Spring 5-8-2010

Riparian Efformation

Laura C. Brodersen

University of Nebraska at Lincoln, lalawithaj@hotmail.com

Follow this and additional works at: http://digitalcommons.unl.edu/archthesis

Part of the Architecture Commons

Brodersen, Laura C., "Riparian Efformation" (2010). Theses from the Architecture Program. 93.
http://digitalcommons.unl.edu/archthesis/93
RIPARIAN
EFFORMANCE

By
LAURA BRODERSEN
A Terminal Project
Presented to the Faculty of
THE COLLEGE OF ARCHITECTURE AT THE UNIVERSITY OF NEBRASKA

In Partial Fulfillment of Requirements
For the Degree of Master of Architecture

MAJOR: ARCHITECTURE

Under the Supervision of Professor Jeff Day

LINCOLN, NEBRASKA
05:10
This thesis deals with two widespread issues facing contemporary society and the environment which it finds itself:

1. It is often assumed that what and where one calls home is straightforward, that our sense of home and identity are singularly rooted in a local place. Rather than being seen as an integral aspect of social life, mobility has been regarded as a special and temporary phenomenon classified under such headings as migration, refugee studies, and tourism. But increasingly, modern forms of dwelling, working, and playing involve circulating through a geographically extended network of social relations and a multiplicity of widely dispersed places and regions.

2. Trends in pollution and mass fertilization of crops have led to low levels of oxygen in the Mississippi watershed. As a result, one of the largest hypoxic dead zones in the world occurs at the Mississippi River outlet in the Gulf of Mexico. Fixed infrastructure river communities and remedies have proven to be detrimental to the needs of the diverse and changing river environments.

In response to the current cultural sense of place, an increasingly mobile lifestyle, liberation from boundaries, and neglect for the land to, Riparian Efformation proposes a flexible future architecture which caters the mobility of a network of people to negotiate with a specific environmental force: hypoxia on the Mississippi River.

At a local level, sense-of-place meanings are less stable than they once were, being buffered by increasingly distant and uncontrollable social and economic forces. Meanings have become more fragmented and boundaries have become more permeable. For example, international trade, travel, media, and migration increasingly challenge or contest traditional meanings of many communities.

Recognizing that mobility is no longer the disruption of life that it was once presumed to be, this condition effectively dislodges what have long been geographically bounded conceptions of culture, home, and identity. People, cultures, objects, images and ideas migrate with modern communication technologies we can even experience virtual migrations. The point here is to emphasize that mobility, by any means, has a profound impact on the meaning and experience of place, social interaction, and our very sense of self.

As a result of this research, I developed Riparian Efformation as a way to connect and adapt our built world to the environment. The project is a system of living that would take advantage of its temporary location in order to repair the permanent damage stricken on the land by stationary architecture. Similar to a riparian vegetation zone, an architectural buffer is created to filter water before it reaches the Mississippi River. A stronger bond to the environment is created via geographic exposure and a social condition is manifested as a customizable physical network resembling something similar to our virtual social networks. Proximity to only the most relevant activities and relationships can easily be adjusted to be more inclusive of the totality of one’s identity as opposed to the modern geographically extended condition of work, home and leisure.

Architecturally, a hydrostatic skeleton would provide Riparian Efformation a fluid structural system that allows the spatial configuration to morph and adapt to its environment as well as neighboring dwellings and the entire community. Interweaving of chains of dwellings which are then tethered to a minimal number of anchors in the land permits minimal foundation along the river’s edge as well as a flexibility to move with the changes in the river. The community is further secured to the hydrology of the natural environment by circulating the earth’s water...
This thesis deals with two widespread issues facing contemporary society and the environment which it finds itself:

1. It is often assumed that what and where one calls home is straightforward, that our sense of home and identity are singularly rooted in a local place. Rather than being seen as an integral aspect of social life, mobility has been regarded as a special and temporary phenomenon classified under such headings as migration, refugee studies, and tourism. But increasingly, modern forms of dwelling, working, and playing involve circulating through a geographically extended network of social relations and a multiplicity of widely dispersed places and regions.

2. Trends in pollution and mass fertilization of crops have lead to low levels of oxygen in the Mississippi watershed. As a result, one of the largest hypoxic dead zones in the world occurs at the Mississippi River outlet in the Gulf of Mexico. Fixed infrastructure river communities and remedies have proven to be detrimental to the needs of the diverse and changing river environments. In response to the current cultural sense of place, an increasingly mobile lifestyle, liberation from boundaries, and neglect for the land to, Riparian Efformation proposes a flexible future architecture which caters the mobility of a network of people to negotiate with a specific environmental force: hypoxia on the Mississippi River.

As a result of this research, I developed Riparian Efformation as a way to connect and adapt our built world to the environment. The project is a system of living that would take advantage of its temporary location in order to repair the permanent damage stricken on the land by stationary architecture. Similar to a riparian vegetation zone, an architectural buffer is created to filter water before it reaches the Mississippi River. A stronger bond to the environment is created via geographic exposure and a social condition is manifested as a customizable physical network resembling something similar to our virtual social networks. Proximity to only the most relevant activities and relationships can easily be adjusted to be more inclusive of the totality of one's identity as opposed to the modern geographically extended condition of work, home and leisure. Architecturally, a hydrostatic skeleton would provide Riparian Efformation a fluid structural system that allows the spatial configuration to morph and adapt to its environment as well as neighboring dwellings and the entire community. Interweaving of chains of dwellings which are then tethered to a minimal number of anchors in the land permits minimal foundation along the river's edge as well as a flexibility to move with the changes in the river.

The community is further secured to the hydrology of the natural environment by circulating the earth's water.
Hypoxia means “low oxygen.” In estuaries, lakes and coastal waters, low oxygen waters do not have enough oxygen to support fish and other aquatic animals. Hypoxia can be caused by the presence of excess nutrients in water. Excess nutrients can cause intensive growth of algae. The consequences of this enhanced growth are reduced by sunlight penetrating the water, a decreased amount of oxygen dissolved in the water, and a loss of habitat for aquatic plants and animals. The decrease in dissolved oxygen is caused by the degradation of dead plant material (algae), which consumes available oxygen. The overall effect is called eutrophication. Nutrients can come from many sources, such as fertilizers applied to agricultural fields, golf courses, and suburban lawns; deposition of nitrogen from the atmosphere; erosion of soil containing nutrients; and sewage treatment plant discharges.

