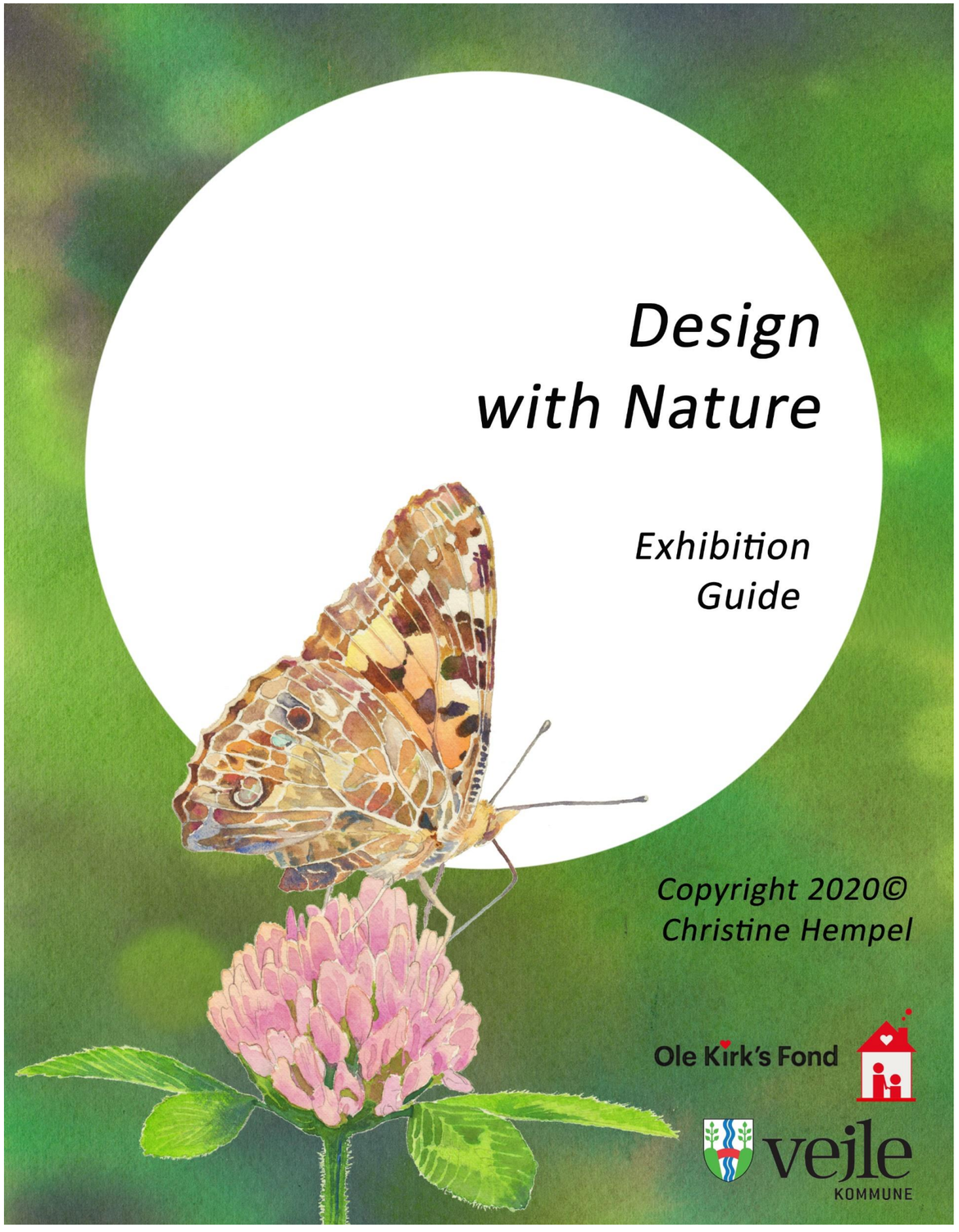


Contents

Introduction

Throughout history, human societies that have been built on sustainable relationships with nature have succeeded, while those that worked against natural systems have collapsed. Human societies have altered ecological systems profoundly, and the consequences are disastrous: species extinction, global warming, depletion of resources. City makers are now challenged to better understand and adapt to rapidly changing environmental systems. We must envision cities and landscapes that function *with* rather than *against* nature.

The Eco-city model, in combination with the Design With Nature exhibition and workshops, offers an opportunity for children and adult visitors to learn some of the key concepts of ecological planning in an engaging, creative way. This exhibition and workshop guide is designed so that museum staff, teachers, community volunteers and students (age 13+) can guide visitors to the exhibition, introducing key concepts of ecological design, and provide guidance for the facilitation of workshops.

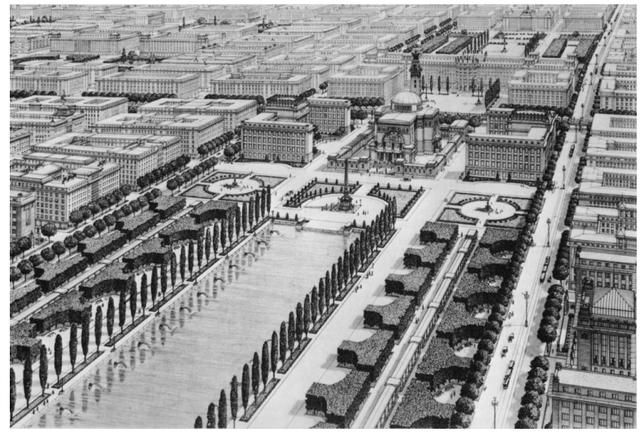
This guidebook describes key contributions of three pioneers in the field of ecological planning: Ian McHarg, Anne Spirn and Randolph Hester. A series of short lessons and activities offer a variety of possibilities for using the Eco-City model and exhibition material to demonstrate essential concepts to children and adult audiences.

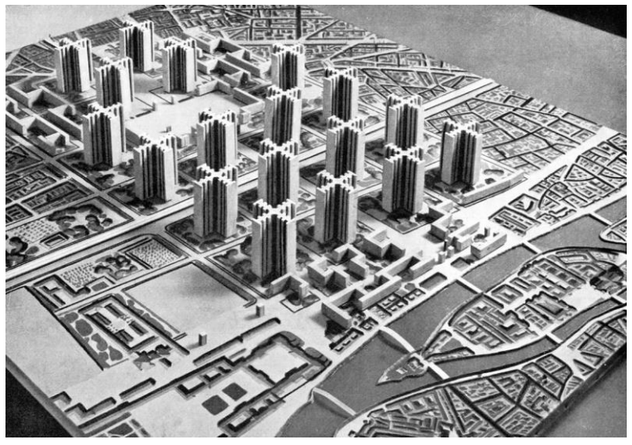
Modernist Planning

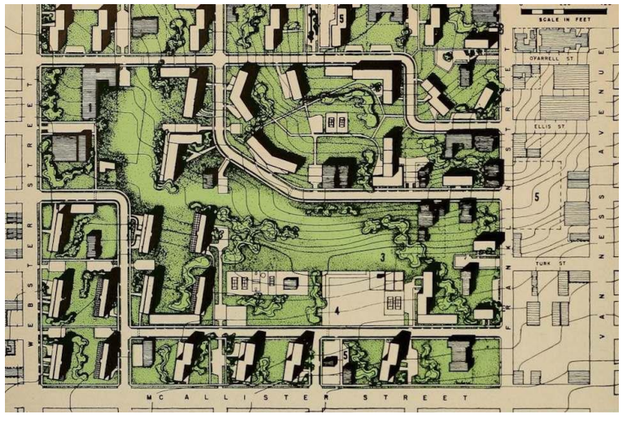
Historically, urban design was rooted in the disciplines of architecture and engineering, with a primary focus on infrastructure systems and built structures. Hippodamus of Greece is known as the Father of Urban Planning and credited with the development of modernist planning (sometimes referred to as orthogonal, rational, or “Gridiron” planning). However, it was European architects of the early 20th century who are credited with popularizing modernism as a dominant method for city planning.

