage rate, Atlanta is not just built on the wheels, but also on the ground. All the open green space among the tall buildings especially the Beltline Development project, have made the city better than before, but there some issues still exist as the consequence of the post-industrial period. The issues like afterlife of the lots of industry relics and the suffering of the drought conditions have become more and more obvious through urbanization and globalization. At the same time, the green space is spotted in the concrete and steel structure, separated from each other and having a lack of connection, which reduces the performance of the landscape as a whole system. Although the Beltline Development is a great attempt to connect the brownfield-recovery project, a ring is still far away from enough. Here landscape is no longer part of the infrastructure, but itself is the green infrastructure. As the skeleton of the urban development process, landscape could provide more than services and entertainment. it’s the network of all the elements and systems in the urban condition.
The Metropolitan Atlanta Mapping

- Metropolitan Atlanta
- Urbanized density
- Lakes
- Wetland
- Public park system
- Highway system
- Urbanized area
- Urban heat
The Atlanta City Scale Mapping

- Transportation
  - Highway
  - Major Road
  - Rail Road

- Natural Elements
  - Water Features
  - Parks
  - The Beltline
Chapter 4

Site selection and site condition analysis
potential site selection

site selection process

- Identify a strategically located terrain
- Develop the terrain in such a way that it can become resilient and adaptive
- And through this, provide an extraordinary landscape system that energizes and rehabilitates the system it is connected to.

site selection method

- Looking for a landscape system that is currently not performing well. A well performed system is a system that not only has the basic function and service it has to have, but also contains a high quality of the services and experiences it can provide.
- Create better conditions to create opportunities around it. Looking ecological and social component, for example, Not performance the ability it should be because some element is missing like water or lack of infrastructure systems.
- Find several potential sites through mapping process. The relationship among different urban systems, such as connections between urban development and natural environment; between human society and non-human environment; between the structured infrastructure and the newly planning infrastructure; and so on.

potential site identification

- Find a site has the greatest potential to provide the opportunity to become a higher performance system which is resilient.
- Not design a spot, but looking for a network that a system could have more resilience to other systems.
- Not a single, but in a connection system. The potential to provide, such as, close to the water, access, open space, community, but at the same time, not too hard nor too damaged to fix with the landscape method.
- A little damaged, get the wrong path, not performing well.
- Gray infrastructure system: Provide service but not healthy.
- Green infrastructure system: Provide the service it used to be, being healthy and special at the same time, also, have something more and special than the old ones.

mapping indensity

The objective of the research project is to design a resilient urban landscape system. The component of a resilient urban landscape system including the ecological like water and habitat as well as the social aspects like access, shelter and variety.

As the developing of the post-industrial period, the after-life of the once thrilling industry have becoming a problem. The project could be a model of the afterlife of abandoned quarry as well as the catalyst of the surrounding redevelopment.

People as well as the human society are also part of the whole connected resilient system. People’s activities contribute to the system by both cause disturbance and being response to disturbance. On one hand, people’s behavior pattern and social activities make a contribution to the change of the landscape developing as a process; on the other hand, the change of the system also affect people’s respond as a reflection.

The aim of the mapping strategy is to look for degraded ecological connected to potentially high performing social conditions. Laying down the initial conditions of a resilience urban system to develop in an adaptive and evolutionary way.
site connection mapping

Through the mapping process, the intensity of high active points have been identified. And the existing railroad corridor has the great potential to be used as the corridor connecting the high density urban fabric and the magnificent nature. On the trail of the corridor, the Bellwood Quarry seems to be a perfect point as the sample of the research of resilient landscape system.

Bellwood Quarry is located in the midtown area of Atlanta. The Bellwood Quarry was established in 1909 as the property of Vulcan Materials Company, Southeast Division. The main business used to be the crush rock and stone supply for construction materials. Most of the crushed and broken stone are limestone. After almost a hundred years of serving and being abandoned, Bellwood Quarry was bought by the city in 2006 and became public property. Acquired by the city of Atlanta, Bellwood Quarry is planned to be a mixed-use recreational park as well as a water reservoir facility.

According to the statement and previous research, Bellwood Quarry could be identified as a good potential site for the project to do some test design and research on the aspects of multi-use recreational park, water reservoir as well as a model for a afterlife of a post-industrial brownfield redevelopment.