A direct effect of hypoxia include fish kills which deplete valuable fish stocks and damage the ecosystem. Non-mobile animals cannot move to healthier waters and are often killed in hypoxic episodes.
During the spring, sun-heated freshwater runoff from the Mississippi River creates a barrier layer in the Gulf, cutting off the saltier water below from contact with oxygen in the air. Nitrogen and phosphorous from fertilizer and sewage in the freshwater layer ignite huge algae blooms. When the algae die, they sink into the saltier water below and decompose, using up oxygen in the deeper water. Starved of oxygen and cut off from resupply, the deeper water becomes a dead zone. Fish avoid the area or die in massive numbers. Tiny organisms that form the vital base of the Gulf food chain also die. Winter brings respite, but spring runoffs start the cycle again.
Throughout the world, large areas of our coastal waters are becoming so polluted that they lack sufficient oxygen, one of the basic building blocks of life. Although this is sometimes a natural condition, the increased area of water affected, extended length of each episode, and higher frequency in recent decades are due to human activities. Over enrichment of estuaries and coastal waters with nutrients, especially nitrogen, stimulates outbreaks or “blooms” of algae that consume vital oxygen from the water when they decompose. The effects of hypoxia include fish kills and shellfish bed losses. These losses can have significant detrimental effects on the ecological and economic health and stability of coastal regions.

GLOBAL DEAD ZONES

1 CONFIRMED HYPOXIA

2 POSSIBLE HYPOXIA

3 IMPROVING CONDITIONS
Throughout the world, large areas of our coastal waters are becoming so polluted that they lack sufficient oxygen, one of the basic building blocks of life. Although this is sometimes a natural condition, the increased area of water affected, extended length of each episode, and higher frequency in recent decades are due to human activities. Overenrichment of estuaries and coastal waters with nutrients, especially nitrogen, stimulates outbreaks or "blooms" of algae that consume vital oxygen from the water when they decompose. The effects of hypoxia include fish kills and shellfish bed losses. These losses can have significant detrimental effects on the ecological and economic health and stability of coastal regions.

The largest hypoxic zone in the United States forms every spring and summer in the Gulf of Mexico. The Mississippi River is the largest river system in the United States and the largest of North America. About 2,320 miles long, the river originates at Lake Itasca, Minnesota and terminates in New Orleans, Louisiana. Along with its major tributary, the Missouri River, the river drains all or parts of 31 states.
We are debating which bits of the life support system we might sacrifice without fatally damaging its workings.

Biodiversity is more than the sum of its parts. Our economies are riddled with beneficial subsidies and incentives that lead to environmental degradation. Assigning value to the full range of ecological services provided by the natural world may prove impossible. Still, the known economic value of certain services to agriculture such as nitrogen-fixation, pest control and pollination is staggering. It stands to reason that wild ecosystems offer an immense "option value" to society. Yet putting a realistic dollar value on the services they provide as living repositories for potential crops, medicines, and other products is a daunting task.

One problem with valuing and protecting services such as genetic diversity, flood control, waste clean-up, and even natural pest control is that the benefits typically extend well beyond the boundaries of the defined ecosystem. An ecosystem threatened by a particular land use decision may provide regional benefits, while the land use changes gives direct value to the landowner. Irreversible decisions about what to save and what to let go, based on today's valuations, would be plagued by too many uncertainties. Many of our current decisions to sell off bits and pieces of our ecological life supports have a reckless quality to them.

The issues of the Mississippi watershed are in direct accordance with the issues of an ecological price tag.
We are debating which bits of the life support system we might sacrifice without fatally damaging its workings.

ECOLOGICAL PRICE

Biodiversity is more than the sum of its parts. Our economies are riddled with beneficial subsidies and incentives that lead to environmental degradation. Assigning value to the full range of ecological services provided by the natural world may prove impossible. Still, the known economic value of certain services to agriculture such as nitrogen-fixation, pest control and pollination is staggering. It stands to reason that wild ecosystems offer an immense "option value" to society. Yet putting a realistic dollar value on the services they provide as living repositories for potential crops, medicines, and other products is a daunting task.

One problem with valuing and protecting services such as genetic diversity, flood control, waste clean-up, and even natural pest control is that the benefits typically extend well beyond the boundaries of the defined ecosystem. An ecosystem threatened by a particular land use decision may provide regional benefits, while the land use changes give direct value to the landowner. Irreversible decisions about what to save and what to let go, based on today's valuations, would be plagued by too many uncertainties. Many of our current decisions to sell off bits and pieces of our ecological life supports have a reckless quality to them. The issues of the Mississippi watershed are in direct accordance with the issues of an ecological price tag.
The largest hypoxic zone in the United States forms every spring and summer in the Gulf of Mexico just west of the mouth of the Mississippi River. This hypoxic zone has ranged in size from 16,000–20,000 km² since 1993. In 1999, the hypoxic zone was the biggest ever measured at 20,000 km², or roughly the size of the state of New Jersey. For several years before the 1993 Mississippi River Floods it was approximately half this size. Researchers now agree that this hypoxic zone is the result of huge loads of nutrients that pour out of the Mississippi and Atchafalaya Rivers every year combined with mixing patterns in the Gulf that separate surface waters from bottom waters. These conditions are optimal for the development of a hypoxic zone. Together, the cities, suburbs, and farms in the Mississippi River watershed contribute an estimated 90 percent of the nutrient flow into the Gulf of Mexico.

Dead zones are hypoxic areas in the world’s oceans, the observed incidences of which have been increasing since oceanographers began noting them in the 1970s. These occur near inhabited coastlines, where aquatic life is most concentrated. Dead zones are reversible. The Black Sea dead zone, previously the largest dead zone in the world, largely disappeared between 1991 and 2001 after fertilizers became too costly to use. Fishing has again become a major economic activity in the region.

The current Gulf of Mexico outlet comes close to overshooting the reef line, placing needing nutrients directly into a deeper, less diverse region of the ocean.

Gulf of Mexico outlet comes close to overshooting the reef line, placing needing nutrients directly into a deeper, less diverse region of the ocean.