Modernist planning uses rectilinear geometry to create urban forms and structures, with constructed systems and objects designed often without consideration for natural landscapes. While major features such as cliffs, or large water bodies might impose limitations or influenced the design of modernist plans, most smaller features such as creeks, forest patches, arable soils and wetlands are removed, diverted, flattened, or paved over to fit the order of the gray grid, and the simplified and orderly designed environment.

In North America, mid-century architects and urban planners embraced the efficiency of geometric planning. In efforts to build for the automobile, streamline traffic, remove slums and create housing for a growing population, city builders like Robert Moses made sweeping plans to modernize American cities





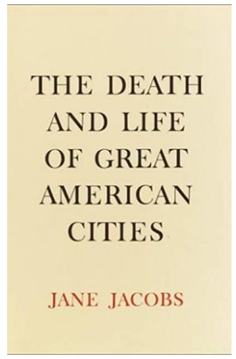


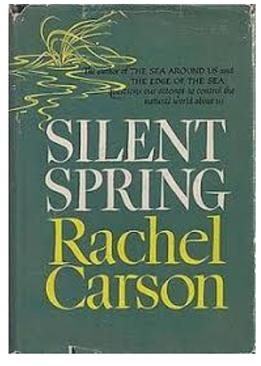
Clockwise from Top:
1. Otto Wanger’s perspective view of Die Grozstadt.
2. Le Corbusier’s plan for Voisin, Paris, 1922
3. Le Corbusier’s idealized “Radiant City Plan” is realized in San Francisco’s plan for Jefferson Square Neighbourhood, 1947 (from 1947 City Planning Commission report)

Protest

During the 1960s, concerns over environmental and social problems as a result of rational planning grew. There were few environmental protection policies, and little concern with inclusion of citizens in the planning process. Urban Planning concerns were brought to the attention of the public with the publication of *Death and Life of Great American Cities* by Jane Jacobs. Rachel Carson's book *Silent Spring*, published in 1962, brought public attention to biodiversity destruction linked to pesticide use in North America. Her book is credited with inspiring the environmental movement.

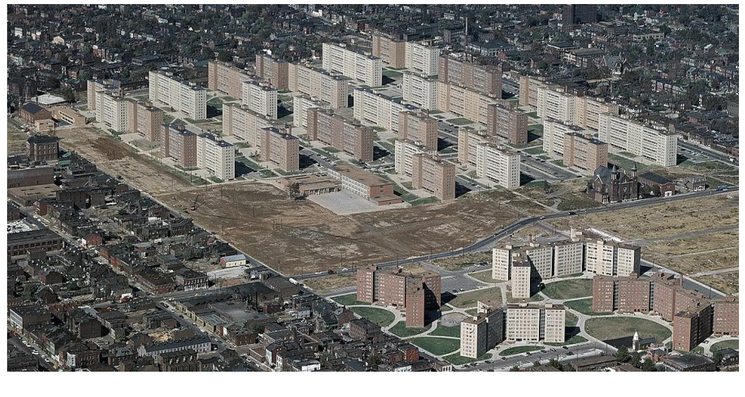
Inspired by Jacobs, citizens protested Moses' plan and succeeded in stopping the expressway.





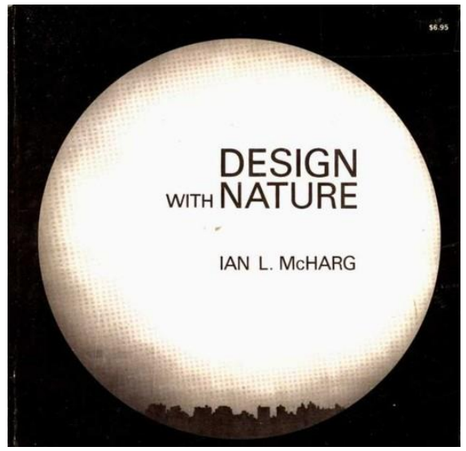
The End of Modernism

Often seen as a symbol of the failure of urban renewal and rationalism, the demolition of the Pruitt-Igoe housing project in St. Louis, Missouri marks the end of the era of rationalism as the dominant mode of planning in North America. Planning processes gradually evolved to be more socially fair and inclusive, using techniques that engaged and empowered citizens.

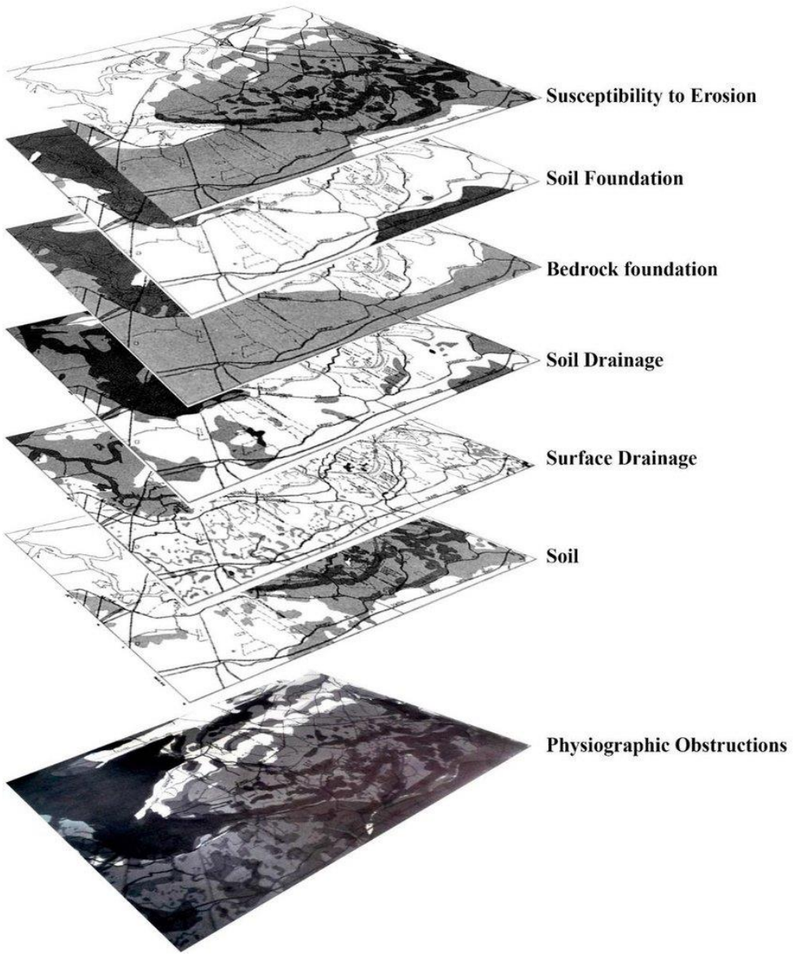


Above: Pruitt-Igoe, 1964. Housing Project designed as an urban renewal effort to provide modern social housing in St. Louis, Missouri, US.
Above Right: Demolition of the project between 1971 and 1976

A Pioneer in Ecological Planning

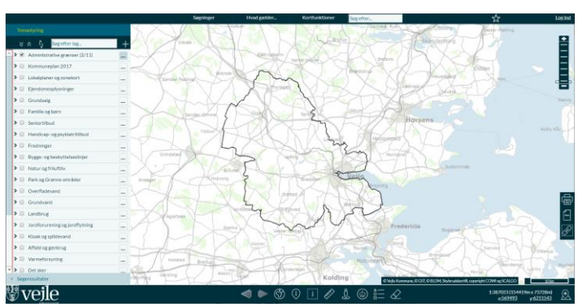


Ian McHarg's strong voice joined other environmental activists and political protesters against modernist planning, and one of the key founders of the Environmental Movement in North America. McHarg reached a wide audience; he was a university professor at the University of Pennsylvania's school of landscape architecture and urban planning, and hosted a TV series, *The House We Live In*, to share his ideas with ordinary Americans. He helped lead the first "Earth Day" rally in Philadelphia on April 22, 1970.



Analysis of soil substructure printed on acetate. This layered method gradually evolved into GIS - the layered mapping process used by modern environmental designers.