The mapping of the Bellwood Quarry connecting to other systems demonstrate its potential to become a self-organizing system and its openness to the context including the connection to the large urban infrastructure systems.

As a relatively blind point in the connection corridor, the Bellwood Quarry is a crucial spot to be linked into the urban networks like the transportation system and hydrological system. With a better connected network, the urban landscape could perform well in an expected way.

[city of Atlanta, mayor’s office of communications news release: city of Atlanta completes purchase of the quarry]
From the history map of the site, a clear topography and geology changing process can be seen as the starting of the crushing limestone industry moving in and eventually out of service. The digging of a hole on the earth surface could provide more data and the construction materials. However, a potential landscape thinking to bear the issue which is not dwelling but respecting to the history. A respecting way means not to cover it with a beneficial coat but to accept the fact what is used to be as well as what it looks like now. That is a crucial point of the whole project.

The meta map of the site shows a dynamic conditions of the interacted systems on the Bellwood Quarry site and its complex relationship to the surrounding environment and its connection to the urban fabric of the city of Atlanta.
Bellwood Quarry progression

Bellwood Quarry water issue strategy

The existing water usage conditions in the city of Atlanta can be seen clearly in the diagram. The main users of the city water are the residential and commercial. To be more specific, the major use of Atlanta’s residential water is bathroom water and outdoor watering. The annual precipitation is relatively equal in 12 months.

The Bellwood Quarry progression diagram shows its shifting process. It used to be a crush stone industry; it is a hole currently; and it has the potential to be used as public green space in the future.

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Bellwood Quarry water issue strategy

Based on the water resource and the quality of the quarry, there are some possible ways to deal with the water issue. These diagrams are some of the possible solutions. For example, the quarry could be used as an emergency water resource as a daily water cleaning and storage procession. Also, some water circulation strategy is recommended for dealing with the issue.
The social identification of the Bellwood Quarry including three aspects: public attraction, urban planning, and landscape. As a public attraction, it could be educational, leisural, and tourism. From an urban planning aspect, it responds to environment, architecture and region. As a large landscape, it contains resources including soil, water, and all the other ecological elements.

Since the quarry is crushed into layers and great vertical space change is the major characteristic of the site, the concept is to design as vertical, by using the different elevation as the different functional layers. For example, based on the topography of the site and the vertical layers, a water management process could be designed into the landscape.
Site Layer Analysis

The site consist of multiple layers, including transportation and circulation, hydrology conditions, the building structures, vegetations and surface type.

Transportation condition on the site consist of highway on the south and east side, a railroad go through on the east, and some relic limestone industry truck path. One of the major character of the circulation is the lacking of access and the separation with the urban fabric.

The general hydrology condition of the site including the Proctor Creek go through from the southeast to the north west and then goes into the Chattahoochee River which eventually moving into Mexico Gulf. 100 year flood plain is on the buffer of the creek. Another water character of the site is the quarry water.

Vegetation cover of the area is good pine forest in the surrounding area with little vegetation open ground and the quarry in the middle. Tree canopy is good as well as the mash and lawn under it.
Site Section Analysis

1180 feet

910 feet

820 feet

620 feet

540 feet

- Well grown vegetation
- Original crushed stone area
- Ecological buffer area
- Current water storage area
- Existing truck transporting pass
- Power line corridor
- Well grown vegetation
A green sponge for a water-resilient city
Qunli stormwater park, China

- green vegetation as sponge to absorb water when flooding and release water when drought
- separation of the human system and lifting of the pedestrian system
- reuse of the materials in an ecological way

The Quarry Garden in Shanghai Botanical Garden, China

Key design characteristic identification:

- Space experience represented through and within the design
- The incorporation with topography and grade design
- Ecological renovation and cultural reconstruction
- The use of the materials to show the respect of industrial history

The designer’s unique design language and style:

- Giving different experience through the landscape
- Using height change and create elevation space to emphasis the space
- The use of materials, the rusted steel

The quarry design in commons:

