Projective Transformations: Balancing Urban Development with Regional Character in South Korea

THESIS

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By

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Abstract

This thesis project problematizes the popularly held distinction that agriculture and urban development cannot occupy the same space. With the question “Can design mediate the tensions between agriculture, ecology and development?” in mind, a literature review of current thought within the landscape architecture discipline was conducted. This literature review focused on landscape urbanism and landscape infrastructure, key approaches that specifically focus on answering this question and related questions. In order to understand the application of these theoretical principles and their use in site design, a site case study is conducted on a region in South Korea called Cheorwon, where incoming development threatens to disrupt the regional character of a town on the edge of the demilitarized zone between North and South Korea. As the case study reveals key areas of intervention, precedent studies are brought to bear on the process of generating solutions. The resulting catalogue of interventions, begins to address how theory, applied through the use of precedents can build a better understanding of the theory itself and its roles within the discipline.
Dedication

This document is dedicated to my mom.
Acknowledgments

I would like to thank, first and foremost, my advisor Jake Boswell for his patience, passion and professionalism. I would like to thank Jason Kentner for stepping in as my committee member, and for his service as long-term interim chair for our department. I extend my gratitude to new Chair of the landscape department Dorotée Imbert. Finally, I would like to thank Katherine Bennett and Sarah Cowells for contributing feedback during various stages of this project. I would also like to thank my family for their enthusiastic support during this process.
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Fields of Study

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Table of Contents

Abstract .................................................................................................................................................. ii

Dedication ............................................................................................................................................... iii

Acknowledgments ................................................................................................................................. iv

Vita ......................................................................................................................................................... v

List of Figures ....................................................................................................................................... viii

Chapter 1: Introduction and Literature Review ......................................................................................... 1

   Literature Review: Current Trends in Landscape Architecture ......................................................... 2

Chapter 2: Case Study Site Analysis and Background .............................................................................. 8

   International Context ........................................................................................................................... 8

   The Koreas .......................................................................................................................................... 11

   The De-Militarized Zone (DMZ) Peace Park ......................................................................................... 12

   South Korea ...................................................................................................................................... 15

   Cheorwon .......................................................................................................................................... 16

   Development: .................................................................................................................................... 17

   Eco-Agro-Tourism ............................................................................................................................... 18

   Rice Farming Agriculture ................................................................................................................... 19
Chapter 3: Landscape Intervention Catalogue ................................................................. 27

Intervention 1: Precedents .......................................................................................... 27

Proposed Intervention 1: Rice Field Urbanism ......................................................... 31

Intervention 2: Precedents ......................................................................................... 40

Intervention 2: Irrigation Infrastructure Circulation Network ............................... 41

Intervention 3: Precedents ......................................................................................... 42

Intervention 3: Extending the network to the larger landscape ............................... 46

Intervention 4: Precedents ......................................................................................... 48

Intervention 4: Patches and Corridors ...................................................................... 49

Conclusion .................................................................................................................. 53

References: .................................................................................................................. 55
List of Figures

Figure 1 ............................................................................................................................. 10
Figure 2 ............................................................................................................................. 13
Figure 3 ............................................................................................................................. 23
Figure 4 ............................................................................................................................. 24
Figure 5 ............................................................................................................................. 25
Figure 6 ............................................................................................................................. 36
Figure 7 ............................................................................................................................. 37
Figure 8 ............................................................................................................................. 39
Figure 9 ............................................................................................................................. 43
Figure 10 ............................................................................................................................ 44
Figure 11 ............................................................................................................................ 47
Figure 12 ............................................................................................................................ 52
Chapter 1: Introduction and Literature Review

This thesis set out to formulate an understanding the roles of landscape, as it is currently theorized, through application to a site and the resultant set of landscape interventions. By distilling the key elements of Landscape Infrastructure and Landscape Urbanism theory and generating a catalogue of potential design solutions the linkage between theory and application begins to become clearer. This process allows the student of landscape architecture the potential to obtain a greater understanding of the role and functionalities of recent contributions of theorists to the practice.

This project begins with a question: Is it possible to use design to mediate the tensions between development and agricultural and ecological roles of the landscape? Can this design approach also consider the social and economic impacts of each of these competing land uses? How can landscape acknowledge the traces of historic farming practices within the development of urban agglomerations? Can this landscape continue to be productive while becoming more ecologically sustainable? Can all of these tensions become a coherent landscape that harbors its own cultural identity and sustain growth?

With these questions in mind, a literature review was conducted to identify how theory could inform the process of answering these questions. Because a case study is also a critical component of this analysis, the ideas distilled from current theory on landscape
design in order to begin to identify the ways in which it could apply to a specific site design project. The use of precedents was incorporated to yield examples of how theory was applied to other projects which may also be adaptable to a new context. Each of the precedents is evaluated in relation to its successful application of theoretical principals to its site. Only precedents that successfully applied these principals were used to generate design solutions on the site. Finally these solutions are presented as a ‘design catalogue’ of potential solutions that could answer the thesis question through application to this site and potentially to others. The unique twist to this project was that the design would attempt to create a design framework for a city that did not yet exist in order to preemptively incorporate landscape systems and logics into it as foundational to its structure and design, rather than retrofitting an existing conventionally planned city with landscape infrastructural solutions. This distinction is critical as much current work is focused on the former type of solution while few critically approach the latter.

**Literature Review: Current Trends in Landscape Architecture**

The process that this thesis takes draws on tactics from a combination of theoretical movements, highlighting elements of both landscape infrastructure and landscape urbanism within the ecological urbanism paradigm.

Landscape urbanism emphasizes landscape process with the creation of landscapes that recognize, participate in, utilize, and make legible the host of temporal processes that comprise landscape.
Landscape infrastructure, on the other hand is a sub-field of landscape urbanism which specifically looks at landscapes as a form of infrastructure, coupling with other largely urban infrastructures in order to ameliorate or augment those infrastructures, and often to produce tertiary programs.

Both of these theoretical approaches were borne out of a large field of theory called ecological urbanism. Ecological urbanism is a paradigm that directs landscape solutions towards resilience in changing environment, based in ecological systems, which are defined as ‘interrelationships of organisms (including human beings) and the environment (including cities.)” (Mostafavi, 13, emphasis added)

In the introduction to perhaps the seminal work on the subject of landscape urbanism, landscape theorist Mohsen Mostafavi points out that one of the key generating forces for the landscape urbanism paradigm were a tension between sustainability and high design thinking which resulted in ‘novel ways of thinking that contribute to both ways of thinking.’

