

FIELD ACTION JOURNAL

SUSTAINABLE SYSTEMS

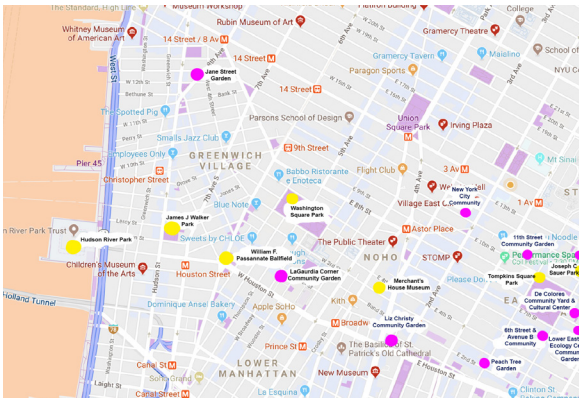
**DESIGNING MIGRATORY
STRUCTURES**

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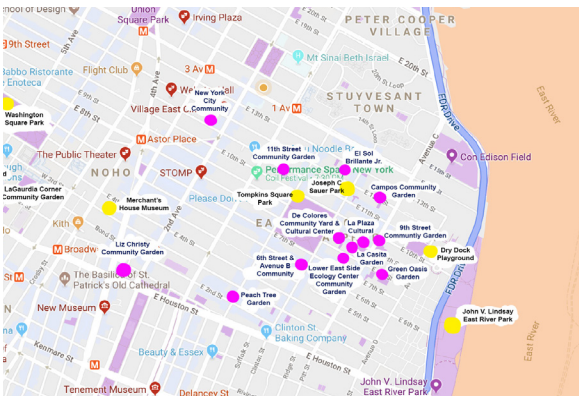
PARSONS SCHOOL OF DESIGN, SPRING 18
INSTRUCTOR: CAROLIN MEES

SOCIAL & SYSTEMS

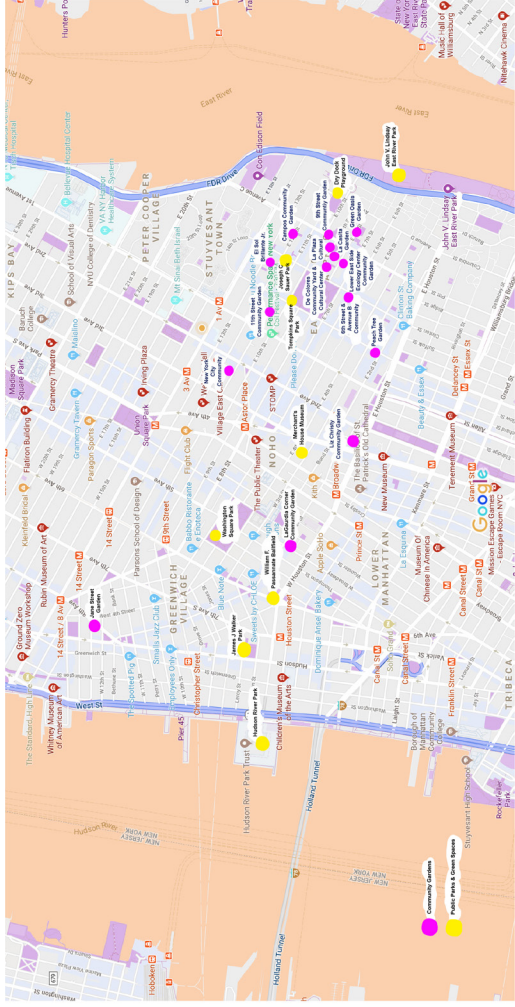
Community Gardens and Public Spaces in New York



Zoomed in version of the map of community gardens, green spaces, and public spaces in New York on the west side.



Zoomed in version of the map of community gardens, green spaces, and public spaces in New York on the east side.



Zoomed out version of the map of community gardens, green spaces, and public spaces in Manhattan, New York between 14th street and Hudson Street.