Sediment from the Mississippi River carries fertilizer to the Gulf of Mexico.
GULF OF MEXICO DEAD ZONE

The largest hypoxic zone in the United States forms every spring and summer in the Gulf of Mexico just west of the mouth of the Mississippi River. This hypoxic zone has ranged in size from $16,000^2 - 20,000 \text{km}^2$ since 1993. In 1999, the hypoxic zone was the biggest ever measured at $20,000 \text{km}^2$, or roughly the size of the state of New Jersey. For several years before the 1993 Mississippi River Floods it was approximately half this size. Researchers now agree that they hypoxic zone is the result of huge loads of nutrients that pour out of the Mississippi and Atchafalaya Rivers every year combined with mixing patterns in the Gulf that separate surface waters from bottom waters. These conditions are optimal for the development of a hypoxic zone. Together, the cities, suburbs, and farms in the Mississippi River watershed contribute an estimated 90 percent of the nutrient flow into the gulf of Mexico.
If we are realistic about our dreams for tomorrow, our goal is not really “saving the planet” in some minimalistic form, but perpetuating its atmosphere, climate, landscapes, and living services in a state that allows human civilization to prosper. For that to occur, we need to preserve natural systems that are rich, healthy, and resilient enough to continue to support human welfare and economic activity.

Every species counts to some degree in keeping the earth’s life-support systems working. Some play crucial roles day to day; others step in the breach only in times of stress or disturbance. Organisms were not designed by natural selection to fill slots on an assembly line; each organism strives to make a living and reproduce itself. But as it eats, grows, excretes waste, and moves about, disturbing the physical environment, it unwittingly plays a part in generating grander processes that alter the flow of water, the recycling of energy and materials, the renewal of atmosphere.

The work of nature highlights examples where shifts in species have affected:
1) the persistence and stability of natural communities;
2) water quality and flow and the health of aquatic habitats;
3) soil fertility and its relation to healthy crops and forests;
4) the productivity or lushness of both our wild lands and agricultural lands;
5) the look and functioning of the landscape and the frequency of disturbances, such as fires; and
6) local rainfall patterns and weather, as well as the state of the atmosphere and global climate.
Every species counts to some degree in keeping the earth's life-support systems working. If we are realistic about our dreams for tomorrow, our goal is not really "saving the planet" in some minimalistic form, but perpetuating its atmosphere, climate, landscapes, and living services in a state that allows human civilization to prosper. For that to occur, we need to preserve natural systems that are rich, healthy, and resilient enough to continue to support human welfare and economic activity.

Every species counts to some degree in keeping the earth's life-support systems working. Some play crucial roles day to day; others step in the breach only in times of stress or disturbance. Organisms were not designed by natural selection to fill slots on an assembly line; each organism strives to make a living and reproduce itself. But as it eats, grows, excretes waste, and moves about, disturbing the physical environment, it unwittingly plays a part in generating grander processes that alter the flow of water, the recycling of energy and materials, the renewal of atmosphere.

The work of nature highlights examples where shifts in species have affected:

1) the persistence and stability of natural communities;
2) water quality and flow and the health of aquatic habitats;
3) soil fertility and its relation to healthy crops and forests;
4) the productivity or lushness of both our wild lands and agricultural lands;
5) the look and functioning of the landscape and the frequency of disturbances, such as fires; and
6) local rainfall patterns and weather, as well as the state of the atmosphere and global climate.
Biodiversity is more than the sum of its parts. Our economies are riddled with beneficial subsidies and incentives that lead to environmental degradation. Assigning value to the full range of ecological services provided by the natural world may prove impossible. Still, the known economic value of certain services to agriculture such as nitrogen-fixation, pest control and pollination is staggering. It stands to reason that wild ecosystems offer an immense “option value” to society. Yet putting a realistic dollar value on the services they provide as living repositories for potential crops, medicines, and other products is a daunting task.

One problem with valuing and protecting services such as genetic diversity, flood control, waste clean-up, and even natural pest control is that the benefits typically extend well beyond the boundaries of the defined ecosystem. An ecosystem threatened by a particular land use decision may provide regional benefits, while the land use changes gives direct value to the landowner. Irreversible decisions about what to save and what to let go, based on today’s valuations, would be plagued by too many uncertainties. Many of our current decisions to sell off bits and pieces of our ecological life supports have a reckless quality to them.

The issues of the Mississippi watershed are in direct accordance with the issues of an ecological price tag.
We are debating which bits of the life support system we might sacrifice without fatally damaging its workings.

Biodiversity is more than the sum of its parts. Our economies are riddled with beneficial subsidies and incentives that lead to environmental degradation. Assigning value to the full range of ecological services provided by the natural world may prove impossible. Still, the known economic value of certain services to agriculture such as nitrogen-fixation, pest control and pollination is staggering. It stands to reason that wild ecosystems offer an immense “option value” to society. Yet putting a realistic dollar value on the services they provide as living repositories for potential crops, medicines, and other products is a daunting task.

One problem with valuing and protecting services such as genetic diversity, flood control, waste clean-up, and even natural pest control is that the benefits typically extend well beyond the boundaries of the defined ecosystem. An ecosystem threatened by a particular land use decision may provide regional benefits, while the land use changes gives direct value to the landowner. Irreversible decisions about what to save and what to let go, based on today’s valuations, would be plagued by too many uncertainties. Many of our current decisions to sell off bits and pieces of our ecological life supports have a reckless quality to them. The issues of the Mississippi watershed are in direct accordance with the issues of an ecological price tag.
Riparian Effermation

Research/Analysis:
Louisiana’s Mississippi River
Scientists have long said the only way to restore Louisiana’s vanishing wetlands is to undo the elaborate levee system that controls the Mississippi River, not with the small projects that have been tried here and there, but with a massive diversion that would send the muddy river flooding wholesale into the state’s sediment-starved marshes.

The thing is to stop wasting 120 million tons of sediment the river carries into the Gulf of Mexico on an average year.

Because the bird-foot delta has grown so far into the gulf, she said, the river’s mouth is at the edge of the continental shelf. As a result, the sediment it carries ends up in deep water, where it is lost forever.

A diversion would send the river’s richly muddy water into marshes or shallow-water areas where the natural processes of waves, coastal currents and even storms can rework that sediment and bring it up and bring it into the coast.

About 250 miles from the gulf, near Lettsworth, La., the river stops taking water in and starts feeding it out, into the gulf through the main stem of bird-foot delta but also in distributaries like the Atchafalaya River, which flows into Atchafalaya Bay to the west.

Until people interfered with its flow, the Mississippi’s path to the gulf silted up naturally over time; water flow slowed and the river bed lost its capacity to carry a big flood. When next the big flood came, the river would suddenly turn one of its distributaries into its new main stem.