Mostafavi notes the importance of scale in using this paradigm, stating that most sustainable work has been done on small or ‘botique’ scales, not on the scale of territories or infrastructures of whole cities or towns. The need to incorporate this thinking at larger scales is one of the driving factors of the selection of the site for this project.
Mostafavi’s approach is best summarized when he defines the urban as a “site of complex relations (Economic, Political, Social, and cultural) that requires an equally complex range of perspectives and responses that can address both current conditions and future possibilities.” Perhaps the reason that ecological urbanism became the central point of theoretical reference for this thesis project is that it is clearly described as a source of solutions for apparently incompatible forces within the landscape. Mostafavi puts it this way in Ecological Urbanism: “…imagining a new urbanism that is other than the status quo requires a new sensibility, one that has the capacity to incorporate and accommodate the inherent conflictual conditions between ecology and urbanism.” This quotation summarizes the research question of this thesis and offers landscape urbanism as a method by which to approach it.

Landscape Urbanism is a mode of thought that takes it’s directives from the collective pressures of global ecological crises and focuses its intellectual efforts on making landscape architecture as a profession sustainable and ecologically responsible. With the importance of ecology comes an increased level of importance for landscape as profession in relation to its allies in the design fields as well as a change in the scale and degree of interventions.

Some of the key elements of designs that have been conceived within the paradigm of landscape urbanism are that the horizontal landscape begins to dominate vertical or architectural arrangements as the defining logic of a space, and that this landscape has an open-ended and dynamic future.
Architect, and urban theorist Rem Koolhaas defined the role of landscape in new urbanism in the following way:

“‘new urbanism’…will be the staging of uncertainty; it will no longer be concerned with the arrangement of more or less permanent objects, but with the irrigation of territories with potential; it will no longer aim for stable configurations, but for the creation of enabling fields that accommodate processes that refuse to be crystallized into definitive form; it will no longer be about meticulous definition, the imposition of limits, but about expanding notions, denying boundaries; not about separating and identifying entities, but about discovering unnameable hybrids; it will no longer be obsessed with the city but with the manipulation of infrastructure for endless intensifications and diversifications, shortcuts and redistributions – the reinvention of psychological space.” (Koolhaas, 205.)

Alex Wall also weighs in on the nature of landscape urbanism as a conceptual framework in relation to the agricultural landscape;

“…no longer refers to prospects of pastoral innocence, but rather invokes the functioning matrix of connective tissue that organizes not only objects and spaces, but also the dynamic processes and events that move through them. This is the landscape as active surface, structuring the conditions for new relationships and interactions among the things it supports,’ (Richardson, 54)
These theoretical assignations of qualities and characteristics begin to build a conceptual framework for how designers can begin to approach Landscape Urbanism and incorporate it into their own design approaches and methodologies.

One of the ever-present facets that define the nature of landscape urbanism is the metaphor of landscape as a cyborg system – containing elements of both machine and biological organism which operates systematically to process elements of the landscape within a larger metabolism.

Andrea Branzi builds on this idea in terms of the relationship between cities and agricultural land use, calling for the ‘co-habitation of agricultural and urban territories.”

This idea is relevant to the project because it refers to the tensions that drive the thesis question and suggests sharing space between the two uses, sharing and coordinating these two distinct systems.

Dorothee Imbert points out the relevance of the work of Michel Desvigne, who has advocated the landscape as preceding architecture or planning. Desvigne refers to this as idea as ‘projective ecology’. While including the value of landscape as having ecological benefits, Desvigne also emphasizes the critical importance of its role in setting the groundwork for future urban development (Imbert, 263.) The design work and approach of Michel Desvigne in many ways exemplifies the tenets of landscape infrastructure with the most humble of materials and simple, yet elegant arguments.

“As with the earth artist Robert Smithson, Desvigne
views landscape architecture as a work in process, never really attaining an ideal state at any one moment in time, but always exceeding expectations when set in motion over time, when viewed as an active palimpsest accruing new properties, qualities, and potentials in time. Here, his understanding of landscape as active infrastructure suggests new ways of validating investment in landscape in cities, as these green living infrastructures can be the catalysts for new forms of development and new lifestyles, new armatures for more complex forms of urbanism to grow and evolve "(Corner, )
Chapter 2: Case Study Site Analysis and Background

*International Context*

Because this case study is meant to illustrate the axioms of landscape theory as a thought paradigm, and a major tenet of that paradigm is to clearly understand the systems at work on a given site in depth and across scales. It was necessary to move out to a scale large enough to allow the origins of the key tensions to become visible. The tensions, as alluded to in the introduction are the conflict between human land uses and use of the same space by non-human inhabitants. In order to attract attention to these conflicts, usually a charismatic “keystone species” emerges as the non-human protagonist, whose habitat is threatened by the forces of development. In this case, that role is played by a pair of species of migratory cranes that happen to be very charismatic as a species. Though this project began with the intention to just ‘save the birds’ it became evident as the process progressed that the conservation efforts playing out in the region were about a lot more than just birds.

The included diagram *(see figure 1)* shows that all of East Asia is experiencing the biggest urban influx ever witnessed by humanity. In figure 1, the sheer scale to which this is happening is illustrated with large circles indicating the size of populations in cities in the international region where South Korea is situated. Of all of these cities, the capital of South Korea, Seoul, may very likely be the most rapidly urbanizing, especially
considering the small landmass of the country. Within this same diagram, the migration pattern of the two ‘keystone species’ of cranes are highlighted. There are three necessary stops on their routes, as with most migratory birds; a summer breeding ground (in China), a place to rest along the way and finally a peaceful wintering grounds. The plains of the Cheorwon district of South Korea are considered by ecologists to be the most critical winter habitat for both species. Ecologists predict that without this habitat, it is likely the birds will decline rapidly in the wild.
Figure 1

Urban vs. Habitat

Scale: Regional

White-Naped Crane
Grus vipio

Red-Crowned Crane
Grus japonensis

South Korea
Population: 58,000
Area: 5,609 sq. mi.