- Dealing with great level change Making vertical connections
- Making space flow

http://www.asla.org/2012professionalawards
http://www.asla.org/2012awards/images/largescale
The concept remains extraordinarily impressive.
Visible benefits so far include but are largely limited to parks and trails.
A decent start has been made on revitalization and workforce housing.
Some intriguing proposals have been put forward to speed the BeltLine’s implementation.

http://www.fastcodesign.com/1665138/what-the-atlanta-beltline-can-teach-us-about-urban-revitalization
Roman Quarry Redesign
by AllesWirdGut Architektur

Monte Testaccio, Rome, Italy
informal settlement case study

developing process
• the intersection of diverse activities, cultural identity, historic waste
• landscape claim to diverse infrastructural challenges
• manufacturing topography through urban process
• transform waste space into civic terrain

the transformation
• historic hill
• limestone quarry
• largest & highly engineered landfill
• informal development

• effective and efficient use of the elevation change and the moving space
• building structure and architecture fit into the environment of the quarry site
• multiple haptic experience through the bridge


http://places.designobserver.com/feature/roma-monte-testaccio-landfill-reclamation/115689
“Living with the paradox”
The key principal of urban resilience.
The design exploration of a single system reveals its connections with other systems. Learning from the investigation and make conclusion from the design process will influence the next step of the exploration.

Since water is a crucial issue both to the site and to landscape, the investigation starts from the touch of the hydrology system on the site.

The respect of the city’s planning proposal of turning the quarry into a public park, the second design investigation concentrates on the circulation system, which is essential to make the place public and accessible.

By exploring the hydrology system and the circulation system respectively, there is a better understanding of the site condition as a whole. The threshold area is a desirable point to be a sample to test the design of the system interactions, since it is the most potential connecting point between the quarry site and the urban fabric.

As the post-industrial brownfield is a general problem in developed countries. Remediation and redevelopment has always been intricate when dealing with a number of inevitable issues. One of the issues is to make the space active and accessible for public again. Landscape design could be a therapy to cure social diseases and give it an afterlife of the degrade urban space.

Since landscape is a resilient infrastructure, the design is not finished yet. Whether a landscape system is resilient or not is determined by abilities to deal with disturbance and make responsible reactions. As the high-profile and well-planned landscape has been demonstrated in the previous phase of design, there are always unpredicted distractions to make the plan out of its orbit.

Obviously the more systems are interacted in the design, the more complexity it can be. When the disturbance occurs, the more complex the system is, more energy flow and object circulation will be in and through the system and its surrounding environment, the more capable it can be when dealing with the disturbance, the more resilient the system can be.

**DESIGN INTRODUCTION**

- **How to design with landscape systems?**
  
  Landscape are interacted systems. Design with landscape systems is a process to deal with their relationships instead of dealing with a single and separated factor. Moreover, landscape design is a management of the interaction. With a better connection to the environment, the system could perform better than an isolated system.

- **Turning an abandoned quarry into a public park.**

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  Culture, social as well as history is being demonstrated through the area. Moreover, human beings, as a system, would get involved with the space. Senses are the feeling that makes human resilience and being distinguished from other creatures. The exploring of the haptic realm is a future understanding of resilience.

  Obviously the more systems are interacted in the design, the more complexity it can be. When the disturbance occurs, the more complex the system is, more energy flow and object circulation will be in and through the system and its surrounding environment, the more capable it can be when dealing with the disturbance, the more resilient the system can be.
system interactions
landscape as systems
hydrology system
disturbance: drought + flood
human system
disturbance
animal system
circulation system
vegetation system
social system
history system
informal settlement
disturbance
system interactions
investigation I
investigation II
investigation III
Hydrology system investigation

The investigation of the hydrology system start from the study of the topography and water features on the site. The great changing of the elevation and the shifting of the space makes it possible to use the quarry as a potential emergency water storage pond. The Protcor Creek go through the site from southeast to northwest. On the buffer of the flood plain, well growing vegetation provide the protection of the surrounding environment.

Bellwood Quarry Model
The model of the Bellwood Quarry shows the current water level of the quarry water and the general shaded condition in the morning.

The changing of the water level in the quarry could affect the ecology and the space. The maps demonstrate a changing process of the quarry water level from low to high and the side effect of the space transition.
By using the existing truck path as the base of a water cleaning ramp, the starting of the water collection and purification process can be done through the way of moving.