This kind of switching has occurred roughly every 1,500 years, geologists say, and since about 1950 the river has been ready for a change to the Atchafalaya. The Corps of Engineers prevents that from happening with enormous installation of locks, dams and power stations near Lettsworth, north of Baton Rouge and about 100 miles northwest of New Orleans.

Simply letting the Mississippi shift to the Atchafalaya would do a lot for the sediment-starved marshes west of the Mississippi. But it would leave cities like Baton Rouge and New Orleans without fresh water or a navigable waterway.

A more new architectural solution which contained a more flexible infrastructure would remedy a large portion of this issue.
Scientists have long said the only way to restore Louisiana's vanishing wetlands is to undo the elaborate levee system that controls the Mississippi River, not with the small projects that have been tried here and there, but with a massive diversion that would send the muddy river flooding wholesale into the state's sediment-starved marshes.

The thing is to stop wasting 120 million tons of sediment the river carries into the Gulf of Mexico on an average year.

Because the bird-foot delta has grown so far into the gulf, she said, the river's mouth is at the edge of the continental shelf. As a result, the sediment it carries ends up in deep water, where it is lost forever.

A diversion would send the river's richly muddy water into marshes or shallow-water areas where the natural processes of waves, coastal currents and even storms can rework that sediment and bring it up and bring it into the coast.

About 250 miles from the gulf, near Lettsworth, La., the river stops taking water in and starts feeding it out, into the gulf through the main stem of bird-foot delta but also in distributaries like the Atchafalaya River, which flows into Atchafalaya Bay to the west.

Until people interfered with its flow, the Mississippi's path to the gulf silted up naturally over time; water flow slowed and the river bed lost its capacity to carry a big flood. When next the big flood came, the river would suddenly turn one of its distributaries into its new main stem.

This kind of switching has occurred roughly every 1,500 years, geologists say, and since about 1950 the river has been ready for a change to the Atchafalaya. The Corps of Engineers prevents that from happening with enormous installation of locks, dams and power stations near Lettsworth, north of Baton Rouge and about 100 miles northwest of New Orleans.

Simply letting the Mississippi shift to the Atchafalaya would do a lot for the sediment-starved marshes west of the Mississippi. But it would leave cities like Baton Rouge and New Orleans without fresh water or a navigable waterway.

A more new architectural solution which contained a more flexible infrastructure would remedy a large portion of this issue.
As it winds from Minnesota to the Gulf of Mexico, the Mississippi River is in constant flux. Fast water carries sediment while slow water deposits it. Soft riverbanks are continuously eroded. Floods occasionally spread across the wide, shallow valley that flanks the river, and new channels are left behind when the water recedes. The history of change is recorded in the Army Corps of Engineers map from 1944. Despite modern human-made changes to the landscape, traces of the past remain with roads and fields following the contours of past channels.

In the twentieth century, the rate of change on the Mississippi slowed. Levees now prevent the river from jumping its banks so often. The human engineering of the lower Mississippi has been so extensive that a natural migration of the delta from its present location to the Atchafalaya River to the west was halted in the early 1960s. The delta switching has occurred every 1,000 years or so in the past, and the channel becomes more shallow and meandering. Eventually the river finds a shorter, steeper descent to the Gulf. In the 1950s, engineers noticed that the river’s present channel was on the verge of shifting westward to the Atchafalaya River, which would have become the new route to the Gulf. Because of the industry and other developments that depended on the present river course, congress authorized the construction of a river control structure to prevent the shift from happening.
As it winds from Minnesota to the Gulf of Mexico, the Mississippi River is in constant flux. Fast water carries sediment while slow water deposits it. Soft riverbanks are continuously eroded. Floods occasionally spread across the wide, shallow valley that flanks the river, and new channels are left behind when the water recedes. The history of change is recorded in the Army Corps of Engineers map from 1944. Despite modern human-made changes to the landscape, traces of the past remain with roads and fields following the contours of past channels.

In the twentieth century, the rate of change on the Mississippi slowed. Levees now prevent the river from jumping its banks so often. The human engineering of the lower Mississippi has been so extensive that a natural migration of the delta from its present location to the Atchafalaya River to the west was halted in the early 1960s. The delta switching has occurred every 1,000 years or so in the past, and the channel becomes more shallow and meandering. Eventually the river finds a shorter, steeper descent to the Gulf. In the 1950s, engineers noticed that the river's present channel was on the verge of shifting westward to the Atchafalaya River, which would have become the new route to the Gulf. Because of the industry and other developments that depended on the present river course, congress authorized the construction of a river control structure to prevent the shift from happening.
Humans move 40 billion tons of soil each year during mining, construction and indirectly eroding it away by plowing croplands and clearing forests. This is more than underwater volcanoes and similar to rivers, constantly remodeling channels and banks. Humans sculpt the earth more dramatically, but we seldom make it more geologically more complex. Specialty in simplifying the landscape, turning more diverse forests or meadows into tree farms, uniform rows of grain, or monotonous expanses of concrete and lawn. In contrast, many animals and plants routinely foster a more heterogeneous and dynamic landscape than the forces of the climate, geology, or human activities could create.

What changes occur when the work of organisms on the land is disrupted? Natural landscapes consist of a mosaic of habitat types, all linked by the movement of water, nutrients, energy, seeds and animals. Changes in biodiversity that alter the distribution of flow of these resources affect the landscapes workings, especially its productivity and conservation of soil, water and nutrients.

Also, most landscapes are subject to periodic disturbances such as fire, flood or hurricanes. Losses or additions of organisms that influence the frequency or intensity of disturbance can strongly change the dynamic of the landscape. Most systems are also vulnerable to losses of key animal species whose daily activities modify the landscape, either directly, through physical changes like tunneling or toppling trees, or indirectly through what they eat or do not eat.
Human managed lands seldom ever achieve—or ever aim for—the dynamic complexity inherent in natural systems.

Humans move 40 billion tons of soil each year during mining, construction and indirectly eroding it away by plowing croplands and clearing forests. This is more than underwater volcanoes and similar to rivers, constantly remodeling channels and banks. Humans sculpt the earth more dramatically, but we seldom make it more geologically complex. Specialty in simplifying the landscape, turning more diverse forests or meadows into tree farms, uniform rows of grain, or monotonous expanses of concrete and lawn. In contrast, many animals and plants routinely foster a more heterogeneous and dynamic landscape than the forces of the climate, geology, or human activities could create.