In 1969, Ian McHarg published 'Design with Nature', an influential book that described "Ecological Planning": a practical new method for creating beautiful and healthy cities and landscapes that work in harmony with natural processes. McHarg claimed that ecological planning was based in science, although governed by nature's irregular forms, rather than artificially imposed geometry. McHarg's method proposes that an understanding of landscape features and systems must come before making decisions about urban development. First, planners must gain an understanding of geology and landscape features, water features, flood plains, drainage networks, soil structures and types, vegetation and forest cover, as socio-cultural values and existing structures. McHarg presented diagrams showing different landscape features on clear acetate film that were displayed in layers. On the top layer, he showed how planners could find "optimum locations for development".



Optional exhibition supplements: use a computer to demonstrate how people can use the GIS applications available online in the region to analyze the systems and features of their environment.

Video Clip of McHarg
from Multiply and Subdue the Earth [video, tv] Running time: 6 minutes

Using LEGO© to demonstrate Ecological Planning

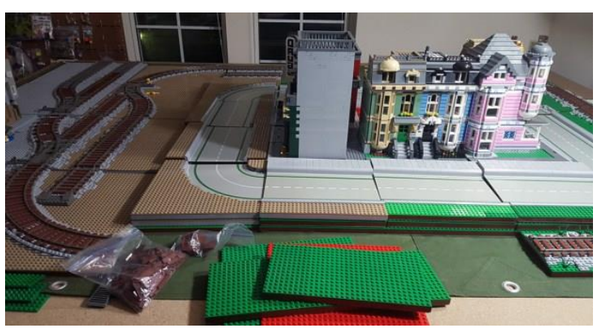
This display is an imaginary city that was designed with nature using LEGO©!

In the 50 years since Design with Nature was published, most designers have adopted a more ecological approach to planning. It seems strange that is today, most cities designed using LEGO still conform to the outdated “modernist” method of planning.

McHarg’s ideas were adopted during the planning phase of this imaginary LEGO city model. The details of the design provide an opportunity to showcase several fundamental concepts of environmental and social resilience in urban design, with a focus on principles explained by notable scholars Anne Spirn and Randolph Hester in the decades after McHarg.

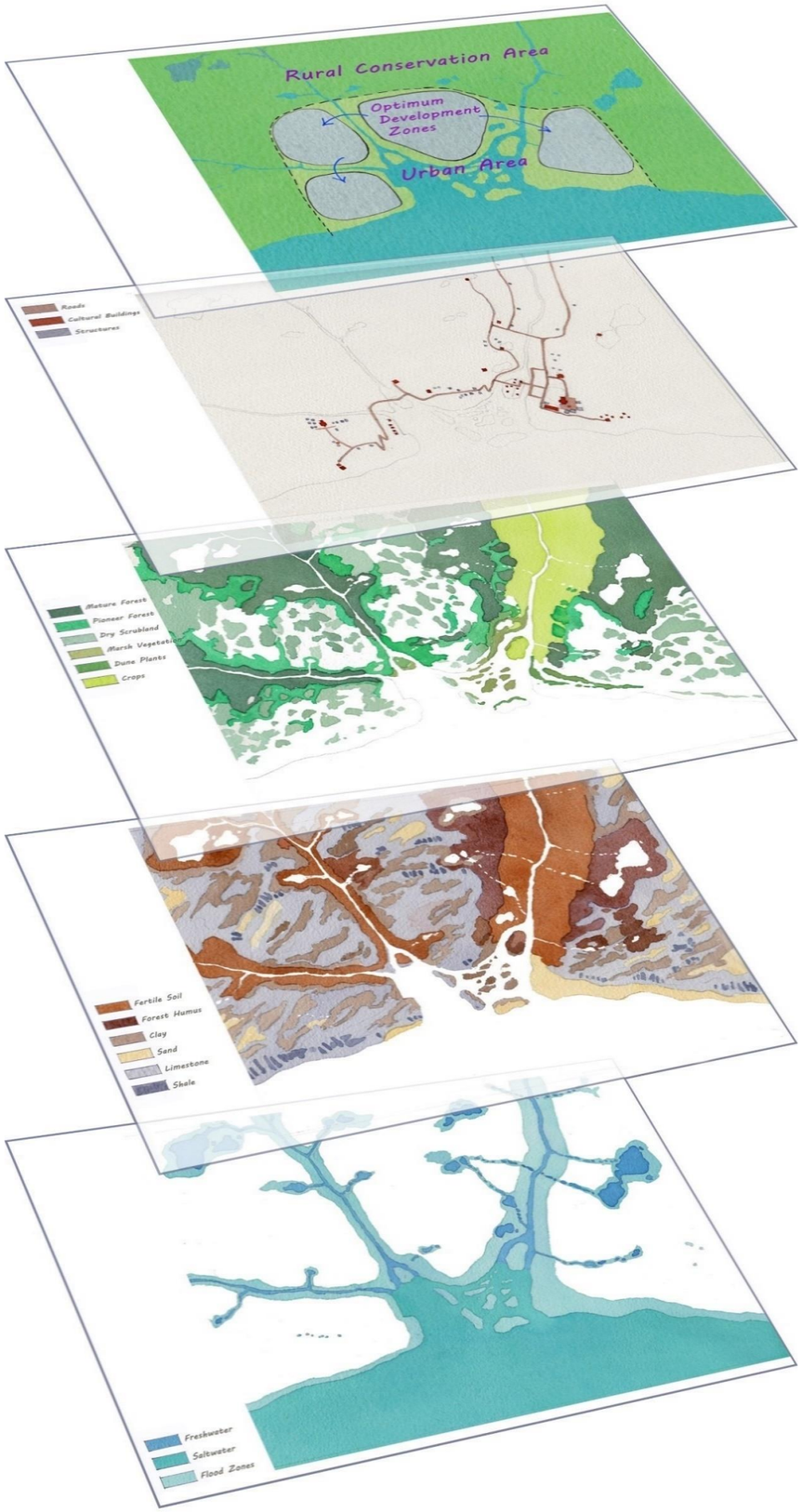
The Gray Grid: Modernist Planning in LEGO

Most LEGO cities are built on flat, geometric plates. Infrastructure such as roads and train tracks are planned first, and their geometry follows the grid of the underlying structure. Buildings and sidewalks are added next. The landscape features such as parks, gardens, rivers, urban trees and plants are usually added on top once the structural elements are given form. They are treated as decoration or ornament, not important or fundamental features and structures.



The physical structure of most LEGO© cities still represents a modernist approach to urban planning.

Left: This images from Brickworld Chicago (2015) illustrate a modular or “gridiron” approach to city making.
Middle: Instructions for building base/Street sections.
Right: Part of “City” display built by LEGO© from LEGOworld Copenhagen, February 2020



Finding Optimum Development Zones

Although imaginary, the preliminary design process for the model offers an introduction to ecological planning. Preliminary sketches describe soil types and geologic structures, surface and underground water systems, flood plains, vegetation and forest cover, existing settlements and roads, structures with historic interest, topography, key habitat regions and animal migration routes. Once natural systems were analyzed, “Optimum Development Zones” were identified, and the layout of the urban infrastructure could begin.

A simplified mapping process illustrates the analytical method used to find the best locations for building the Eco-city. Just as McHarg has proposed in 1969, these maps are printed on sheets of clear acetate and mounted together to demonstrate the concept.

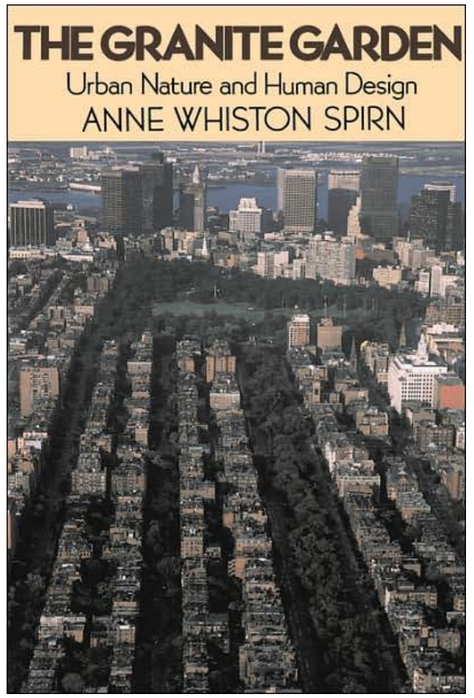
Cultural Values

The landscape had a small village already, with existing roads, churches, graveyard, houses, restaurants, and schools. The map shows places that are most meaningful to local residents. Preserving those structures with significant cultural value is important for local people, and gives new residents a way to connect with the past.