Here are some section details of the water cleaning ramp. From the long section of the slope ramp, a typical water cleaning process is produced through the moving water pond including the process of water collection, sedimentation, filtration and purification. Finally water will be collected in the quarry after the whole cleaning process.

From the short section, different layers have a clear role in the water cleaning process. With the artificial wetland and water growing vegetation, the ecology condition will be improved at the same time.
The concept of the idea comes from the capillarity system in a human body which is a perfect organic sample of resilience. The capillarity system makes it possible for the liquid to move against the gravity without the need for power injection. A general model of the phenomenon is water can move from a relatively low level to a relatively high level through a narrow tube. Although being influenced by many factors, such as the temperature of the water and the material of the tube, it follows the general instruction of the narrower the tube is, the higher the water can go.

Based on the theory of capillarity, an investigation to explore a building of a structure could achieve the goal of using the already cleaned water in the quarry as the filtration resource to the surrounding landscape without manural management. It is a self-organizing system to absorb water from the quarry in a low level to the landscape and vegetation on a high level. The building of the structure could be also engaged with people’s activity and for educational response.

Once the primary process systems that are operating on site have been identified, there is a way to re-arrange and re-organize the systems. That is the beginning test to see how the system will reflect to the different kinds of disturbance. Since water is the primary element, the disturbances start from the general changing conditions – flooding and drought.

A test design __ a capillarity system
the capillarity structure section
the capillarity structure investigation
rain & flood disturbance

The capillarity structure will function when the heavy rain and flood disturbance is coming. Without the structure, the over flood will swallow the buffer area of the creek; with the build of the capillarity structure, the over flood can be absorbed into the system and release when the decrease of the water level.
The capillarity structure will function when the drought disturbance is coming. Without the structure, the drought will make the landscape and vegetation of the surrounding environment suffer even more. With the build of the capillarity structure, the landscape and vegetation can be filtered by the cleaned quarry water through the capillarity structure.
The settle of the structure can provide an initial condition for the vegetation succession process to occur. When the build of the structure is start, pioneer species will start to settle around the structure. After a period of time, the continue succession will be achieve when the vegetation community established.
the capillarity structure investigation
people's engagement with the structure
the capillarity structure investigation
light and firefly habitat in the night
system interactions

landscape as systems

hydrology system

system investigation I

human system

culture system

animal system

vegetation system

circulation systems (road, bridges, pathways) as the disturbance to the natural system

social system

system investigation II

system interactions

disturbance

informal settlement

system investigation III
resilient circulation system investigation

The investigation with the design of the circulation system is also generate by the research question of resilient landscape. Of course, resilience can not be identified without the discussion of disturbance. Unlike the previous test design of the hydrology system, which is to see a designed structure dealing with the coming disturbance and it’s reaction, the point of this investigation is to design a disturbance to the existing conditions. The designed circulation system itself is the disturbance to the existing natural environments.

A resilient circulation system including two aspects, the way it interact with other systems is resilient as well as the circulation system itself is resilient.

To be resilience, the disturbance should be minimized. By using the different kinds of intersections, like the human and wildlife cross bridge, the bio-swale along with the roads, the additional system that is add to the existing condition can be reduced. Ecological corridors are kept through the process as well as the increasing of the edge condition and biodiversity.

A highly performanced circulation system consist of several characteristics: accessibility, well connection to the urban fabric, safety and clarity.

proposed resilient circulation system

- Hierarchie
  - 1st main road
  - 2nd vehicle road
  - bike lane
  - pedestrian

- Protco Creek bike lane
- jogging friendly
- extend to neighbour
- neighbour attraction
- opening access
- proposed vehicle road
the circulation system is resilient

itself __ access, function, location

pedestrian bridge across over the vehicle road

wildlife bridge over the vehicle road

section of the vehicle road and bike lane

section of bike lane and pedestrian deck

interacted with other systems __ edge condition of the quarry

scenery viewing deck

stair and fishing spots

outdoor activity __ rock-climbing
the threshold area is disturbed by the unpredictable human development
Threshold area multiple systems interaction investigation

Multiple system interactions

Site material exploration
The design investigations are exploration with landscape systems being resilient. Apart from the hydrological system and the circulation system, there are still many other systems that are significant to the design exploration. People as the running initial of the social system, can affect lots of changes in both positive and negative ways.