What changes occur when the work of organisms on the land is disrupted? Natural landscapes consist of a mosaic of habitat types, all linked by the movement of water, nutrients, energy, seeds and animals. Changes in biodiversity that alter the distribution of flow of these resources affect the landscapes workings, especially its productivity and conservation of soil, water and nutrients.

Also, most landscapes are subject to periodic disturbances such as fire, flood or hurricanes. Losses or additions of organisms that influence the frequency or intensity of disturbance can strongly change the dynamic of the landscape. Most systems are also vulnerable to losses of key animal species whose daily activities modify the landscape, either directly, through physical changes like tunneling or toppling trees, or indirectly through what they eat or do not eat.
Replacing natural systems that work for free with engineered systems seldom attempt to replace the full array of services supplied by the natural system.

Most industrial societies tend to disregard and devalue ecosystem processes, opting instead for a technical fix whenever environmental services falter. Lost services are replaced not with natural mimics but with engineering solutions: dams, reservoirs, waste treatment plants, air scrubbers, air conditioners, synthetic pesticides and fertilizers, and water filtration systems. Replacing natural systems that work for free with engineered systems powered by fossil fuels is enormously expensive, often problem-plagued, and commonly impractical, especially in developing countries. Furthermore, these systems seldom attempt to replace the full array of services supplied by the natural system.

When forests are cut:
We must find replacements for wood products, build erosion control works, enlarge reservoirs, upgrade air pollution control technology, install flood control works, improve water purification plants, increase air conditioning, and provide new recreational facilities.

These substitutes represent an enormous tax burden, drain on the world’s supply of natural resources, and increase stress on the natural system that remains. The diminution of solar-powered natural systems and the expansion of fossil-powered human systems are currently locked in a positive feedback cycle. Increased consumption of fossil energy means increased stress on natural systems, which in turn means still more consumption of fossil energy to replace lost natural functions if the quality of life is to be maintained.

It has been calculated that even the per capita costs of treating human wastes, which are only one small part of the pollution disorder generated by cities, would be more than doubled if there was no natural environment available and able to carry out the work of treatment of these wastes.
Replacing natural systems that work for free with engineered systems seldom attempt to replace the full array of services supplied by the natural system.

AN ENGINEERING FIX

Most industrial societies tend to disregard and devalue ecosystem processes, opting instead for a technical fix whenever environmental services falter. Lost services are replaced not with natural mimics but with engineering solutions: dams, reservoirs, waste treatment plants, air scrubbers, air conditioners, synthetic pesticides and fertilizers, and water filtration systems. Replacing natural systems that work for free with engineered systems powered by fossil fuels is enormously expensive, often problem-plagued, and commonly impractical, especially in developing countries. Furthermore, these systems seldom attempt to replace the full array of services supplied by the natural system.

When forests are cut:

We must find replacements for wood products, build erosion control works, enlarge reservoirs, upgrade air pollution control technology, install flood control works, improve water purification plants, increase air conditioning, and provide new recreational facilities. These substitutes represent an enormous tax burden, drain on the world's supply of natural resources, and increase stress on the natural system that remains. The diminution of solar-powered natural systems and the expansion of fossil-powered human systems are currently locked in a positive feedback cycle. Increased consumption of fossil energy means increased stress on natural systems, which in turn means still more consumption of fossil energy to replace lost natural functions if the quality of life is to be maintained.

It has been calculated that even the per capita costs of treating human wastes, which are only one small part of the pollution disorder generated by cities, would be more than doubled if there was no natural environment available and able to carry out the work of treatment of these wastes.
Wildfires occur on every continent except Antarctica. Fossil records and human history contain accounts of wildfires, which can be cyclical events. Wildfires can cause extensive damage, both to property and human life, but they also have various beneficial effects on wilderness areas. Some plant species depend on the effects of fire for growth and reproduction, although large wildfires may have negative ecological effects.

Architecture as we utilize it today is destructive of the natural environment. Is there a model we can use to reanalyze the way we construct and possible even the way we live? The natural environment does benefit from some types of destruction, although they are temporary and can be recovered from at a more biodiverse levels.
Wildfires occur on every continent except Antarctica. Fossil records and human history contain accounts of wildfires, which can be cyclical events. Wildfires can cause extensive damage, both to property and human life, but they also have various beneficial effects on wilderness areas. Some plant species depend on the effects of fire for growth and reproduction, although large wildfires may have negative ecological effects.

Architecture as we utilize it today is destructive of the natural environment. Is there a model we can use to reanalyze the way we construct and possible even the way we live? The natural environment does benefit from some types of destruction, although they are temporary and can be recovered from at a more biodiverse levels.
A riparian buffer is a vegetated area near a stream, usually forested, which helps shade and partially protect a stream from the impact of adjacent land uses. It plays a key role in increasing water quality in associated streams, rivers, and lakes, thus providing environmental benefits. With the decline of many aquatic ecosystems due to agricultural production, riparian buffers have become a very common conservation practice aimed at increasing water quality and reducing pollution.

Riparian buffers act to intercept sediment, nutrients, pesticides, and other materials in surface runoff and reduce nutrients and other pollutants in shallow subsurface water flow. The

...
A riparian buffer is a vegetated area near a stream, usually forested, which helps shade and partially protect a stream from the impact of adjacent land uses. It plays a key role in increasing water quality in associated streams, rivers, and lakes, thus providing environmental benefits. With the decline of many aquatic ecosystems due to agricultural production, riparian buffers have become a very common conservation practice aimed at increasing water quality and reducing pollution.

Riparian buffers act to intercept sediment, nutrients, pesticides, and other materials in surface runoff and reduce nutrients and other pollutants in shallow subsurface water flow. Sediment, fertilizer, and pesticides are carefully managed. Fertilization, deposition, plant uptake and other natural processes remove sediment and nutrients from runoff and subsurface flows. Maturing trees provide detritus to the stream and help maintain lower water temperature vital to fish habitat. Debris dams hold detritus for processing by aquatic fauna and provide cover and cooling shade for fish and other stream dwellers. Tree removal is generally not permitted in this zone. Periodic harvesting is necessary to remove nutrients sequestered in tree stems and branches and to maintain nutrient uptake through vigorous tree growth. Watering facilities and livestock are kept out of the Riparian Zone.
Plants reroute rainfall into their roots for storage. The cycle of freshwater (atmosphere, land, sea) is eternal and enduring. The ocean is a reservoir, not a grave for fresh water-glaciers, ice caps, aquifers, rivers, lakes, and reservoirs hold the fresh water of the world-only 3% of all the water. The continual renewal and cycling of water through plants and animals across the landscape is critical to the productivity of the lands, lakes and coastal waters from which we harvest food. A vegetated coastline is needed to buffer the force of ocean waves and storms- especially at times of sea level rise, reducing coastal erosion.