What I realized when I was creating this map and researching about the community gardens was that there aren't as many public spaces on the west side of New York as there are on the east side. Many of the activists start from the east side including the Museum of Reclaimed Urban Spaces, which we visited in our field tript is located on the east side. More and more development of real estate on public spaces is occuring all around Manhattan. In 1999, to create revenue, the city auctioned many of the garden for personal property developments, but these gardens were saved since The Trust for Public Land negotiated a purchase of all these lands. Since then, there have been some conflicts over public lands being developed into real estate, but campaigns like these and activists starting these campaigns have been saving these lands of New York.

The field trip to the Museum of Reclaimed Urban Spaces made me think about how

even in closely tight spaces like in the bourough of Manhattan, it is possible to make these spaces effiecient if we want them to. By visiting the community gardens, it was really shocking to find out how just a few small gardens make a difference in the city. Small amounts of rain water harvesting, composting pits, and community building in these gardens actually make a change towards our environment. The gardens aren't just for recreation purposes or to cure air pollution of the city, since there wasnt even as much greenery as I saw. But its about so many more complex small things that we used to make use out of before but have now forgotten about like making our own soil and harvesting rainwater. These are very original and old techniques that we need to bring back and in a more effiecent way because maybe inefficiency is the reason why most sustainable acts are dropped or abandoned. Its about taking smaller steps in small spaces and making them a bigger contribution in total.

CLIMATE CHANGE & ENERGY

Grow-Your-Own-Food Experiment



Ariel view of Wheatgrass after 2 weeks.



Front view of Wheatgrass after 2 weeks.

The seeds did not grow at all for the first 2 days. But after 2 weeks the result was the 2 pictures on the previous page. I wrapped the seed in a paper towel and soaked them in water for 8 hours. The seeds became bigger after this step. After that, I took half of them and put them in the soil. I pressed them in and then took soil from the sides of the cup

to cover the seeds. I then watered the cup every day once and left them near the window. The results were only apparent after the 3 day. The seeds started to germinate. But the shoots were not as dense and were sparingly scattered. I think I should have used all the seeds that were given, so that the experiment would have yielded more shoots.



Joe Coffee near 5th avenue 13th street provided the recyclable cup for this experiment.

Plants and their water system

Different shapes of leaves make plants function differently. Plants with large leaves transpire/lose water more because they have much more stomata cells in their larger surface area leaves. Plants with smaller leaves lose less water as there are less stomata cells in the smaller surface leaves. In deserts, cacti have leaves reduced to thorns so that

less transpiration occurs. They also have waxy cuticles which make it harder for the water to diffuse from the plant to the atmosphere. Many desert plants also have a leaf structure that makes them have sunken stomata, which makes the stomata be present under many layers of other cells, which prevents any water loss from winds and transpiration.

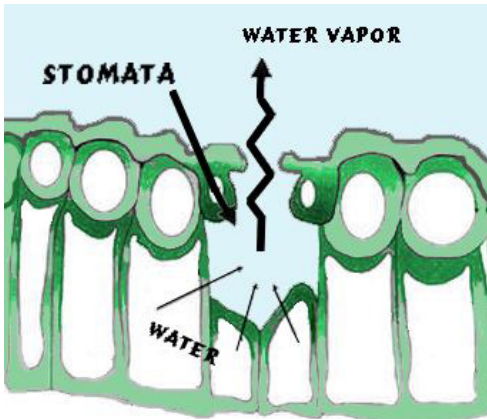


Diagram of Stomata and plant cells explaining transpiration.

The easy way to describe photosynthesis is that the sunlight is used as energy to break down water and carbon dioxide to form glucose and oxygen. In a more complex and exact way, the chlorophyll in chloroplast in plants converts light energy into chemical energy or ATP. In this process, H_2O splits into O_2 and hydrogen ions. The oxygen is released and the hydrogen ions are combined with CO_2 molecules to make $C_6H_{12}O_6$, also known as glucose.

Energy from a plant's leaf is transferred to the water molecules in the leaf. This energy weakens or breaks the strong force between the liquid water molecules through which they become gas molecules with a higher energy state before. When these gas molecules escape the leaf, they take their energy with them leaving the plant cooler.