Ohio
Population: 11,475
Area: 4,482 sq. mi.
The next layer of complexity relationship is introduced when the current land use of the Cheorwon plains is taken into consideration. The plains are currently under intensive use as rice agricultural fields. In this case study, this becomes a particularly apt feature of the site for several reasons. First, South Korea’s ratio of land mass to population is striking with a very high population density and little land to support that population in terms of food production. The country must import the majority of its food, with rice being the only staple it actually occasionally exports. Secondly, the amount of land on the Korean peninsula that is actually cultivable is the minority, with 75% of the land being mountainous. Unlike the low mountains of China where the terraced fields are built, it would not be sustainable to use such practices in Korea. This is one reason that North Korea’s current food situation is so dire; clearing the forest only leads to rapid erosion and degradation of the land and surrounding waterways.

Finally, Agriculture plays a key historic and cultural role in the Koreas, with rice agriculture forming the basis of its societal organization and culture since the earliest dynasties. This area’s historic farming culture stands to experience a kind of gentrification through tourism if it can survive the age of development. Agriculture defines the landscape through its processes and systems and it becomes therefore necessary for the designer to study these systems in depth if the resulting design is to truly incorporate all levels of the tenets of landscape infrastructure.
The Korean de-militarized zone (hereafter, the DMZ) is a highly militarized political boundary that divides the Korean peninsula into two countries was established as part of the cease-fire agreement of June 1953. This two mile wide, 253-mile long band of land has been fenced off for over sixty years and has for the most part, remained untouched by human development. As a result, many of the endemic species of the Korean peninsula, some unique to Korea, exist only within this strip of land due to the fact that both sides have seen immense development during the intervening era. Currently, NGO’s are working with the Korean governments towards the establishment of an international peace park in the DMZ to preserve the habitats it contains along with buffer zones on either side that will also be protected from intensive development. Peace parks are a phenomenon that have been occurring in Africa and Asia among younger nations that struggle with disputed borders. There is a tendency for these parks to express idealism and a desire for peace as well as to become an ecological preserve. These parks are usually instigated by NGOs.

While this park is still in the conceptual stages, its implications for the region have been taken as an assumed future scenario with its master plan (see figure 2) being in the early stages of finalization, its shape and relationship to the proposed site for this project be foundational for the design intervention strategies suggested by this project. The site in Cheorwon is excluded from the ecological protection of the planned future peace Eco Park, but its location in a central position places it in an important position to help
The DMZ Peace Park

Scale: DMZ - Seoul

Figure 2
hinder the parks ecological preservation imperatives. The proposed peace park would exist to house and conserve habitat for the up to 1,600 species of plants, 66 species of mammals, 233 bird species, 46 amphibians and reptile species, 98 freshwater fish species, and 535 insect species. These including some very charismatic species such as Asiatic black bear, musk deer, Korean yellow-necked martin, leopard cat, Amur goral, otter, Chinese water deer, spotted seal, leopard and lynx, and perhaps even one last Amur Tiger (there have been reported sightings but no concrete evidence of the existence of this now extinct species in the DMZ). South Korea has already gone so far as to declare some of these species as “national monuments” and some of these animals are found nowhere else on the planet, including a number of large insects, fish and vascular plants – some of which are currently endangered to various degrees. Many of these endangered plants, however exist principally within the Cheorwon region, the majority of which is not included within the protected area of the park. The DMZ houses a full array of Korea’s ecosystems including Oak/Pine forest, Grasslands, wetlands (five types of wetlands – several of which are endangered or make up a very small percentage of the land cover), and bodies of water and two of Korea’s principal rivers originate in the DMZ. This peace park is being proposed by a group of non-governmental bodies (NGOs) including UNESCO, IUCN, EAFES (East Asian Federation of Ecological Societies), UNEP (United Nations Environment Program)

White-Naped and Red-Crowned Cranes are only two of a wide diversity of potential reasons to conserve the habitat that all of these animals require to live. In addition to the cranes a number of other endangered and even critically-endangered listed migratory
birds use this area as habitat during migration. October through March is the winter season for the East Asia flyway.

South Korea

Through researching the climate in South Korea in terms of public value of ecological resources and desire to reconnect with them to establish a potential for support of a design for this site that incorporates landscape infrastructure as opposed to traditional urban planning it becomes evident that strong support could be garnered from several directions. Recently, over 85% of South Korean citizens polled felt that the environmental issues were becoming more important than development in South Korea (Brady, 586). Additionally, a number of landscape infrastructure inspired designs have begun to be adopted for parks and green space within the capital city and future planned cities, such as the new Administrative zone in Sejong, South Korea (Balmori, 206). This trend towards sustainable designs is reflected throughout the international community with many new ecological urbanists and landscape-focused designs being built throughout China’s developing cities. There are existing precedents in South Korea for the adoption of eco-tourism and agro-tourism based conservation and development of specialized cultural landscapes, such as the citrus-based tourism on Jindo Island in the south. Tourism is a big industry is South Korea with an established system of eco-tourism and war tourism already existing in the Cheorwon/DMZ region with Cheorwon positioning itself as the base point for touring the DMZ. The tourism industry is leading the infrastructural improvements to the region with a proposed passenger rail line
dedicated to taking tourists from downtown Seoul to the DMZ at Cheorwon and also to Kaesong from Seoul. This rail line also serves as the base infrastructure for commuters working in Cheorwon and living the suburbs of Seoul and vice versa. Such a connection would precipitate residential development in this highly desirable bucolic agrarian region.

*Cheorwon*

The Cheorwon valley has few occupants besides the farmers who grow rice, but new development is already visible with a scattering of high-rise apartments appearing across the landscape, especially along the highway and the town of Cheorwon. The valley is wide and very flat, making it a highly desirable area for development. As a DMZ border region, it contains a number of ‘propaganda villages,’ which were originally intended to show off the prosperity of South Korean farmers with larger houses and farm plots in a highly efficient grid of fields and irrigation canals with ample reservoirs. The vestiges of war are prominently evident with the road corridor being increasingly militarized, a constant awareness of aerial presence and many scattered fenced off mine fields now overgrown with successional wetland forests. Over the years, the valley has lost much of its young population to the city. Currently it is seeing a rise in tourism with the construction of the Cheorwon Peace Observatory at the upper edge of the valley, and a direct commuter rail line between Seoul and Cheorwon planned for the near future. One of the small towns in the valley has already branded itself “The village of migratory birds” and numerous tourism activities are proposed for this site and other. The infrastructure for this ecotourism is still in its nascent stages, but there is a master plan for
the development of the peace park, which is critical to spur the activities that lead to the
development of this infrastructure. The town itself houses the Agricultural Products
Inspection Bureau along with the Iron Triangle Tourism Office. It is 2.5 hours north of
Seoul by car. There are rumors that Cheorwon is rebranding itself the “future capital city
of United Korea.” Though this moniker may be a bit optimistic.