Sometimes buildings and roads are located in less than ideal places – such as in flood prone areas. Although future development should not take place in these spots, some can be protected.

The Central historic church and graveyard has served generations of people in the village 	The lighthouse was built to guide ships into a safe harbor. Although no longer in use, locals enjoy visiting and learning about history. 	The Lakeside camp has been used for generations of people for fishing, hunting and relaxing. 
The historic Colony Garden is located in flood prone areas where new development is not allowed but places with cultural legacy can remain. 	The hotel is located in an area at risk of tidal flooding and storm damage, but it has historic value. Special architecture protects the lower floors. 	Some restaurants have been serving customers for generations! 

Ecological Urbanism



The detailed planning process for the Eco-City presents an opportunity to explain Anne Spirn's concepts of *ecological urbanism*. She echoes McHarg's earlier writings, describing cities as part of the natural world, not opposite to, or apart from nature. Resilient cities as those that are designed in concert with natural processes.

In her book "The Granite Garden", Anne Whiston Spirn describes an approach to create cities that are life-sustaining, resilient, and less costly to build and maintain. Under headings of Air, Earth, Water, and Life (plants and animals), Spirn details the ways that city design and ecological systems can be united.

This watercoloured plan of the Eco-City was created before building the LEGO model. It is an imaginary place, but the design follows the multi-step process that an urban planner might use when designing with nature, in consideration of the natural systems (animal and plant life, water, air, and earth) and human-centered needs.

In the next sections, Spirn's principles are described, and examples from the Eco-City model show how urban design in LEGO can support natural systems.

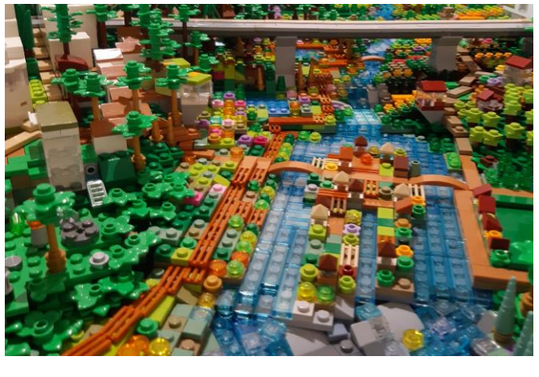
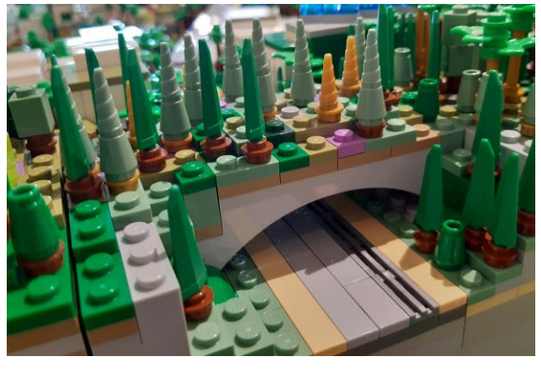
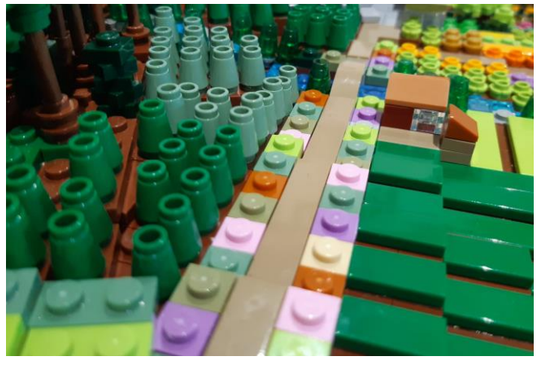
Life

The most important action that designers can take is to designate large tracts of landscape beyond the city for wilderness preservation. In this way, plant and animal species can live naturally with as little interference from people as possible. Within the city boundaries, urban plants can contribute to healthy biodiversity, enriching habitat for animals and people on private lands and public lands. An urban landscape that flourishes responds to the city's natural legacy and vegetation structure – identify most beautiful and significant plant resources including both cultivated and untended landscapes.

Linkages and roadways within the city

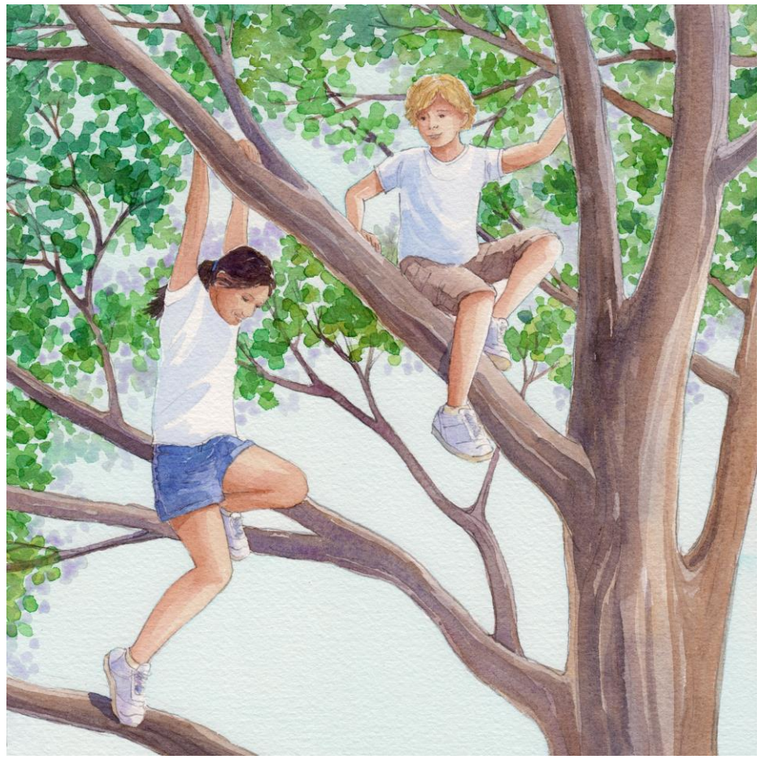
Cities should provide linkages so wildlife can navigate from one area to another within the urban area, and to migrate through the city to larger natural landscapes beyond. Traffic design for wildlife considers animals that swim, walk, slither and fly, as well as plant colonies that travel through their root systems, and by using pollen and seed distribution to reproduce.

The first consideration is to map existing vegetation and waterways to understand how wildlife is already moving through the landscape. Where planned civic infrastructure disrupts important wildlife corridors, creative designs for bridges, tunnels and tree canopies can mitigate damage.

Rivers and streams are essential transportation links for animals and should be buffered with natural vegetation	This bridge over a large road is designed with animals in mind as it provides a safe passage	Wildflowers planted along roadways provide habitat for birds and insects, and provide pollination services to farmers
		

Urban Forests

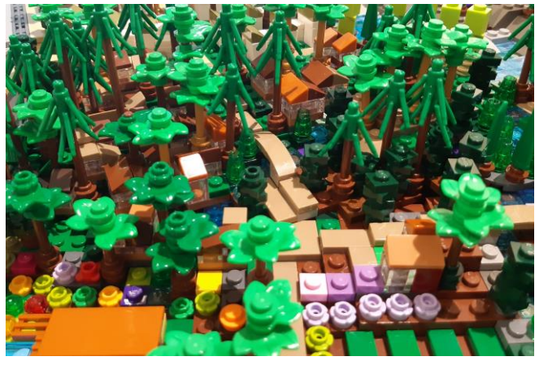
Significant forested areas within the city should be preserved with minimal destruction so the tree species can achieve a natural level of diversity and resilience, and they can function as habitat for wildlife. Forested areas provide beauty and opportunities for recreation and in large cities, “managed forest” can contribute to local economies with timber harvest.