Landscape used to be interested in the special, human body experience the world. Even nowadays’ focus have been changing into the more ecological aspect, physical experience is still a significant part of the landscape performance. By putting human body experience into the site helps a more physical scale understanding of the human perception. We can’t perceive the world without the sense of a place. It is our sensorial realm that makes us resilient. Without the haptic senses, human beings won’t be able to make responses and react to the outer stimulations.

Physical model making is not only an extension of the classic field of landscape, but also an investigation with scale, texture, size as the measure.
threshold area physical model exploration

haptic experience

physical model details
green tube analysis

- concrete
- striping
- peeling
- rolling
- holeing

vegetation & light changing
sun tolerance low-grow grass

shade & moisture tolerance
tolerant low-grow grass

the green concrete tube __ variety scales, variety functions

green __ soft outside, hard inside

grey __ hard outside, soft inside

water movement and circulation system

vegetation filtration

collected from the roof

to the water channel

to the water channel

to the water channel

water pond

water cleaning

wet land

water cleaning

water cleaning
The threshold area is under great pressure since it is located in the area of intersection space between the quarry site and the urban fabric. All the systems that are interacted with each other could be the origin of the disturbance to the threshold area. For example, the change of the Proctor Creek water level could affect the ecological condition of the site; the changing of the population could also cause unpredictable disturbance to the landscape system.
unpredictable human development disturbance __ the disassemble of the building
succession & bio-diversity

moving objects and energy flow

succession timeline

moving out objects
another possible development pattern
informal settlement __ starting from take over of the tubes in the threshold area

settlement from the take over of the tubes
which can be moved around

ALL THESE EXPLORATIONS LED ME TO RECONSIDER THE SITE AND THE PROJECT.

SHOULD THE DESIGN GOES IN THIS WAY SPREADING THE WHOLE SITE?
OR
IF THERE IS ANOTHER WAY TO LOOK AT THE LANDSCAPE ROLE?

RESEARCH QUESTION SHIFTING
FROM
HOW COULD RESILIENCE BE DESIGNED INTO THE LANDSCAPE OF BELLWOOD QUARRY IN ATLANTA, GA?
TO
HOW COULD RESILIENCE BE DISCOVERED IN THE DEGRADE URBAN LANDSCAPE LIKE THE BELLWOOD QUARRY IN ATLANTA, GA?
Disturbance investigation

The coming of the disturbance to the well-designed landscape system

Disturbance may not be so tolerant on a relatively small site and in a short period of time, but from a long term of the developing timeline, it could definitely increase the variety and complexity of the system. As the disturbance happened unpredictably, the system will respond to the change spontaneously. It may not recover to the same one it used to be in the end. Instead, the exotic elements are being absorbed into the system now and becoming the new gradient of the progression. The new system is more complicated than the previous one with the incoming flowing energy and circulating objects. The more complex the system is, the more disturbances it can absorb. As the continually coming in and moving out, the system is always under a relatively balance situation. This is the way that disturbances make the contribution to the resilience of landscape system.

The disturbance that may happen on the quarry site could involve several aspects: social, economic, cultural, political and ecological. Although we have future planning for the development in decades even in hundred years, the world is always changing the way it used to be.

To be site specifically, the disturbance may occur in different times and in different ways, for instance, the buildings may gone in a certain period time, the limestone industry may come back, an unpredictable natural disaster like an earthquake or a forest fire may happen anytime, the change of the ownership of the land may lead to the entire land usage, the coming of the informal group of people may rearrange the threshold area based on their own preference, the rapid increasing of the population may cause the overuse even the extraction of the natural resources, the lack of the living space may make the real estate management agency to construct housing to solve the problem.