Development:
The planned industrial complex just south of the Cheorwon Peace Observatory at the
upper east corner of the valley is being referred to as the Kaesong of the south, in
reference to the existing industrial complex that was established on the northern side of
the DMZ as a first step towards reunification between the two Koreas through economic
diplomacy. Kaesong houses large tech production facilities for companies such as
Samsung, where North Korean laborers make up the lower sector of the workforce. The
arrangement would probably be similar for Cheorwon’s industrial park, with industries
such as major bottled water companies, pharmaceutical companies, mining companies
and hi-tech companies showing interest in the new development. While this would bring
new people into the now depopulated Cheorwon region, without a way to integrate this
new development into the existing infrastructure and character of the region, it could
potentially overtake and eliminate the traditional land uses and become urban sprawl. In
order to combat this tendency, there must be an economically viable response built into
alternative strategies as they are introduced.
Eco-Agro-Tourism

While eco-tourism is a familiar source of income for areas that host parks and natural areas of interest, agro-tourism is more specific to the human context of a given landscape. Cheorwon has already established its position as a future hub of eco-tourism activities for the region with its rail connection and re-branding as well as the construction of a tourist center, small theme-park and tours of the southern side of the DMZ’s war relics (this is yet another form of tourism, referred to as ‘war tourism’), however it could potentially take advantage of the existing cultural landscape to enhance the typical eco-touristic approach with a more robust hybrid form of tourism called eco-agro tourism that incorporates the features of historic and currently active cultural landscapes into the framework of eco-tourism to provide a much greater draw as well as diversity of attractions. Agro-tourism typically includes various forms of “agritainment” that include things to see or experience, things to do, things to eat, and things to buy. Conversely, some forms of agro-tourism are more focused on reestablishing a connection with the land through farm stays, learning about the process of growing and making food, especially items that are a regional specialty such as wine or cheese. Often visitors will stay in traditional homes or bed and breakfast style lodging sited in the village or town where the farming takes place. There are usually agriculturally centered seasonal events or fairs. The streetscape of the village itself, along with trails through the surrounding landscape often become part of the attraction to such areas. Some international examples of agro tourism are the Agros region in Cyprus, which is a deeply historic agricultural region that offers all of these amenities. There are farm-stay programs in unexpected
places, such as Serbia and even in China. The idea of eco-agro tourism is relatively new, but international examples include the Malaysian Shah Alam Eco ‘Agricultural Park’ which is situated in protected rainforest region but hosts agroforestry and traditional rice farming alongside a wide variety of activities, tours, and events. Due to its scale, the Shah Alam Park is very popular with bicycle enthusiasts and has special events focused on biking the region. There are doubtless other examples popping up all over Asia. For eco-agro tourism to be viable in an area, there are certain factors that must exist: there must be a rich cultural landscape with a wide variety of types of attractions possible, a robust and easily accessible forms of transportation throughout the region, tourism infrastructure (places to stay, shop, eat, etc.), stable political conditions, and acceptance and participation of the local agriculturalists (Agrotourism). All these forms of tourism are focused on sustainability of local traditional culture through contact with the world and by financially making their continued existence possible along with an ethic of conservation of local natural resources.

*Rice Farming Agriculture*

Rice agriculture has existed in the Koreas since the earliest known civilization and there has even been some argument as to whether rice was first cultivated in Korea, rather than the long established belief that it originated in China. While that claim was never proven, what is known is that Korea has been farming rice throughout its history. The rice paddies constructed during the many dynasties may have outlived the urban structures themselves. The result is a rich cultural landscape of rice farming that stretches over the
entire peninsula. Some sites are especially key within this context, and Cheorwon is one of them. With the earliest civilizations having emerged in and around the DMZ, especially the Cheorwon plain (Seth, 2013, the outlines and ruins of ancient civilizations are intermixed with the fields. Historically, the rice agricultural system was a feudal system with tenant farmers working the land under wealthier landlords. During Japanese occupation, just before the Korean War, these landlords were removed and were replaced with Japanese landlords (Brady 592-593). Even today, the farmers do not own the land they farm, with approximately 80% of the farms being owned by wealthy investors in Seoul (Kim Lecture).

The season begins in early spring, as early as February, with a preliminary tilling and repairs being made to the compacted earth ‘bunds’ or mounds that enclose the fields. The fields are then flooded and the hardpan is re-established through a process called ‘puddling’ where a tractor is fitted with cage wheels or a wide flat tool that compresses the mud and destroys the soil structure, creating a seal on the bottom of the field that prevents water from being lost through percolation down to the water table. Once the weather is warm enough, the water level is reduced to accommodate seedlings, which are mechanically transplanted from a small nursery plot to the larger fields. As the seedlings grow in height, more water is allowed into the field until they reach a mature size. The water level is a critical factor in the success of the rice in setting a heavy crop of grain. If it is too low or too high, the rice will be sparse or sub-par. In order to control this level, a very complex and highly coordinated irrigation network is built across the entire valley. While farmers have precise control over their own fields, the system must be operated
cooperatively (CIMMYT). The nature of this system makes up its own artificial watershed, which will be discuss in more detail in a later section. Near the end of the summer, as rice reaches maturity, it must be monitored closely for water content, and when the correct stage of ripening is achieved, the water must be completely drained from the fields and the crop dries out and is ready to harvest. This precise timing results in a tangible seasonality that registers on the landscape scale. Each phase of the process requires cooperative action across on valley wide scale among farmers and processing plants.