Street Trees

Plantings of city trees takes many forms: promenades, allees, boulevards, small parks, and individual specimens add to urban life while providing opportunities for biodiversity. The treetops that stretch above roadways provide a traffic corridor for songbirds and insects. Trees planted in groups are better able to protect each other from exposure, and those planted in ‘open soil’ rather than having their roots covered by pavement have a better chance of accessing nutrients.

To select trees that are best able to adapt to site conditions, identify native species that flourish in different microclimates. Native trees usually support larger populations of animals. Unique specimen trees and non-native or ‘exotic’ species can add beauty to cities, but sometimes require additional care and should be sited with specific needs in mind.

Forest patches serve multiple functions in cities – this patch is a residential area, a recreation area, and provides a transportation system for the wildlife	Street trees create roadways several stories above the ground	The botanical garden is a good place for planting unique specimen trees and exotic species.	Trees that grow naturally in forests rely on each other to withstand wind
			

Meadows, creeks, rooftops

Grassy fields and lawns give people places to play and relax in the sun, but most cities have too many lawns that require expensive upkeep and provide very little habitat. Meadows, on the other hand, have flowers, fruit, root systems and plant cover that houses and feeds insects, birds and even some mammals like bats. Other places to support urban wildlife are on balconies and rooftops; flower gardens, green roofs, birdfeeders and fountains provide places for birds, butterflies and insects to rest and eat along their journeys. Other opportunities for supporting wildlife are in open streams and creeks, roadside ditches, and even abandoned and uncultivated urban lots.

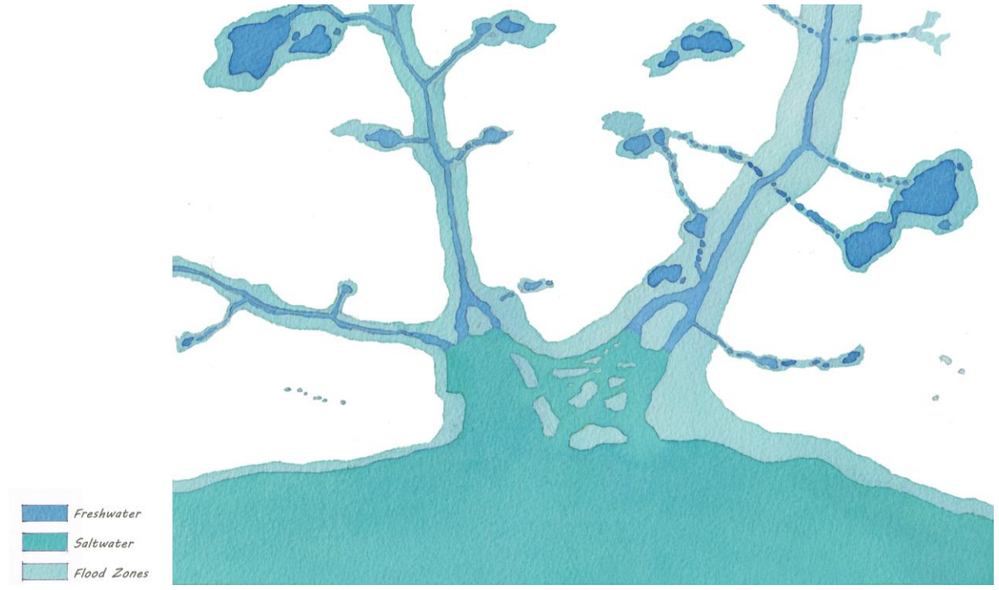
The meadows surrounding the butterfly research center provide places where residents can observe wildlife	City streams and creeks are roadways for fish, reptiles and amphibians but if they are buried underground no animals can thrive	These rooftop plants are chosen to provide food for insects and birds
		

Water

Urban form, materials and activities all have an effect on flooding, pollution and water consumption. How we plan our cities affects fresh water supply, water conservation, sewage and stormwater management and control of flooding, and these must be understood as parts of a greater system. Every built structure and park in the city can be designed to mitigate flooding, conserve water resources, enhance water quality, and enhance aesthetic qualities of water.

Flood control

Topographic maps and history records can be used to identify flood prone areas and tidal inundation zones. Buildings and roads are vulnerable to flooding in these areas, and development should be avoided or designed with water in mind. But natural and constructed wetlands and marshes in freshwater and saltwater environments provide natural protection from storm surges and flooding.



Buildings and pavement types that are impermeable give a “waterproof seal” – rain that falls on the surface runs off rapidly than the same amount of rain on a more absorbent forest floor or field. Plants can be used on rooftops and roadsides to absorb water, and special techniques that use a lattice of concrete blocks with soil and grass between can create more absorbent driveways and parking lots.

Buildings should be located above flood plain levels, but stormwater management areas can also serve as village green spaces and sports fields when water levels are normal.	In dry microclimates, use plants that do not require irrigation and avoid lawns that consume precious water resources.	Holding ponds and wetlands designed to retain stormwater such as the pond by the forest garden can become an aesthetic resource for the community	Planting strips can line roadways and capture dirt and pollutants after heavy rains, helping to slow down and clean up stormwater
			

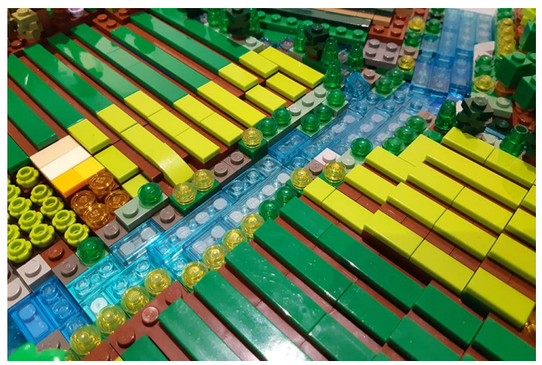
Conservation

In dry climates, plants should be chosen that are more likely to adapt to the site conditions and require less irrigation than non-native species and thirsty lawns. Designer can take advantage of existing water resources (springs, ponds, streams) to provide beauty and enjoyment.

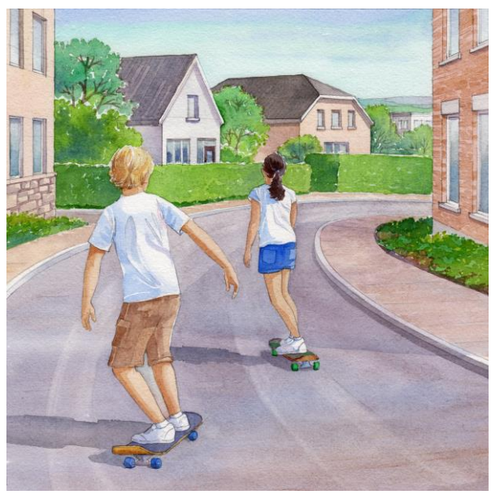
Natural Purification

To keep water resources clean and healthy, freshwater resources should be conserved, and sources of pollution need to be identified and remedied. Heavy rainfall sweeps the dirt from urban streets into storm sewers, and toxic materials such as oil, grease and heavy metals can be flushed into rivers. Agricultural run-off can cause phosphorus, nitrogen and animal waste to enter rivers, causing algae blooms or contamination downstream.

Plants can be used to naturally purify water. Wetlands can be constructed and integrated into sewage treatment processes, riparian buffers can be used to slow down and filter water draining from farm fields, and roadside plant buffer strips can absorb and filter run-off from city streets. In a process called phytoremediation, plants can even clean up heavy metals and other toxins from damaged landscapes.

This civic fountain and pool was designed to take advantage of a natural spring that provides fresh water.	Wastewater treatment center uses special types of plants to filter effluent and purify water. Energy can be created as a by-product from biogas.	Plants are used to line agricultural landscapes, creating natural buffer strips that clean water and prevent erosion.
		

Air



Planning for excellent air quality in a city involves two strategies. The first is improving air quality by reducing atmospheric pollution by reducing what pollutants entering the atmosphere, and by using filtration to help clean the air. The second is working with the natural flows and air currents and microclimates; designers can harness these patterns to help cool cities in summer, create warm pockets in winter, allow fresh air to circulate, and avoid creating wind tunnels.