The ecosystems that buffer the abrupt transition from land to sea are equally critical. Deltas, marshes, and estuaries sop up nutrients, filter out sediments, and stabilize salinity levels in areas where fresh water flows into coastal waters. These natural cleansing and filtering services are particularly important because most of the earth’s human population lives in coastal zones and thus comes into direct contact with the sea. More than 80 percent of the world’s fish catch comes from the waters of the continental shelves, coastal margins, and estuaries. meters deep.

The highest productivity is concentrated in the coastal plain and offshore zone that runs from two hundred meters above sea level to two hundred meters deep. Yet, 60 % of the human population lives on the shore side of this zone. 2/3 of rain evaporates directly from wet leaves or soil or gets drawn up by plant roots and transpired back to the atmosphere as crops, meadows and forests grow. 1/3 percolates through the soil into underground aquifers or runs off across the surface to join oceanward flow, replenishing lakes, rivers or other aquatic habitats along the way and creating a vast arterial system that connects alpine forests to coastal marshes.

Deltas, marshes, and estuaries sop up nutrients, filter out sediments, and stabilize salinity levels in areas where fresh water flows into coastal waters.
Deltas, marshes, and estuaries sop up nutrients, filter out sediments, and stabilize salinity levels in areas where fresh water flows into coastal waters.

The ocean is a reservoir, not a grave for fresh water—the glaciers, ice caps, aquifers, rivers, lakes, and reservoirs hold the fresh water of the world. Only 3% of all the water. The continual renewal and cycling of water through plants and animals across the landscape is critical to the productivity of the lands, lakes, and coastal waters from which we harvest food. A vegetated coastline is needed to buffer the force of ocean waves and storms, especially at times of sea level rise, reducing coastal erosion.

The ecosystems that buffer the abrupt transition from land to sea are equally critical. Deltas, marshes, and estuaries sop up nutrients, filter out sediments, and stabilize salinity levels in areas where fresh water flows into coastal waters. These natural cleansing and filtering services are particularly important because most of the earth's human population lives in coastal zones and thus comes into direct contact with the sea. More than 80% of the world's fish catch comes from the waters of the continental shelves, coastal margins, and estuaries.
ST. JOSEPH, TENSAS PARISH

Population: 1,340
Density: 1,505/sq mi

Upstream of the Atchafalaya River-Mississippi River junction, St. Joseph is a town of 1,340 people. This town will be used as a prototype of existing conditions to compare the proposed prototype architectural community. Statistical information such as density and population size will be used and recreated in the new method.
Upstream of the Atchafalaya River-Mississippi River junction, St. Joseph is a town of 1,340 people. This town will be used as a prototype of existing conditions to compare the proposed prototype architectural community. Statistical information such as density and population size will be used and recreated in the new method.
Nature was in a sense demystified and disenchanted. Whatever inherent moral value nature may have possessed, it was replaced by a view of nature as an instrumental resource to be exploited.

Modernity has brought important changes in the way the individual experiences a sense of place and identity:

In the pre-modern era, local conditions and culture served as constraints on how people adapted to and fashioned their world. Exploiting nature was limited by local knowledge and the quantity and quality of locally available natural resources constrained economic and social activities. This produced isolated local cultures with social patterns fitted to the contingencies of that place.

In the modern era, the individual has been liberated from local constraints of place because of modernization (whether in the form of industrial markets, mass communication, or more efficient transportation). This has had profound individual implications for both nature and society. Nature was in a sense demystified and disenchanted. Whatever inherent moral value nature may have possessed, it was replaced by a view of nature as an instrumental resource to be exploited. Socially, the condition of modernity—as the release of social relations, production and consumption, and even one’s identity from particular places—also led to greater freedom to contest the significance of both their immediate and more distant surroundings.

Riparian Efformation’s strong connection to the natural environment, minimal living and physical social network provides a sense of significance, unlike the lack thereof under the pressures of current globalization culture.
Nature was in a sense demystified and disenchanted. Whatever inherent moral value nature may have possessed, it was replaced by a view of nature as an instrumental resource to be exploited.

Modernity has brought important changes in the way the individual experiences a sense of place and identity: In the pre-modern era, local conditions and culture served as constraints on how people adapted to and fashioned their world. Exploiting nature was limited by local knowledge and the quantity and quality of locally available natural resources constrained economic and social activities. This produced isolated local cultures with social patterns fitted to the contingencies of that place. In the modern era, the individual has been liberated from local constraints of place because of modernization (whether in the form of industrial markets, mass communication, or more efficient transportation). This has had profound individual implications for both nature and society. Nature was in a sense demystified and disenchanted. Whatever inherent moral value nature may have possessed, it was replaced by a view of nature as an instrumental resource to be exploited. Socially, the condition of modernity—as the release of social relations, production and consumption, and even one's identity from particular places—also led to greater freedom to contest the significance of both their immediate and more distant surroundings.

Riparian Efformation’s strong connection to the natural environment, minimal living and physical social network provides a sense of significance, unlike the lack thereof under the pressures of current globalization culture.
What were mostly taken-for-granted, subconscious meanings of a place come to the surface and seem threatened by nearly every proposed change to the local landscape.

Sense of place is shaped by increasingly complex social, economic, and political processes. At a local level, place meanings are less stable than they once were, being buffered by increasingly distant and uncontrollable social and economic forces. Meanings have become more individualized and boundaries have become more permeable.

For example, international trade, travel, media, and migration increasingly challenge or contest traditional meanings of many communities. As they develop their own sense of place, the newcomers may become strongly attached to the natural landscape of an area without being socially and historically rooted in the place or community due to its pre-modern authenticity.

Ironically, those forces of homogenization have made place more important, not less. What were mostly taken-for-granted, subconscious meanings of a place come to the surface and seem threatened by nearly every proposed change to the local landscape. Treating nature as a collection of products or commodities to be sold and isolating properties of the environment in order to study them leave many people with the sense that the larger whole, the place itself, has somehow been lost.