The final stage is harvesting, which includes cutting the rice stems, removing the grain from the rest of the biomass and sorting and storing the grain. Since the combine required for this stage of harvest is often a very expensive and specialized piece of equipment, smaller farms do not often have access to this and are more likely to utilize some combination of hand driven harvesting tool and a small free standing separator. This, lower-tech option requires more labor and often mistakes are made when curing the rice in bundles, resulting in waste rice that gets scattered throughout the fields. While farmers elsewhere would burn or discard this, often moldy, waste rice, those in a small village in Cheorwon, called Yangi-ri, have discovered that they can conserve this waste and disperse it in their fields to attract migratory birds, including the rare red-crowned and white-naped cranes that the area hosts during the migration season in winter. The result is a symbiotic relationship, where the birds take advantage of a hybrid form of agricultural wetland that contains food and habitat and the farmers benefit from money spent by eco-tourists to be able to see the birds in the wild.
The system that makes both habitat and farming possible is the irrigation infrastructure that defines the form of the site. The larger, mountainous watershed captures rainwater from regions upstream and channels it into streams that flow into small upland valleys, which are blocked with manmade structures to create reservoirs. The Cheorwon valley is ringed by four such reservoir, the largest of which is the Togyo reservoir to the east. The migratory birds use the reservoirs themselves extensively as habitat during all four seasons. The water in the reservoirs is then released seasonally into a system of irrigation canals that are strategically positioned to maximize the slope of the landscape to move water to the furthest reaches of the valley and then to flow downward into the network of fields in increasingly smaller canals and ditches. The individual fields each have access to a ditch or canal where an opening is controlled by a check dam, which can be lifted, lowered and adjusted to control flow and maintain balance between the field and the larger system in order to maintain an even water level (see figures 3, 4, and 5). Once water is in the field, it is basically stagnant and sits still, if the field is kept properly drained during off seasons, this can result in the putrefaction of vegetative materials in the field and release of greenhouse gasses into the environment. Rice paddies are believed to contribute approximately 50 to 100 million tons of methane into the air per year (GHG online). To combat this, farmers are required to keep their fields as dry as possible during the off season, resulting in less wetland-like habitat for animals. Water is drained from the field on the opposite edge from the irrigation canal – into another canal that carries water further downstream – to
Irrigation of Individual Rice Fields

Figure 3
Rice Paddy Irrigation System: Group Dynamics

Figure 4
Figure 5

Watershed system: Reservoir, Canal, Ditch, Stream River.
other fields of out of the system into the nearest river. Although data on the quality of the streams and rivers isn’t readily available, erosion is a known problem throughout Korea and these rivers receive influxes of water from fields that far exceed their normal input, especially during periods of drying out of the fields, and inundation, when the reservoir drains its excess directly into rivers through a drainage sluice. Since Cheorwon’s rivers empty into the Han, which in turn empties into the invaluable Han delta, it is critical to begin to think about better ways to manage this system that are more sustainable for the rivers, which are visibly degraded in satellite images. An additional critical point of concern with this system is the predicted and already occurring decrease of available water in the watersheds through reductions in rainfall caused by climate change, along with more and more rainfall occurring in sudden, intense storms which generate massive volumes of water that is immediately discharge into the river rather than infiltrated due to the configuration of the existing system (SWAT Conference). This will result in less and less water for irrigation as seasonal rains are lost into the system rather than captured within the landscape.
Chapter 3: Landscape Intervention Catalogue

**Intervention 1: Precedents**

*Balmori – Prairie Waterway, Farmington MI*

This project, built in 1996 was an early work of Balmori’s firm and placed her firmly in the spotlight with its successful implementation of landscape infrastructural strategies for an intermediary landscape around water and ecosystems services as well as defining a highly successful public recreational space. The project is situated on 91 acres between a large housing development (500 houses) and existing agricultural lands with the role of remediating runoff from both in the form of a didactic and habitable system. The wetland consists of several large retention basins and a long winding stream that carries water slowly through vegetation out to the Vermillion River. This system remediates stormwater as well as retains it during peak run off to prevent erosion of the river by dumping excessive amounts during storms.

Balmori makes many points related to landscape infrastructure/landscape urbanism in her ‘landscape manifesto’. Among these arguments were that “We must put the twenty-first-century city in nature rather than put nature in the city. To put a city in nature will mean using engineered systems that function as those in nature and deriving form from them.” This edict is truly key to the how her approach is informative of the South Korea site. The
sites are both areas that are under pressure from increasing development due to overflow from adjacent large metropolises, in the case of Farmington, Minneapolis (Balmori, 79-86.)

Michel Desvigne: Lyon Confluence, Paris, France

Michel Desvigne illustrates the use of a unique concept for the design process for the Lyon Confluence, which he refers to as a ‘prefiguration landscape’. Desvigne convinced the mayor that a large park could be built in place of industrial ruins on a section of riverfront in Leon. The difficulty was obtaining the removal of many vacant and declining factories and warehouses in the area. To show that plans to develop the area in and around the proposed park, Desvigne began designing small swathes of plantings which were interjected where sites had been cleared in narrow linear bands that projected into the surrounding industrial landscape. These green bands outline the beginnings of future development as well as serving as placeholders for a larger park to take the place of many of the abandoned factories on site. On the Cheorwon site, this could initiate a flexible system where farmers take greater role in managing the patterns of rice and other agricultural activities within the green space as a cooperative group.

Desvigne clarifies how this strategy builds upon and offers alternatives to conventional planning approaches of the past:

“If the landscape is a structural frame, it also offers the possibility of temporarily occupying some parts of the city undergoing transformation, in which many unknowns remain. While waiting for construction, these intermediate natures immediately provide positive attributes to the sites. Of course, this is an artifice: this provisory, fulfilling landscape is liable to be destroyed one day to make room for buildings. We see how this idea differs from the concept of préverdissement (plant today, build tomorrow),

28
which developed in the 1970s. It cannot be a question of producing the negative of a site plan, but rather of giving the land an immediate status, maintaining it, and accepting its transformation. This falls in the category of management, maintenance, and respect, even though the qualities and uses are only temporary. (Tiberghien, 38)

The Lyon Confluence design informs a strategy that could be applied to the scale of how individual rice fields inform the scale of valley and region. As individual properties within the structure of the industrial landscape of the confluence related over time to eventual plan for their demolition and incorporation into the space designated for redevelopment, so too could individual rice paddies or groups of paddies be converted to reflect the future coherence of the site.

_Turenscape - Shenyang Architectural University Campus, Shenyang city China_

Build 2004 on 21 acres of former rice agricultural land the university maintained active agricultural fields on its campus instead of converting to a tradition campus landscape. This move was designed to create dialogue among students and professionals around issues of sustainable agriculture, food security and disappearing cultural landscapes in China. The rice is rotated with buckwheat and is harvested annually. The design incorporates the logics of traditional agriculture and is organized over these traces and includes rows of poplars, another agriculturally valuable crop to define the walkways and connect spaces (Turenscape). The design is arguably ‘boutique’ in scale as it is not accessible by the machinery necessary to cultivate large fields and as a result the productivity of these fields does not contribute on a meaningful scale to the local
economies. The precedent could perhaps be more effective with modification to be more relevant to the communities where it is situated.