ALL KINDS OF POSSIBLE DISTURBANCE THAT MAY HAPPEN TO THE SYSTEMS:

SOCIAL ASPECTS
• UNPREDICTABLE DEVELOPMENT
• THE CHANGE OF LAND USE PROPERTY
• THE INFORMAL DEVELOPMENT
• THE COMING OF THE INDUSTRY

ENVIRONMENTAL ASPECTS
• FIRE
• EARTHQUAKE
• HURRICANE
• 100 YEAR FLOOD

ECONOMIC ASPECTS
• THE CITY SELL THE QUARRY TO ANOTHER ORGANIZATION OR PERSON
general characteristics of the informal settlement

- economic deprivations
- the lack of living space
- the lack of infrastructure systems
- instability and flowability
- limited access to food and clean water
- diverse ethnic backgrounds
- the feeling of being marginalized or overlooked

the possible informal settlement growth pattern

growth pattern

get resource

come back

basic settlement colonization succession process

access way

starting points

phase I growing

new community

phase III relatively stable

phase II moving in & out

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In what specific ways does my work address these issues? The site can be reconsidered as a resource that helps to provide these things.
Disturbance investigation
—the informal development settlement

The surprisingly disturbance—the informal development settlement

The disturbance, which originally caused by the changes of the social and culture systems, for instance, an economic depression or a natural disaster, the expansion of the city and the growing population lead to a series of problems, starting from the increase number of local houseless population. Since the area is owned by the city with the land use condition is a public park, and the location of the Bellwood Quarry is not only near the downtown Atlanta but also on the corridor of the rail road transportation system. All the conditions have made the area a perfect place for the possible disturbance to occur. Moreover, the threshold area is the easily accessible place and the creating of the concrete tube is a potential spot for occupation, the assumption can be made as the most possible location for the disturbance to start.

The reason of the disturbance possibly comes from the existing natural and social conditions. The natural resource like the water in the quarry and the variety of vegetation in the surrounding area are the basic need for group stabilization. And the open empty ground and the space creating by the limestone mining industry provide a corner space which can be very productive with the variety function like shaded and structural supportive.

As the continually of the moving in and out of the people, the flowing of the energy and the change of the objects is becoming more and more active and frequent. Therefore is the coming consequence of the increasing of the biodiversity and ecological complexity.
• corner space provide potential spots for shelter
• possible shelter form
• close to water
• enough open space
• continually moving in and out
• the need of food will lead to urban farming

• the need of changing products __ market
• the need of social gathering __ community center
• getting more self-organized

• different edge conditions of the quarry
• provide different functions engage with people

• as growing and developing, the system is becoming more and more complexity
• the more able to dealing with disturbance
• the more resilient

the possible informal settlement pattern on the Bellwood Quarry site

The occupation starting from the take over the place relies on the resource on the site, but as the development scenarios processing, the informal development will reformed into a newly starting community. The informal settlements can be improved into a relatively stabilized on site community without the entirely change of the function by the starting of the occurring of the urban farming. The grass land, the forest and the topography could provide the possible space for urban farming. Agriculture products as well as working opportunities are being able to be provided through the appearance of the urban farming system. The sufficient products and the need of the exchange of the products will lead to the need of a place for the change behavior to happen like a market. With the high density of human activity by using the market, a newly public space even a community center.

The informal settlements appear on the center of the city and the edge of the urban and suburban area. The condition is complicated, so the work and design can be problematic. Although the coming local vagrants differ in age, religions, level of political background, they still sharing some common characteristics including inadequate of housing, insufficient living space, insecure land tenure, and lack of access to basic services, especially clean water and sanitation. The human being may take over the place and resource at the first place, but as long as the recognition of the evaluation significance and a long sustainable development need will spontaneously react to the change of the lack of resource like water and space. Therefore, a self-organized resilient landscape system will generate the direction and take reasonable reaction instead of just recovering from the disturbance occur in the complicated interacted systems. The shifting of landscape elements and the hierarchy of the system role is always changing as the process of the informal development occurring.
the edge condition of the quarry could provide the potential for the informal development

WHERE SHOULD THE PROJECT ENDS?

NORMALLY, THE DESIGN WILL END IN ___

HOWEVER, FOR THE INFORMAL INVESTIGATION, THE WILL NOT END IN A NORMAL WAY.

THE INSIGHT OF THE PROJECT HAS BEEN OPEN, ENDLESS, UNPREDICTABLE...