Sense of place will again be established via Riparian Efformation by allowing natural environments to re-establish and by creating a greater direct participation and dependence on that natural environment.
What were mostly taken-for-granted, subconscious meanings of a place come to the surface and seem threatened by nearly every proposed change to the local landscape.

Loss of place

Sense of place is shaped by increasingly complex social, economic, and political processes. At a local level, place meanings are less stable than they once were, being buffered by increasingly distant and uncontrollable social and economic forces. Meanings have become more individualized and boundaries have become more permeable. For example, international trade, travel, media, and migration increasingly challenge or contest traditional meanings of many communities. As they develop their own sense of place, the newcomers may become strongly attached to the natural landscape of an area without being socially and historically rooted in the place or community due to its pre-modern authenticity.

Ironically, those forces of homogenization have made place more important, not less. What were mostly taken-for-granted, subconscious meanings of a place come to the surface and seem threatened by nearly every proposed change to the local landscape.

Treating nature as a collection of products or commodities to be sold and isolating properties of the environment in order to study them leave many people with the sense that the larger whole, the place itself, has somehow been lost.

Sense of place will again be established via Riparian Efformation by allowing natural environments to re-establish and by creating a greater direct participation and dependence on that natural environment.
It is often assumed that what and where one calls home is straightforward enough, that our sense of home and identity are singularly rooted in a local place. Rather than being seen as an integral aspect of social life, mobility has been regarded as a special and temporary phenomenon classified under such headings as migration, refugee studies, and tourism. But increasingly, modern forms of dwelling, working, and playing involve circulating through a geographically extended network of social relations and a multiplicity of widely dispersed places and regions.

In the future, the changing nature of employment, retirement, and lifestyles are likely to influence not only amenity migration, but residence patterns, meanings, and identities more generally. Riparian Efformation focuses on the impact of increasing geographic mobility to create a greater bond to the environment as well as a way to interweave home, work, and leisure to construct identities.
It is often assumed that what and where one calls home is straightforward enough, that our sense of home and identity are singularly rooted in a local place. Rather than being seen as an integral aspect of social life, mobility has been regarded as a special and temporary phenomenon classified under such headings as migration, refugee studies, and tourism. But increasingly, modern forms of dwelling, working, and playing involve circulating through a geographically extended network of social relations and a multiplicity of widely dispersed places and regions. In the future, the changing nature of employment, retirement, and lifestyles are likely to influence not only amenity migration, but residence patterns, meanings, and identities more generally.
Circulation, by any means, has profound impacts on meaning and experience of place, social interaction, and our very sense of self.

Circulation is perhaps no longer the disruption of life that it once presumed, it effectively dislodges what have long been geographically bounded conceptions of culture, home, and identity. People, cultures, objects, images and ideas migrate and with modern communication technologies we can even experience virtual migrations. The point here is not so much to paint a negative picture of auto-mobility. Rather it is to point out that circulation, whether by car or other means, has profound impacts on meaning and experience of place, social interaction, and our very sense of self.

The physical framework of Riparian Efformation would resemble something similar to that of our virtual social networks with continued advancements in technology and globalization. Physical networking and re-networking reduces the distractions an overly-stimulating environment. Our closest neighbors in proximity will be a web that revolves precisely around the communication broadcast by ourselves. The web then continues network from those people and so on, similarly to a Muir Web of biodiversity. Connection to landscape is greater to due to the constant exposure to different natural environments.
Circulation, by any means, has profound impacts on meaning and experience of place, social interaction, and our very sense of self. Circulation is perhaps no longer the disruption of life that it once presumed, it effectively dislodges what have long been geographically bounded conceptions of culture, home, and identity. People, cultures, objects, images and ideas migrate and with modern communication technologies we can even experience virtual migrations. The point here is not so much to paint a negative picture of auto-mobility. Rather it is to point out that circulation, whether by car or other means, has profound impacts on meaning and experience of place, social interaction, and our very sense of self.

The physical framework of Riparian Efformation would resemble something similar to that of our virtual social networks with continued advancements in technology and globalization. Physical networking and re-networking reduces the distractions of an overly-stimulating environment. Our closest neighbors in proximity will be a web that revolves precisely around the communication broadcast by ourselves. The web then continues network from those people and so on, similarly to a Muir Web of biodiversity. Connection to landscape is greater due to the constant exposure to different natural environments.
Although the topography surrounding the Mississippi River contains complex river systems and marshes, it is in fact, a very flat terrain. This topography only emphasizes how the areas surround the river are in a constant state of change. In order for a community to plan for some longevity along the river, it must also plan for flexibility with the river.
Although the topography surrounding the Mississippi River contains complex river systems and marshes it is in fact, a very flat terrain. This topography only emphasizes how the areas surround the river are in a constant state of change. In order for a community to plan for some longevity along the river it must also plan for flexibility with the river.
After the rainy season, the resurrection plant dries up, dropping leaves and curling branches into a tight ball, and dies. Within the ball, fruits remain attached and closed, protecting the seeds and preventing them from being dispersed prematurely. The seeds are very hardy and can remain dormant for years. Wetted again in a later rainy season, the ball uncurls and the capsular fruits open to disperse the seeds. If water is sufficient, the dispersed seeds germinate within hours.

The process of curling and uncurling is completely reversible and can be repeated many times. Once dry, the ball is said to become detached and is dispersed by wind. This tumbleweed habit has been interpreted as a mechanism of avoiding burial in dunes.

Like the resurrection plant, Riparian Efformation would be dependent upon the conditions of its environment in order to sustain itself. If the conditions are no longer suitable, the structure sacrifices its contents, shrinks to a manageable size, and moves on to a new environment. The structure is also flexible with the changes and shift in the water systems it rests in.
After the rainy season, the resurrection plant dries up, dropping leaves and curling branches into a tight ball, and dies. Within the ball, fruits remain attached and closed, protecting the seeds and preventing them from being dispersed prematurely. The seeds are very hardy and can remain dormant for years. Wetted again in a later rainy season, the ball uncurls and the capsular fruits open to disperse the seeds. If water is sufficient, the dispersed seeds germinate within hours. The process of curling and uncurling is completely reversible and can be repeated many times. Once dry, the ball is said to become detached and is dispersed by wind. This tumbleweed habit has been interpreted as a mechanism of avoiding burial in dunes.