Plants can filter the air, the soil and the water they live in. They take up dangerous gases from the air and soil, like carbon dioxide and gases found by lit cigarettes, through their leaves and roots. They use the nitrogen and phosphorus compounds from the soil, so if there is heavy rain, there is less chance of these compounds being washed down to the groundwater and aquifer. And these compounds are also a part of the plant's food.

There are ways that plants can actually attract good insects that help them survive and compete. For example, some plants have flowers, whose nectar attracts bees. These bees sit on the flower and the pollen from the flower can get stuck on these bees' bodies. After these bees fly away, the pollen on their body can fall down in another area, where

the same species of the plants can start growing and competing for survival and reproduction. There are also various insects in plant soil that benefit the plants. For example, earthworms help to increase the amount of water and air that gets into the soil. They also break down organic matter into natural fertilizers, which are considered the good nutrients for plants. All insects aren't bad for plants. Some actually do help make

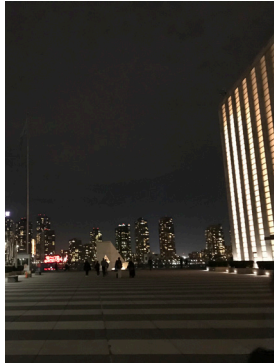
the environmental conditions better for them.

Cellulose is a basic cell structure in plants. It is present in plant cell walls, keeps the cells rigid and strong. Cellulose is used for the production of paper and paperboard. It is one of the main components in cotton and wood. It is also being researched for its use as a biofuel. A conversion of cellulose into cellulosic ethanol is being studied for its use as an alternative fuel.

United Nations Field Trip



A portrait of Ban Ki Moon in United Nations Headquarters of New York.

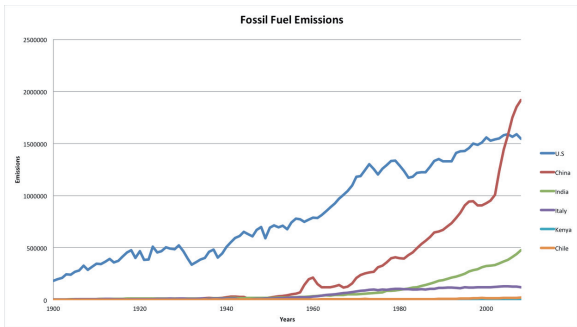


The building of the UN headquarters.

During the United Nations field trip panel discussion, it was the most interesting to see how the Indian dance form, Bharatnatyum, beautifully showed the destructions in the world happening. The tone of the dance changed from destruction to hopeful and it was a great form to explain the realities beautifully. What I really liked about the discussion on climate changes and sustainability was that speakers focused more on developing the vision of

a project altogether as well as keeping in mind the details of that too. It was a different way of thinking. They didn't just say i want to make this and then make it. They set a vision, made discussions with the artists and designers, thought of precautions when climate changes instead of strategies when they would already happen. The approach of if it doesn't work, it's not beautiful was also very inspirational for me as a designer. And that is what I'm trying to focus on. Function.

This Changes Everything



A graph showing the increase in Fossil Fuel consumption over 100 years;
ccfyschile.wordpress.com

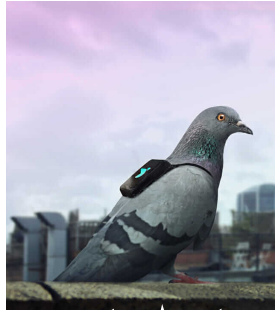
As the urban population increases, there occurs a corresponding increase in industrialization and demand for goods. Capitalists employ the resources in rural, underdeveloped areas to feed their

need for production. The overuse of fossil fuels and sacrificing land inhabited by some so that people in the urban areas can benefit, adds to the conflict of the efficient and sustainable use of resources.