SWA: _Anning River New South Town, Miyi, China._

Principal Yin-yu Hung, graduate of Harvard GSD and clearly takes a landscape infrastructure approach when she wrote a piece by the same name to start off her firm’s latest book, also titled Landscape Urbanism. Hun defines landscape infrastructure and sets out four key principles to successful implementation: Performance, Aggregate, Network and Increment. Notable among SWA’s most recent work is the Anning River New South Town, a 200-hectare site in the historic district of Miyi County and straddles the Anning River, which is highly polluted. The project was titled “Future Historic Ecologies and its imperatives have much in common with this thesis. The project is called an ‘ecological resort district’ which translates into urban opens space (Hung 56-57). Like the Cheorwon project this design was keyed to cater to tourists attracted to the regions historical value and centers on existing water circulation systems. The system also has viable infrastructural importance in flood control. In addition, this project also took into account the many corridors within the watershed and employed space – defining buffer plantings that contribute to overall regional character. Remediated water further down the system serves as swimmable recreational space.

_Wanzhuang Eco-City of agriculture, China._

This city is designed for an 80-kilometer-wide site amidst agricultural lands. Some of the featured design foci are creation of a sustainable community, with low-carbon infrastructure and an ecologically sound platform for clean industrial development and
economic growth. The site design is being promoted as location for business/life environment that is ‘sympathetic’ to existing agricultural land use, and regional character. Among its goals are to attain a high degree of connectivity and extensive interface with the local agricultural community (Mostafavi et al, 600-605). However, how it does this is not entirely clear, as the development seeps scattered broadly across the rice fields. Perhaps the organization logic is based in the patterns of the fields, but just basing a design in field patterns without attention to the needs of density may not be the answer. The existence of this example lends credibility to the fact that there is demand for new forms of urbanisms that relate to their agricultural surrounds and perhaps also show the degree to which solutions are still somewhat unclear.

Proposed Intervention 1: Rice Field Urbanism

Wetlands form the foundation of the local ecosystem and they have been replaced with rice paddies. The rice paddies serve a role in some limited ways as habitat for some migratory birds, they are a stand-in for the prior ecosystem that do provide some ecosystem services. Since rice paddies do not allow water to infiltrate into the ground, but rather temporarily trap it in place, neither do they provide remediative effects in terms of pollutant removal and they do not allow for a high degree of biodiversity being that they are a highly modified monocrop. The need to reintroduce some of the ecosystem services that wetlands provide in order to developing areas, the first move is to find a way to introduce wetlands into the site as part of the city-building infrastructure.
There are two specific habitats on which this project focuses within the Cheorwon site: the first is Cheorwon plains and wetlands, which no longer exist on the site but are proposed to be reclaimed from the rice farming industry in a manner that is least disruptive to ongoing farming while establishing a strong spatial system and infrastructural framework for the developing urban centers within the valley. The second habitat type is forest, which currently only exists on very steep, erosion-prone topography where it is absolutely impossible to build and in areas that that contain active mine fields and have been fenced off from agricultural production, these form small patches across the landscape.

In order to establish a design that incorporates Foreman’s logics as well as a number of design precedents, it was important to start with the wetlands and the logic of their intervention into the historic existing rice agriculture hydrological and topographical systems.

The design attempts to meet several of Foreman’s key edicts in protection watersheds under development pressure. The first is to establish a set of successive vegetative bands, parallel to the river corridor where development takes place.

Second the incorporation of wetlands to mitigate and remediate surface runoff within and around the developing area are highly recommended to store surface runoff.

Wetlands supply a number of vital roles for the threatened watershed and restore some of the missing habitat and ecosystem services to the valley while providing green space opportunities within the urban fabric as it develops. Wetlands in isolation do provide a
few benefits, but they are far more impactful when connected into a system (Foreman, 228, Item D)

Wetland benefits can be summarized as ecosystem services to the communities they inhabit including surface runoff holding to prevent floods, control erosion, and recharge groundwater as well as remove pollutants from water, which is beneficial to the agricultural lands downstream as well as upstream. Perhaps the most critical purpose for maintaining these wetlands on site would be to store water that normally would simply leave the system directly via overflow into the river. The major climate change effects on the region are expected to be increased intensity of storm events and potential water shortages, which could be devastating for the local agricultural activities. By storing water in wetlands, treating and retaining surface runoff, the local hydrology sustains far less damage and impact from increased urban pressures.

In addition to this, wetlands provide a dynamic, seasonally changing, successional open space with high habitat value. Many other forms of green space could be attached throughout the city to add to the open space value, including traditional parks, walking/biking path networks, urban farming and gardening plots, green walls and roofs, indoor agriculture and orchards. With this space built into the city, it is possible to envision many possible attractions within traditional and future forms of sustainable urban agriculture that could serve as eco-agro-tourism attractions including wineries, collaboration with the arts and research opportunities.
While the wetlands provide the framework within which the urban development and expansion takes place a second element is required to connect the wetlands within these areas to the areas outside. (Foreman, 228, Item F) In order to populate the restored wetlands quickly with a high diversity of local species, best results occur when a restored wetland has a connection to a remnant wetland (Forman, 228). On the site, the closes thing to a remnant would only exist within the DMZ, therefore, this system would ideally connect to the DMZ itself at some point or multiple points as it expands.

Landscape ecologist, Richard Forman suggests retaining an edge of open space around urban developments as a form of “placeholder” that could become future green space when development continues on the other side. Wetlands have much to offer as an interface between development and farmland as seen in the example of Farmington, IN designed by Diana Balmori., where the wetland did not precede development but came alongside plans to develop rather than later.

The upper terraces would be the first to become less productive due to difficulty irrigating them, erosion factors and development needs. The upper terraces follow the contours of the landform and make them legible through a curved pattern. These rice fields tend to be smaller and have more convoluted edges, which are very well suited to habitat.

For this site, this process can begin to take form by designating a group of fields as green space and strategically taking a number of those fields offline from production. These
converted fields form the outline of the future urbanized space based on the layers of
topography created by the forms of the rice terraces. (see figures 6 and 7)

The wetland rice fields define the edge of this first terrace but active rice or dry crop
fields can continue to be farmed within the open space bands as they are spacious enough
to accommodate both. The terrace below these green space fields will now begin to allow
concentrated development. As development increases, another layer of parcels will be set
aside to convert to productive green space with wetlands woven throughout.
Figure 6
Development Pattern: First layer of preserved landscape.