Reducing Pollutants

The most effective way for cities to improve the atmosphere is by reducing the number of cars on the road, and by supporting greener transportation systems. To encourage people to leave their cars parked, bus routes, cycling paths and walking routes must be provided, and they must be more compelling than a daily commute.

Cities can support the use of low-carbon energy generation that creates fewer emissions, and stringent regulations can reduce emissions from cars and industries. Buildings that are well insulated and well sited can use less energy to heat in winter, and cool in summer.

Natural strategies take advantage of natural filtering qualities in trees and plants to capture polluting air particles in their leaves and branches where they can be held and cleansed.

Exhaust from cars can be buffered by urban forest areas and street trees	Alternative modes of transportation like buses, bikes and trains will reduce dependence on cars	Electricity can be created from solar panels on rooftops, and buildings can be designed to benefit from passive solar energy.
		

Understanding atmospheric changes and air circulation in cities can help designers work with natural patterns. North and west winds can bring welcome breezes in summer, but create harsh conditions in winter, and designers must take care not to create wind tunnels from buildings that are too high and too dense. Along shorelines, breezes are different in the day and the night. In valleys, air can become trapped and stagnant if there are no cross channels to refresh the air, especially if too many cars are using valleys for transportation corridors.

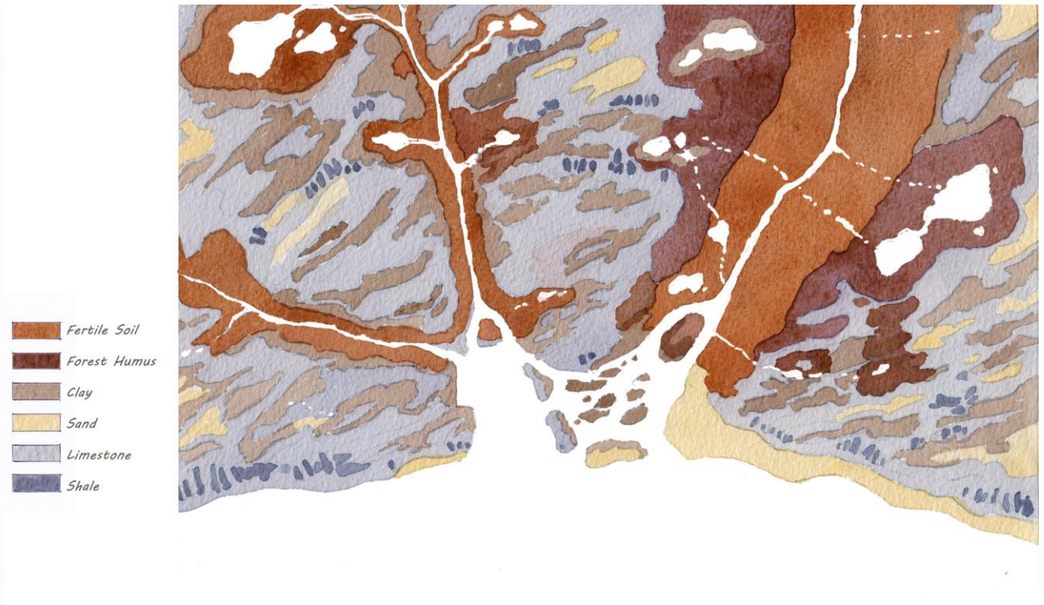
Natural features such as hills and valleys, lakes and rivers can create microclimates which are small areas that have a different climate than areas nearby. Trees are excellent on urban streets and near buildings. They provide shade and moderate humidity in summer, but in winter when leaves fall, they allow the warming sun through.

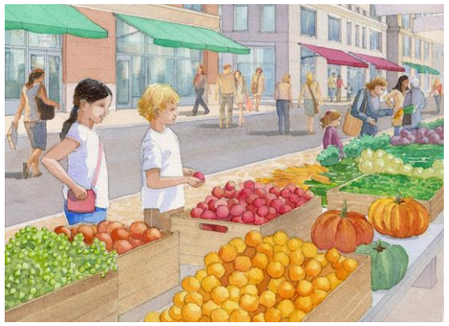
Buildings and roads can create microclimates too. Surfaces that are lighter in colour absorb less heat; too much dark asphalt can create urban “heat islands” in summer. Construction materials, window locations, shade structures, overall height and spacing and orientation all contribute to a more pleasant environment.

Green roofs and carefully considered architectural surfaces can help moderate the temperature of buildings and reduce the need for air conditioning, and buildings can take advantage of wind patterns to provide shelter and to ensure fresh air flow.

Roads are not planned in valleys where pollutants can become concentrated, and air channels are designed to allow continuous circulation of air. 	Light coloured paving absorbs less heat than asphalt, and green roofs and walls can regulate building temperatures to avoid heat islands. 
Gardens and rooftops that are sheltered from the north wind are “sunny pockets” and pleasant places to sit in the early spring. 	During the summer, “shady havens” can be designed to capture breezes and create cool oases to escape the heat. 

Earth



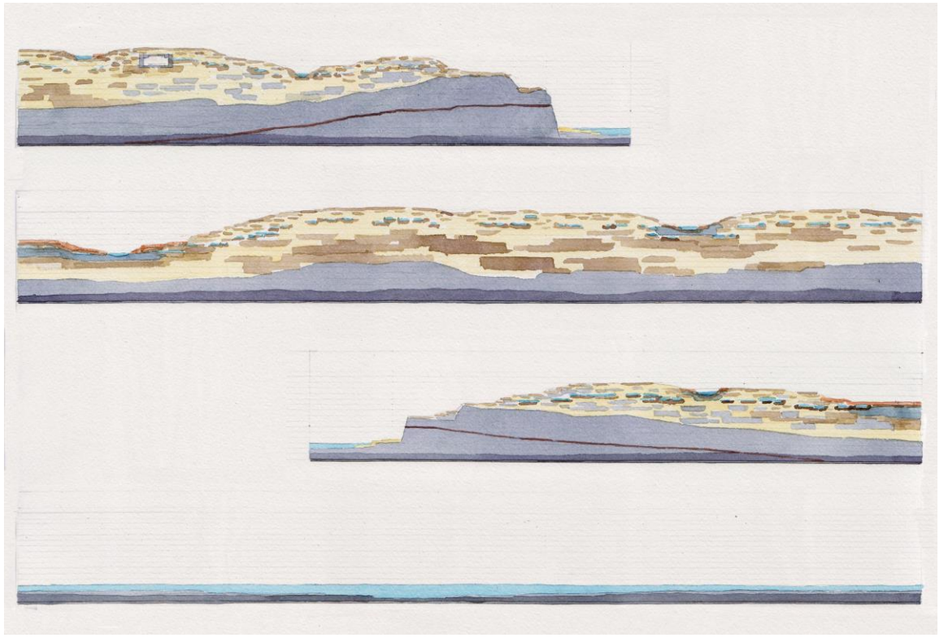


There are many reasons to understand the landscape beneath our feet before designing a city. Distinct qualities of the rock and soil make some areas more suitable for building on, some places ideal for growing foods or forests, and other spots ideal for recreation.

Lands that can be built upon require stable bedrock foundation, and some clay and sandy soils can also support roads, and buildings. But rich topsoil, such as the soil that is deposited along fertile river valleys, should be reserved for growing food. Mature forests also create soil types that are best for supporting woodlands.

Urban farmers are using pockets of fertile soil within the city 	The freshwater river deposits rich nutrients and clay on the island during floods 
The river creates a wide valley of fertile soil that is ideal for food production and agriculture in the countryside. 	Different soil types provide different growing conditions for plants and native trees that adapt to their surroundings. 

The Eco-City model demonstrates that there are layers composed of different materials below the surface of the earth. These colours might represent chalk, limestone, shale, sand, clay and saturated clay, with more examples of unique rock types at the surface and on cliffs, but they are intended to be general rather than to represent a distinct region's geologic structure.