Air Pollution Mitigation



Smog Free Tower in Beijing; notable-life.com



Pigeons on patrol for Air-pollution monitoring; autodesk.com

Air pollution mitigation strategies include not just having catalytic converters in cars or scrubbers on top of chimneys. These are very primitive strategies for cleaning the air. There are many more strategies that are more innovative and efficient these days. And these don't just include taking the air right now and filtering it. These include filtering the air from the soil,

higher troposphere of the earth, or the dust we create through doing basic work like making roads and drilling the earth. Dust abatement refers to the process of inhibiting the soil dust. And this process can be used after activities like drilling and breaking the earth. It includes methods like spraying the dust area immediately with water, which calms the dust

down and reduce particle matter. Land closures are also a method from stopping air particle matter to increase. An innovation called the Smog free Tower is a giant air purifier in the middle of the Beijing's 751 Park. It is over 20 feet high and cleans up to 1,000 cubic feet of air per hour. The purifier works on a small amount

of green electricity too. Innovations like this are easy to make (technology wise) but use up a lot of metal and natural resources, whose extractions might be harming and promote a less sustainable growth. Instead of this, we could use recycled materials, which would make this invention totally efficient and sustainable.

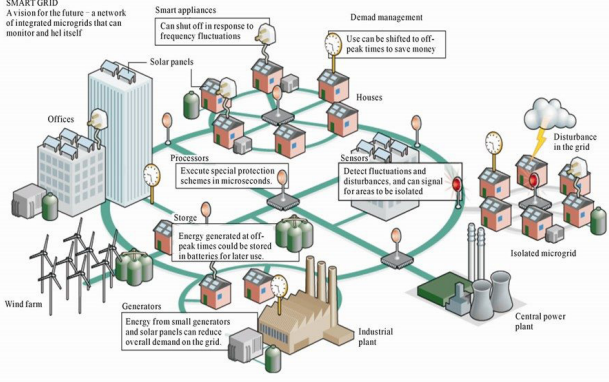
Energy and sustainability

Energy can never be made, it is just transformed from one form to another. For example, fossil fuels are burnt to heat up water and produce steam, which can be used to turn turbines and produce electricity. So here chemical energy in fossil fuels is converted to electric energy. Batteries store energy using a chemical reaction known as redox reaction and converts electric energy into some form of potential energy. Energy is transferred from power grids through cables. These cables can often be seen above ground level up high or in constricted places like New York, they are below ground level. Electricity

is not directly transferred from the power grid to homes or building. There are transformers, which adjust the current and voltage of the electricity before sending it for low intensity requiring purposes. The transformers reduce the current and increase the voltage so that there is less power loss, since high current means high power loss through the long cables. A microgrid is a discrete energy system that consists of several energy resources and provides security for a city during energy shutdowns and problems with traditional electric grids. Microgrids offer close proximity and therefore power transmission is easier than traditional electric grids.

Smart System

SMART GRID
A vision for the future - a network of integrated microgrids that can monitor and hel itself



A diagram of a Microgrid consisting of various energy sources close to the house. Photograph: <http://strattonreport.com/news/tech-leapfrogging-power-biz/>

WATER & MATERIALS

Living in China's Expanding Deserts, The New York Times



Aerial view of the farming/agricultural practices done in the Tengger dessert; nytimes.com

The living conditions become really tough as the climate changes. In the case of China's, the Tengger desert is expanding. Many people have left but many have also decided to stay. The reasons of leaving these extreme climate conditions are for survival. The families or the people themselves

want to survive and live in better conditions. But there is also pressure from the government, in which the officials are trying to move these people into better villages. The government thinks that the practices of the people living in deserts like herding are actually contributing to more desertification.



A person living in the desert trying to help the climate conditions through tree plantations; www.nytimes.com

There are a lot of reasons why people choose not to leave and survive in their bad climate conditions. They are not very obvious reasons but there is a direct link between climate conditions and security. There can be conflicts between two regions if there are refugees moving from one region to another. People fleeing from droughts may go into a region where there is a lack of water resources, and this

causes trouble. There is bureaucracy and countless nights of waiting, and on top of that these refugees don't have many belongings and jobs. Additionally, many people have enough money-making businesses for them to survive, which is a better option for them for them than waiting in long refugee lines.