Like the resurrection plant, Riparian Efformation would be dependent upon the conditions of its environment in order to sustain itself. If the conditions are no longer suitable, the structure sacrifices its contents, shrinks to a manageable size, and moves on to a new environment. The structure is also flexible with the changes and shift in the water systems it rests in.
Similarly to the resurrection plant, Riparian Efformation will be able to locate itself anywhere along the Mississippi River watershed or along any water formation where filtration is needed. Due to the flexibility of the structure and community, it will also be able to adapt to topographic changes in the land.
LAND INTEGRATION

Similarly to the resurrection plant, Riparian Efformation will be able to locate itself anywhere along the Mississippi River watershed or along any water formation where filtration is needed. Due to the flexibility of the structure and community, it will also be able to adapt to topographic changes in the land.

DWELLING ADAPTATION
The principle behind the hydrostatic skeleton is that water is effectively incompressible at physiological pressures. Thus, a fiber-wound chamber full of water acts as a constant-volume system.

A hydrostatic skeleton or hydroskeleton is a structure found in many cold-blooded organisms and soft-bodied animals consisting of a fluid-filled cavity surrounded by muscles. The pressure of the fluid and action of the surrounding muscles are used to change an organism's shape and produce movement, such as burrowing or swimming. Hydrostatic skeletons have a role in the locomotion of starfish, sea urchins, jellyfish, earthworms, nematodes, and other invertebrates.

Sea anemones and earthworms do not have a single bone in their bodies. Instead, they are supported by pressure from a liquid which consists mainly of water in their cells and in spaces between their body.

An endoskeleton is an internal support structure of an animal, composed of mineralized tissue.

An exoskeleton is an external skeleton that supports and protects an animal's body, in contrast to the internal endoskeleton of, for example, a human. Some animals, such as the tortoise, have both an endoskeleton and an exoskeleton. In popular usage, many of the larger kinds of exoskeletons are known as "shells".

A hydrostatic skeleton would provide a fluid structural system that would allow the architectural configuration to morph and adapt to its environment as well as surrounding dweller structures. In addition, Riparian Efformation secures its location by plugging into the hydrology of the natural environment and circulating the earth's water and nutrients through the building systems. Dwellers are also more concerned and aware of the natural environment because all consumed water is derived from the structure and then cycled back into the earth.
The principle behind the hydrostatic skeleton is that water is effectively incompressible at physiological pressures. Thus, a fiber-wound chamber full of water acts as a constant-volume system.

A hydrostatic skeleton or hydroskeleton is a structure found in many cold-blooded organisms and soft-bodied animals consisting of a fluid-filled cavity surrounded by muscles. The pressure of the fluid and action of the surrounding muscles are used to change an organism's shape and produce movement, such as burrowing or swimming. Hydrostatic skeletons have a role in the locomotion of starfish, sea urchins, jellyfish, earthworms, nematodes, and other invertebrates.

Sea anemones and earthworms do not have a single bone in their bodies. Instead, they are supported by pressure from a liquid which consists mainly of water in their cells and in spaces between their body.

An endoskeleton is an internal support structure of an animal, composed of mineralized tissue. An exoskeleton is an external skeleton that supports and protects an animal's body, in contrast to the internal endoskeleton of, for example, a human. Some animals, such as the tortoise, have both an endoskeleton and an exoskeleton. In popular usage, many of the larger kinds of exoskeletons are known as "shells." A hydrostatic skeleton would provide a fluid structural system that would allow the architectural configuration to morph and adapt to its environment as well as surrounding dweller structures. In addition, Riparian Efformation secures its location by plugging into the hydrology of the natural environment and circulating the earth's water and nutrients through the building systems. Dwellers are also more concerned and aware of the natural environment because all consumed water is derived from the structure and then cycled back into the earth.
SCHEMATIC 1

OPTION ONE: HYDROSTATIC SKIN

OPTION TWO: NETWORK

ADD WATER

PLUG INTO PLACE

ELEMENT GAIN
HYDROSTATIC SKIN

OPTION ONE:

OPTION TWO:
String connects itself to its water source as a few anchor point, but stays compact and clustered by tangling and weaving into itself. Similarly, the proposed architecture will overlap and weave to have a minimal foundation, maintain flexibility and remain as compact as possible.
Riparian Eformation

Research/Analysis:
String Algae

WORM-CHAIN MOVEMENT

CONCEPT CHAINS

STRING ALGAE
Layers of hydrostatic skin have the ability to expand and contract. The inner most skin filters water to a degree dwellers may be able to use it for themselves. If a dweller is present, the interior skin is present, if not, the interior skin collapses and the unit becomes public and is able to turn.
Layers of hydrostatic skin have the ability to expand and contract. The innermost skin filters water to a degree dwellers may be able to use it for themselves. If a dweller is present, the interior skin is present, if not, the interior skin collapses and the unit becomes public and is able to turn.
Given the same population and building area, the proposed design is able to achieve almost twice and much dwelling space in about half the area. A significantly larger area of public space is also provided in the proposed community.
Given the same population and building area, the proposed design is able to achieve almost twice and much dwelling space in about half the area. A significantly larger area of public space is also provided in the proposed community.
Kitchen and bath units are able to plug in the interior skin for all of the dweller's water needs.
Addional wall and stair units may be added to each unit for customization. Nets are suspended between the layers of skin for wall and floor structure which are then covered by a finish membrane.
Units that angle to cross over another community chain are used as public spaces to grow food. The nutrients that are being filtered out of the water going into the Mississippi are used to grow other plants.
Units that angle to cross over another community chain are used as public spaces to grow food. The nutrients that are being filtered out of the water going into the Mississippi are used to grow other plants.
METHOD

HYDROPONIC UNIT
An additional pipe is connected from the chains to the anchor which contains the extra filtered nutrients and algae. The algae is then stored at the base of the anchor for use as a biofuel.

The proposed community is tethered by a minimal number of anchors which are able to turn and rotate as the community shifts with the river. The anchor also has minimal structure, similar to that of a tap root.
An additional pipe is connected from the chains to the anchor which contains the extra filtered nutrients and algae. The algae is then stored at the base of the anchor for use as a biofuel. The proposed community is tethered by a minimal number of anchors which are able to turn and rotate as the community shifts with the river. The anchor also has minimal structure, similar to that of a tap root.
METHOD