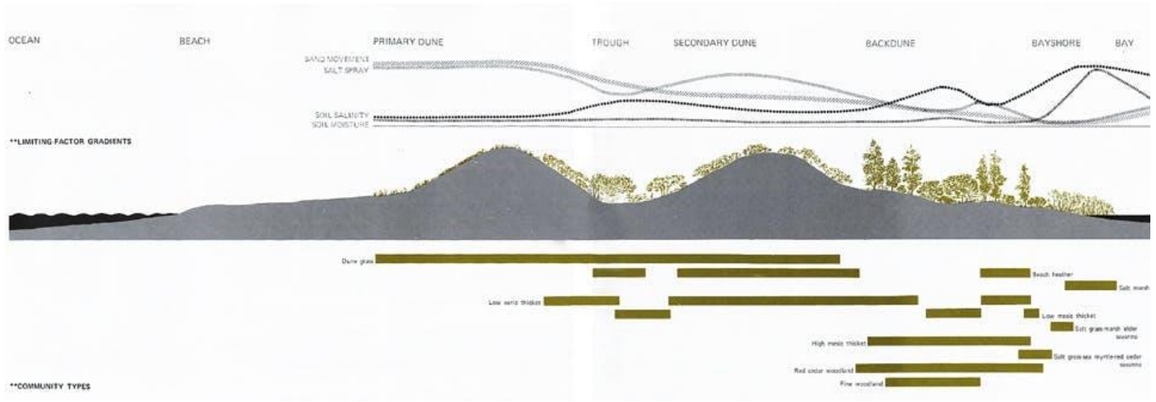
There are springs and pockets of water underground, because water falls into porous areas and caves. Far below the surface, a deep level aquifer is shown, where the chalk layer is saturated with water and never drains.

Geologic features such as the thin "Fiskeler Layer" marks a boundary between chalk and limestone, illustrating a violent change on earth that can be read in the rock

In some places along the cliff face where underground springs create small waterfalls and cascades, changing the rock composition.

A tunnel is built in an area where there are few water bodies or underground springs, and where the underlying rock is suitable

Sandy shorelines and natural sand dunes demonstrate how plants can transform a landscape from bare sand into a soil type that supports plant growth.



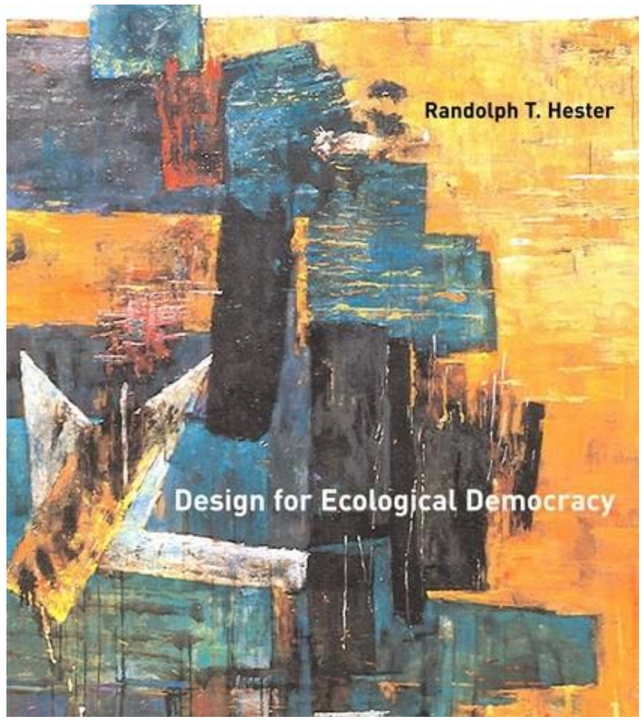
Ian McHarg's diagram showing the formation of sand dunes

Rock formations just under the surface of the water can make navigating boats difficult.	Coastal estuaries and tidal flats can be composed of sand and clay deposits that come from the river. Plants that grow in these soils can tolerate salt water	The model shows that the sturdy parts of the beach are good places for recreation and activity, but where dune plants getting established people should walk on designated paths and walkways so they don't trample the fragile plants
		

Ecological Democracy

Features of the finished Eco-City model provide an opportunity to discuss qualities of a city where the needs of natural systems are balanced with the needs of people. Randolph Hester describes city-making processes that are aimed at ecological resilience, but also provide joy and pleasure and help us make stronger connections with other people.

- Centeredness
- Connectedness
- Fairness
- Sensible Status Seeking
- Sacredness
- Particularness
- Selective Diversity
- Density and Smallness
- Limited Extent
- Adaptability
- Everyday Future
- Naturalness
- Inhabiting Science
- Reciprocal Stewardship
- Pacing



In the following pages, Hester's 15 principles are described, and tied to components of the Eco-City model in a visual catalogue to provide opportunities for interactive discussions with viewers of all ages.

Nature and Society

Centeredness

Spaces such as village greens, civic plazas and parks can provide urban focal points where people gather and undertake numerous activities. Successful centers are concentrations of different uses so they attract people of mixed income levels, ages and gender groups, encouraging social interaction and liveliness.

Public space at the harbor brings together people from the skateboard park, market area, shopping center and marina

The community sports fields in the city center connect the high school, art gallery, and science museum.

A civic plaza draws together the church, the hotel lobby, local shopping and local restaurants

Connectedness

Connectedness is a way of thinking about design, and can seem invisible, but the concept manifests in in physical planning as well. Just as individual actions like recycling and energy conservation are connected to global efforts to curb resource consumption, an ecologically functioning city is not broken into isolated parts and functions, but demonstrates connectivity on a number of scales.

Transportation networks (trains and highways, and a marina) provide connections to other regions without severing neighbourhoods.

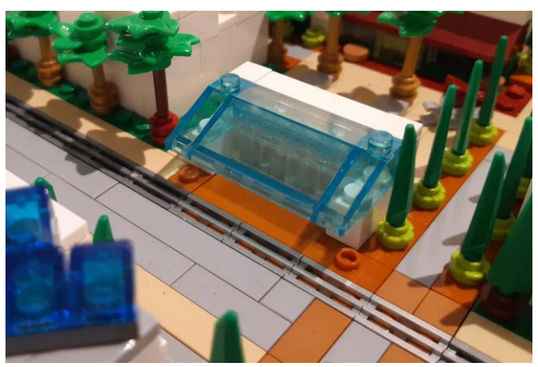
Smaller wildlife habitats sheltering animals are physically linked to large open spaces beyond the city wilderness preservation areas.

Natural water drainage systems that flow into rivers demonstrate connectivity with larger systems; these are visible rather than buried in culverts.

Fairness

Good city form can contribute to aims of social justice, democracy and fairness, just as poor urban form can exacerbate social inequality. The Eco-city demonstrates accessibility, and inclusivity that is available to people with limited wealth and limited mobility distribution of wealth, and inclusiveness.

A central public transit system offers access to areas within the city, into the countryside and connections to other regions



Public and private buildings can provide shared spaces such as swimming pools, elevators and gardens to ensure access to city amenities.

Food markets and grocery stores are located within walking distance of all residents

Nature and Society

Sensible Status Seeking

A mix of dwelling forms (small houses, apartment blocks and homes with more prestigious sites) occurs in all areas of the city, ensuring that there is no physical segregation strategy for rich and poor.

Small housing types, apartment blocks, and prestigious housing are mixed together in city neighbourhoods

The most precious resources – the shorelines, the beautiful rivers, the natural forests, are not privately owned but shared by everyone.

Architectural distinction is displayed in public buildings and shared spaces rather than attention paid to individual residential properties.

Sacredness

When we think about landscapes and community structures that are considered sacred, many think about those historical monuments protected by law, or national parks that are emblems of what we value as a society. Everyday spaces can also underscore the authentic character of a place, are loved and treasured; even an ice cream shop can become a beloved focal point for a community.

A colony garden established for generations can create a strong sense of place

Sacredness can also arise in natural landscapes that enable mindfulness and meditation.

Churches and graveyards often symbolize a community's identity and connects a modern city to its past

Particularness

Whether we are discussing the watershed of a large geographic region, or the microclimates created by cliffs or forest patches, the most resilient cities are built in harmony with their particular ecosystems. At the regional scale this principle is demonstrated by the urbanized ridge tops, and less-developed flood plains. At a smaller scale, unique buildings respond to their immediate surroundings with a suggestion of material and architectural compatibility.