I think a refugee is someone who is thriving to survive. Their homes

are already lost and all they can do is trust people that are supposed to provide help. People like me can do that but the help would be indirect and maybe help refugees of a different generation. We can start by protecting the already good lands that exist. And slowly sliding into deserts and areas affected by drought.

Planting trees would help with soil erosion, the most important cause of dry lands. Planting efficient water systems in deserts and improving underground water levels by not throwing toxic wastes on grounds can help the water levels of the deserts and help oases, like the Swan Lake in the Tengger desert, stay as they are.

Make-your-own-materials Experiment

I think it is very interesting to grow your own material and that too sustainable because it can be done anywhere and for this specific climate change project, it makes even more sense. The people surviving in extreme weather conditions can make these materials as they are quite traditional than industrial. They don't need big machines and extra skill, just some basic prep. I think our clothes can definitely be replaced by materials like Kombucha leather.

Fluidity in a structure can be achieved with bioleather. Foam made from mycelium can also be more structured and used instead of metal or wood. I also really want to grow my own crystals. I think it could also be used as a more structured material. The crystals could also add an aesthetic factor if maybe used for their transparency. All these materials don't take much to grow and don't harm the environment and so are very sustainable.

Lower East Side Ecology Center Field Trip

The field trip to the Lower East Side Ecology Centre was really interesting. It made me think about how only a little part of the waste in New York can make be so useful in making so much soil. And the composting process was a lot more technical than I thought it would be. There are browns and greens

whose ratio has to be right to make the composting work. The composting does not even require big machines and without them, the compost piles were huge. You could see the difference between the finished pile and the pile that was still in the process. It was a really good experience and I learned a lot.