Figure 7
Meanwhile, the most productive areas in the valley continue to be productive just below the developed terraces.

Figures 6 and 7 show the logic of the intervention with additional layers of urbanism interspersed with layers of wetland until the farmland is potentially eventually phased out between the topography and the river in this section of the valley. This is just the first element of intervention on this site, there is still need to create a network that allows flows to perforate these alternating bands to the other edge and this will be the subject of the next intervention.

This mapping shown in figure 8 shows one way the matrix of fields and development might appear in plan. The bands could be thicker or thinner in relation to one another, however the upper contours tend to be narrower than the lower ones so the shape would potentially become wider as it progresses down the valley.
Expanded Development Pattern, Onsite

Figure 8
**Intervention 2: Precedents**

*Precedents: Wang Shu*

By conserving this infrastructure, a sense of place and connection to history are embedded in the streetscape as in the example of this commercial street called Zhongshan Road in the Chinese canal city of Hangzhou, designed by architect Wang Shu’s firm Ametuer Architecture. The canal system is preserved embedded into this now mixed commercial district as a unifying set of circulation and open space elements housing water gardens and accepting surface run off. The ideal of preserving traces of previous urban forms is evident also in the maintenance of historic dimensions for this street rather than converting to the extra wide Americanized ideal that the rest of the city adopted.

*Precedents: Richard Forman*

This project takes cues, again from the existing site processes to utilize the existing irrigation and drainage networks to perforate the rings or bands of development with linear stretches of habitat within which the irrigation ditches or streams can flow in the forms of canals or open streams, lined with trees and shrubs to connect the bands of wetlands with the landscape beyond In the earlier phases, the infrastructure would have to be maintained more or less intact to allow water from the reservoirs to reach the fields. The infrastructure, which consists of progressively smaller in ground concrete channels that have rectangular profiles, could fit into the development patterns as a unique water feature within the street setting such as the canals of Wang-shu’s (Ameteur Architecture) Zhongshan Road in Hangzhou, China where the city’s trademark canals were preserved
at a street scale in a commercial district as a stormwater and aesthetic feature that gives identity and a sense of connection to the city’s past. These canals could take on a variety of uses, depending on their size, larger ones could connect neighborhoods with larger wetlands, allowing kayak access across the landscape, others could house fish for decoration or consumption, and others could become planters or wetland gardens as they are decommissioned. While water entering fields from the reservoir is carried by the concretized channels, water leaving them often ends up in naturalized, yet highly degraded streams. These streams could also be maintained within the urban context as linear connections between the interior wetlands to those on the outer ring and through the surrounding countryside. Both the concretized canals and the naturalize streams will continue to serve as conveyance form surface-runoff that has been treated in the interior wetlands downstream toward existing fields and the river. Vehicular and/or pedestrian traffic can make use of these same corridors.

**Intervention 2: Irrigation Infrastructure Circulation Network**

In order to provide connection and transfer flows between the bands introduced in the previous intervention, an existing infrastructure can be adapted to provide this framework. The irrigation canals could connect existing areas of forest vegetation on the upper slopes through the urban matrix to the river corridor. By following the existing irrigation canals, natural streams, streets, boulevards, paths and bikeways with plantings of various densities, both a critical ecological buffer and a system of circulation can be established that sets the groundwork for connection to the extended landscape beyond the
city. Waterways and circulation have historically been a strong landscape pair, and this landscape offers a unique variation with its wide concretized canals offering the potential to add kayaking to the mix.

As upper bands of fields are converted to wetlands, the irrigation canals can continue to serve lower fields and provide unique landscape features within the urban fabric as they are decommissioned or converted to overflow management for the wetlands. The infrastructures themselves act as remnants on the landscape but also harbor functional capacities.

This conceptual diagram in Figures 10 and 11 shows how these corridors could provide a thickened edge of program intersecting the open spaces and urban matrix; connecting them visually as well as providing habitat connectivity and stream buffer material.

**Intervention 3: Precedents**

*Precedents: Michel Desvigne*

In the designs of Michele Desvigne, these linear patterns are comprised of dense plantings along the edges of critical infrastructures such as roads and streams as well as hedgerows and wind breaks along field edges. These spaces are designed to provide connectivity for residents to interact with the surrounding landscape in the form of recreation such as walking, biking and horseback riding. In addition to the ecosystem value of these elements, the added coherence and structure that such simple plantings can add to the overall sense of place by using local species.
Development Pattern: Expanded, with Irrigation Infrastructure Embedded

Figure 9
Figure 10

Irrigation Infrastructure in Development Zone

DMZ Eco Park
Here another project by Michel Desvigne, in Bilbao, Spain which demonstrates use of distinctive endemic vegetation, used to connect a highway corridor to both the city and the countryside. The massings and patterns take cues from the site and intensify its character through strategically emphasizing these often hidden patterns. Often Desvigne’s projects on this scale have a component of eco or agro tourism built in that requires a strong regional character to be visible in the landscape.

*Precedents: Forman*

Wetlands need to connect to other kinds of ecologies, especially forest and successional habitats, this is often accomplished through riparian vegetation along contributing stream corridors and drainage ways (Forman 230-231) as well as connection to surround forest and networks of hedgerows and street trees. For this a network ecology approach is proposed to connect forested topography of the surrounding mountains, urban streets, wetlands, streams and the agricultural land beyond.

In order to connect the various patches of ecologies across the valley floor, it will be important to preserve existing patches and build additional ones to form a thicker-edged corridor. To build up the forest areas without losing productive land, the project suggests the addition of hedgerows, orchards, nurseries and poplar plantings as ways to fill the open voids and connect patches to each other in this area. These hedgerows can connect to the urban development where the street trees leave off, creating a continuous logic to the landscape that serves vital functions. Forman points out that this form of vegetative network helps to consolidate and maintain urban concentration while helping to promote a sense of community and culture (Forman, 235). Desvigne uses such patterns very
successfully in this large-scale exurban projects to yield a sense of ‘coherence’ and connection between urban and rural areas.

*Intervention 3: Extending the network to the larger landscape*

The linear pattern of the second intervention can connect with another system of linear connections across the landscape that fit with the agricultural landscape.