IT COULD BE END IN DIFFERENT FORMS, DEPENDING ON ALL THE VARIABLES, LIKE WHO, WHY, HOW, WHO WITH, WITH WHAT ASSISTANCE...

for example,

The occupation of the quarry edge could take many different forms, depending on the variable conditions...
possible quarry edge condition
  __ if the quarry become a water storing pond
  __ the site is becoming a sports park

possible quarry edge condition
  __ no human touchment

possible quarry edge condition
  __ the informal settlement occurring on the site
The roles of government and authorities in the developing process is complicated, and the project is to explore and raise issues rather than providing answers. Instead of clearance and relocation, the approach has gradually shifted into a more practical and less costly way to integrate the low-income communities into a broader urban context. The improving of the infrastructural system is the basic foundation for the informal settlements to be engaged by the community itself as well as the government.

Can a landscape become self-sustainable? Variation in problems but sharing some common characteristics, the physical structure and the social environment become side effects of the informal settlement. The occupation of the open ground, the corner space and the floodplains, the possible damage to the environment, the separation of themselves from the whole urban system, the lack of healthcare facilities, cultural preservation, economic transmissions are major issues that the informal development have to deal with. “Landscape is conceived both as the primary problem in these communities and as the main opportunity for intervention and improvement.”

The community value can be changed after it is settled on the site. Moreover, designers are able to improve the environment spatially. To develop informal communities is difficult and complicated. They are developing principles and clues for their own improvement and becoming more self-sustainable. The informal sector, involving the political impacts and the authorities’ influences, cannot be ignored. As this is a project that envolving multi-aspects including the informal one, creating a habitable environment is also an improvement of the urban diversity.

Since there is often more complex thinking than the obvious outcome in the built work, the design working on the informal settlement and development requires the focus on the products as much as the process.

“No one project is perfect and complete in itself; many have flawed.” The attempting may not be the best practice for the informal settlements problems, but could be a different model of the redevelopment plan, although the informal settlements are different in physical, cultural, social and economic conditions. Even more, the landscape thinking and the raising of issues is much more valuable than the problem itself.

What can be learned from the design is the acknowledgement of the difficulty to take the informal development under control, using landscape as a design generator leading the development, and that disturbances follow the major changes. The role of landscape architect in the redeveloping process is a paradox, because of being a part of the transformation through the developing process as well as the responsible reaction system to absorb changes caused by disturbances, swallow and digest it to be part of the newly complexity phases.

The research project generally consists of two main parts: the first part of the research is attempting different design investigation to design resilience into the urban landscape system; the second part is trying to discover the existing resilience which is already there in the degraded urban landscape. The shifting of the research question from design to discover breaks the traditional line and gives a new way of landscape thinking in the role of urbanism.

One of the special points of theses is not knowing the end of the project but still get control of the whole research process. It is a paradox. So is design for an informal settlement. The main point of informal is that it cannot be predicted and it is eventhing but formal. But plan for an informal is a huge challenge and a paradox to deal with in the research process.

The research question is always shifting in the whole research process as starting from one aspect and may find something which matters more than the original question that used to be looking for. Sometimes it may go into the wrong directions, sometimes it got stucked in a maze, and sometimes the alternative way is waving. It is a circuitous process instead of a linear approach.

Research through design is well experienced in the model making process. It seems to be a paradox to do the exploration without knowing the end and the result but still take the whole design process under control. Not knowing what is being done can be scary, but the way of design release the existing thinking method and break the boundaries of different fields.

The new ideas and techniques of landscape representations have been explored along with the research through design process. How to represent the design ideas and thinking is an crucial part of the project since graphic is the most effective and efficient way to communicate with other professionals and audience. The exploration involves lots of medias and materials, through a combination of photos, hand drawings, as well as the physical and digital models. In order to make the drawings being meaningful and communicative itself, the motage style borrowed from movies provide a potential approach to achieve the goal.

**PART ONE**

**design** the resilience into the landscape

**things can be learned**
- the reconsideration of the site possibility and potential
- landscape role in the urbanism issue

**things are still challenge**
- the result of the project is endless and open

**things can be carry on study**
- the paradox of plan for an unpredictable or uncertainty

**PART TWO**

**discover** the resilience that is already there

**analysis**

**investigation I**

**investigation II**

**investigation III**

**investigation IV**
REFERENCE


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Chris Reed, Landscape Urbanism Practices: Precis + Case. Stoss LU Press