Limited development occurs in the flood plain, while the hill tops are more developed.

In the woodland area, homes are constructed of wood materials and built in harmony with an existing mature forest patch.

On the cliff edge, structures conform to the natural features of the rock.

Nature and Society

Selective Diversity

To ensure biological diversity, mixed habitats can be planned for wildlife. But other forms of diversity can strengthen economic resilience and social development. Industries can be planned that are most suited to local resources, local production of goods and energy can be enabled, and land-use diversity can enable small economies. Eco-city neighbourhoods are planned to support a balanced mix of functions and activities – housing, shopping, working, school and recreation.

Shopping is not relegated to large malls or suburban districts, but integrated into residential areas, with housing located above local shops.

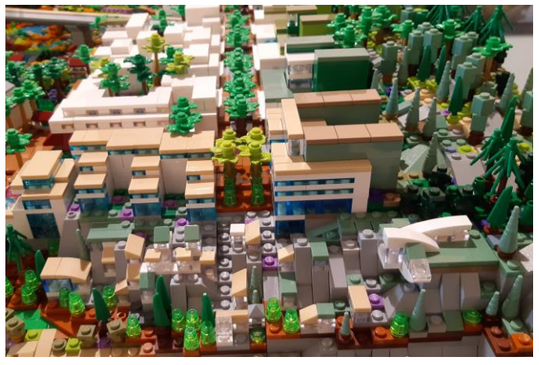
Local industries, such as small urban farms, are planned to encourage interaction and knowledge-sharing on a daily basis.

Forestry is a local resource, and a forestry center invites locals to engage with and learn about local timber production.

Density and Smallness

A city form that is resilient depends on a concentrated density for two key reasons; it is more efficient and economical to provide civic services within a smaller physical area, and biodiversity is better protected if more natural land is left undeveloped. People thrive when density levels are high enough to reduce housing costs and support active community life; the integration of large natural spaces creates a balance and avoids overcrowding in cities.

These buildings show that a density of housing is desirable when a balanced design is achieved with an abundance of open natural space



Benefits of density come from leaving large areas of undeveloped landscape for recreation or for wildlife.

Restaurants, shops and markets are energized and prosper with more customers.

Limited Extent

There are multiple benefits for a compact city that has clearly defined borders. Limiting sprawl preserves natural landscapes outside the city for conservation, and for industries that require large tracts of land such as agriculture and forestry, and compact cities are more efficient. However, the edges between urban and rural zones can be permeable, and facilities located at these edges provide rich opportunities for social learning.

The Eco-city was planned to have a distinct civic edge with no suburban “big box” shopping zones or subdivisions, and a clearly defined city limit.

The edges between urban and rural zones are designed to be “permeable”, the farmer’s market brings together farmers and city residents

Facilities located at the urban perimeter, like this bird observatory, provide rich opportunities for learning about ecosystems beyond the city.

Nature and Society

Adaptability

Resilient cities have urban forms that are adaptable; the land uses are flexible and may change over time. Cities form that dictates strict purposes in function with zoning make adaptation more difficult, therefore the Eco-city does not show functional zoning separations in the overall civic land use, and there is housing, business, recreational and civic use in all areas. On a smaller scale, urban spaces have been designed to be flexible and adapt to different conditions.

Everyday Future

A city that provides integration rather than separation, both socially and ecologically, is most successful if people have access to daily, everyday connections; this allows social bonding and fosters environmental stewardship. The Eco-city supports sharing of everyday experiences across social groups.

Naturalness

People are positively affected by engaging with nature; they improve physical and emotional health, and joy that arises from connecting with the natural world. People improve their physical condition when they get more exercise and fresh air, but stress reduction comes from a multitude of natural experiences: solitude, meditation, and the enjoyment of beauty are restorative.

Container-type shops on wheels are located at the harbor and could be moved to higher ground in flood conditions.

The function of larger civic buildings is suggested in some cases, but multiple uses are possible, indicating flexibility as economies change and the city evolves

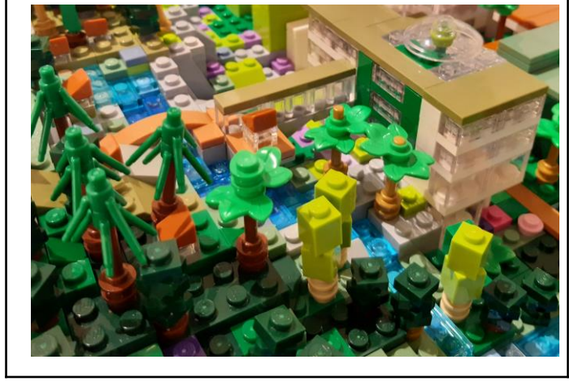
Public green squares might host sports games one day, and festivals or civic gatherings on other days.

The sailboat owners, fishermen, and the town's skateboarding teenagers come together over a plate of French fries at the marina.

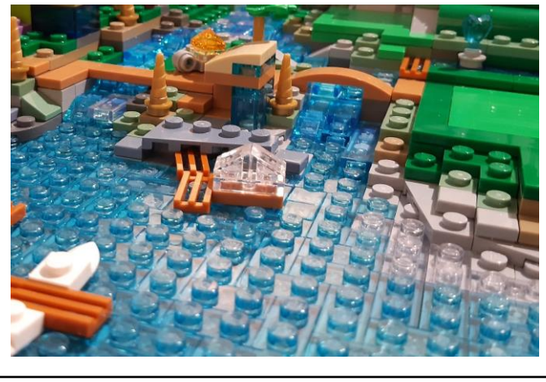
While walking to work, people can see what the gardeners are growing on the island, perhaps visit one of the harvest barbecues

In residential courtyards, children grow up immersed in small gardens with natural landscape features.

The health center connects patients with natural landscapes with bridges, paths and nearby gardens. Views towards nature also promote healing.



The kayak club and marina helps residents explore their seaside environment



A waterfront retreat provides views of the lake and forest for visitors.

Nature and Society

Inhabiting Science

Most people do not understand the urban ecology of the places where they spend their lives. Lack of environmental knowledge reduces peoples' ability to participate building communities where natural systems flourish. Environmental observation, especially over a number of years builds subconscious place-based wisdom. Such experience can happen at work, at schools, and while we are going about our daily lives.

Agricultural schools and colleges can expand learning about local ecosystems.

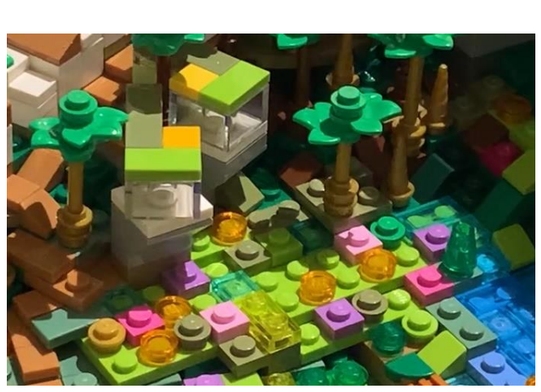
Knowledge about hydrology comes from observation of seasonal changes in creeks, rivers and ephemeral streams

Children learn about geology at school, but also from playing in sand and climbing on rocks

Reciprocal Stewardship

Life experiences can be enhanced by intentional teaching, so that both conscious and sub-conscious learning is absorbed in daily experience. Ecological literacy is enhanced at schools, but also at special facilities where people can gain knowledge of natural science. A deepening of ecological knowledge leads to heightened responsibility and environmental stewardship in citizens.

Residents learn about the importance of pollinating insects and birds at the Butterfly Research Center.



The Forest Garden demonstrates how edible plants can be grown in a forest-like setting.

People can visit the Botanical Garden, Art gallery and Natural History Museum for information and new exhibitions.

Pacing

In cities across the globe, people are encouraged to leave the car at home and walk more. Designing cities for a slower pace conserves energy, reduces pollution, makes a city more pleasant, and improves beauty, physical health and stress levels of people.

A wide variety of interesting walking routes will persuade many residents to leave their cars at home.

The Eco-City provides roads for cars, but most parking is underground.

landscapes that are most compelling are designed to be appreciated slowly, on foot!

Additional Resources

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