This diagram in figure 12 shows a system of hedgerows and windbreaks, as tree-lined sections of highway, alées, and stream buffers, depending on position in the landscape provide connectivity from the plantings along the irrigation systems. Forman refers to this as a “major natural-vegetation network” or also ‘emerald network’ due to the fact that these small corridors provide connectivity between larger habitat patches and smaller ones within the landscape (Forman, 232). Additionally, incorporating a net of space defining sections helps to differentiate urban centers and prevent them from coalescing into a homogeneous continuity with not definition between them.
Figure 11
Intervention 4: Precedents

Precedents: Forman

According to Forman “large patches” or areas of uninterrupted naturalized space are critical to species conservation because they allow species which are not able to withstand close contact with human activities room to develop and thrive (Foreman 82 – 93). In the case of the site in Cheorwon, the two sides of the valley that are included in the conservation master plan form the large patches. The Eco parks contain a great deal of upland Mongolian oak forest and some remnant wetlands and plains, however there is little remaining habitat in the valley to connect these large eco park across the valley. Forman points out the need for small patches between large patches to serve a “rest stops” for wildlife movement. Taken together with the previous two interventions, the irrigation network and the green matrix, a system of forest patches across the base of the valley could provide continuous movement of species through the valley without converting it to a park. The benefits of the two large patches are much greater if they have a strong connective tissue of green spaces between them that allow a large number of different species to move between them (Forman, 199). The system that connects them, according to Forman, should be composed of a network of ‘corridors’ which connect smaller patches together. The creating of these patches and corridors are the subject of interventions 3 and 4, but they also play a critical role in the establishment of the intensively vegetated thicker-edged corridor that intervention 4 creates. All of these interventions taken together are meant to create an infrastructure across the territory of
the valley for a strong mesh of both existing remnant agriculture, along with more resilient and less water intensive agricultures that provide greater habitat value.

**Precedents: Michel Desvigne**

In many of his projects, Desvigne uses a combination of orchards, nurseries and plantings of trees which can be harvested for wood or biomass. All of these uses have great potential on this site and could be tested first in the proposed corridor, replacing a number of rice paddies with highly productive, less water intensive, more resilient and diversified agricultural network. Once these forms of agriculture gain acceptance, they might appear throughout the landscape outside the corridor, providing additional potential to allow additional species to enter region. This use of various agriculturally-based forms of plantings, the roles of which are both productive and ecological, and the futures of which are open-ended, and adaptive are reflected in Corner’s comments on Desvigne’s work: “His idea of substitution is particularly relevant to this point, as he easily adapts by substituting one material for another while retaining the original cartographic lay-out—the organization and trace remain the same, but the material substitution creates a host of new or alternative possibilities.” (Tibergien et al, 10)

**Intervention 4: Patches and Corridors**

Figure 12 shows the outline of a potential animal movement corridor across the lower section of the valley, outlined in green, which would connecting the DMZ across the area
slated for development. This corridor already has many existing remnant patches of mountain forest and mine field forests that could be connected by a network of hedge-rows and arboreal farming methods as well as areas of additional green space to produce an area of intensified eco-tourism interest as well as opportunities for symbiotic interaction between agriculture and endemic species.

Although the wetland forests of the valley floor have been cleared for agricultural production, there are existing patches scattered throughout the rice fields. These patches are contaminated with unexploded mines from the Korean War. It is estimated that there are over a million such unexploded land mines throughout the DMZ and surrounding areas (Brady, 586). Although these patches cannot currently become productive or be used as green space, they still offer considerable ecosystem benefits and a high degree of biodiversity. By connecting to these remnant patches early in the process, they can contribute biodiversity to other parts of the network. Eventually, these forests would be de-mined as the region becomes more populous.

Forman also notes that highways are the one of the most influential factors in breaking up large areas of habitat and preventing active flows between large populations, leading to a lack of genetic diversity. Landscape ecologists have confirmed the effectiveness of both wildlife underpasses and ‘wildlife bridges’ and recommends them for situations where vital habitat must be connected across a major transportation corridor, as is the case in Cheorwon (Jongman, 83). In figure 12, the corridor is shown intersecting two major highways that cross the valley (in orange). Since movement of wildlife through the
habitat intensive thickened-edged corridor (in green) can be channeled effectively through the use of spatial differentiation the most effective places to strategically place bridges or underpasses would be where the corridor overlaps the road.
Figure 12
Conclusion

This project set out to answer a specific question: ‘Can landscape architecture design theory provide guiding logics that can be used to generate a resolution to the tension between agriculture, ecology and urban development?’ Moreover, could this design approach do so preemptively, knowing the potential for development and prefiguring it through incorporation of systems and structures that create a setting for development that is specific to the character of a region? Through the process of literature review, landscape urbanism and landscape infrastructure were conceivable as a set of distinct design initiatives and logics, however they remained abstract and difficult to connect to a specific site.

Through site analysis, it became clear which elements of the site were to become to focus of transformative intensification through design in order to set the infrastructural groundwork for the incoming development.

Finally, through the study of applicable precedent work, suggestions for the productive application of theoretical concepts to a specific site were demonstrated in ways that could be extrapolated and expanded upon for the site considered. This process of intensive synthesis between the conceptual, the practical and the possible required a strong set of connections between the three that emerged over the course of the project as the result of
a process of intellectual feedback. The result is a project that demonstrates the potential for using such a design approach to begin to address tensions that exist on a large scale and require specific solutions. While not all cases will resolve as well as this one did, with existing landforms offering solutions and infrastructures for incoming development clearly legible across the site, the theory clearly does work as a generator for design strategy that potentially can productively resolve these tensions. While this project remains at the speculative level, it could be developed further to begin to find ways to integrate at a finer grain within the landscape and to materialize in a clear set of design schemes that could be built as designed, it will be left as understood that this scale could be reached while sustaining these logics and expanding upon them. Landscape Urbanism and Landscape infrastructure are the new direction that landscape architecture is moving towards as such, it was important to formulate an understanding of the theory and how it was applicable and in that respect, this project was successful.
References:


Barnett, R., (2013). *Emergence in landscape architecture*


Rouse, D. C,. (2013). *Green infrastructure : A landscape approach*


White, Mason, Przybyski, Maya, InfraNet Lab (Firm), (2010). *On farming*. Barcelona; New York; Barcelona; New York: Actar; Distributed by ActarBirkhäuserD.