The composting bins

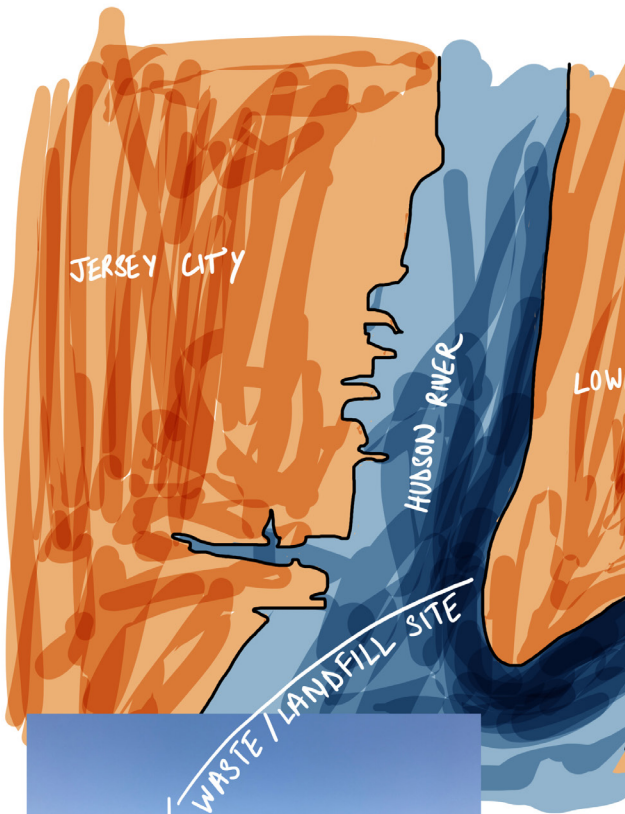


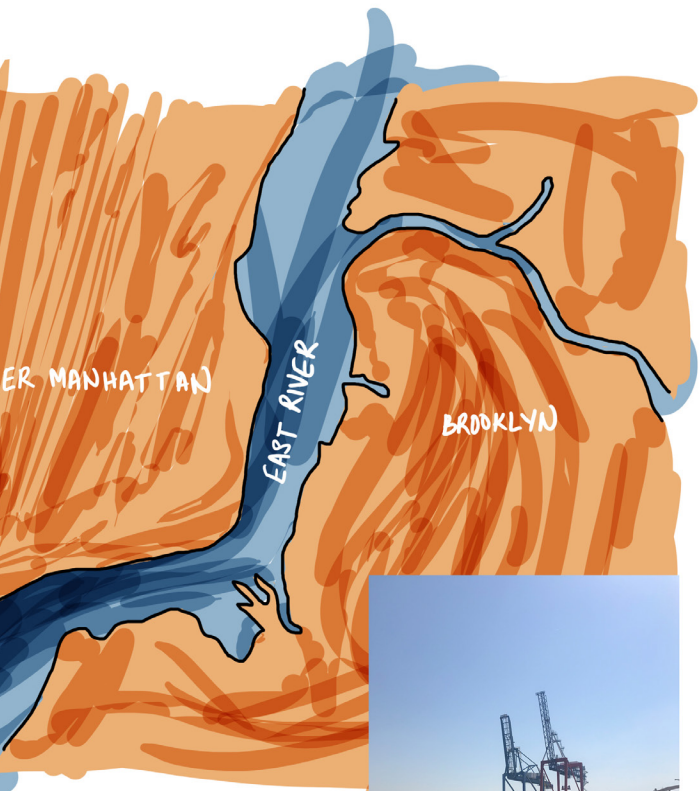
The finished compost piles

Circle Line Field Trip

Since New York is a commercial city, and since most of this commercial jobs are located in lower Manhattan, it wouldn't be easy to turn this area into a wetland. Letting the water flow in the city slowly with time would prevent an intense flooding scenario but over time, this water level may rise again because of rising global temperatures. But in many ways I think it would be very helpful for the people living here and sustainability of New York City. Wetlands could pro-

vide habitats for different species of flora and fauna. Research also shows that wetlands act like the kidneys of an ecosystem. They filter water and make it cleaner. They also absorb wind and tidal forces, which could also help in the decreased chances of flooding into the city. For the people too, wetlands could provide an excellent spot for recreation. It could also attract tourism, because once known commercial city has now become the opposite.

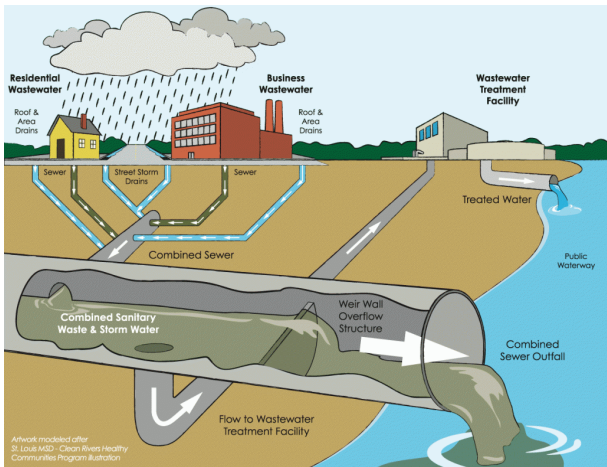




Scienc Lab Experience

The water of New York City's waterways is always contaminated with sewage because heavy rain causes the underwater canal, which takes the sewage to the sewer system, to overflow. And so now, the rain water or the runoff that should go directly in the waterways involves sewage from the overflown canal. This scenario is explained in the image below.

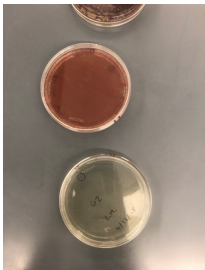
The water in New York City comes from upstate New York and mostly from Delaware water reservoirs, and so, the multiple underground systems in the route and the continuous checking for water contamination in the reservoirs by officials makes the highest quality of water supplied to New York City.



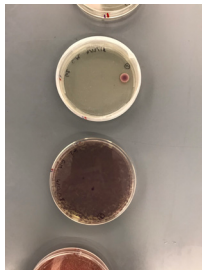
Sewage system during rainfall; <https://www.betterworldsolutions.eu>

To reduce this problem, people could be educated about how their own actions can hurt themselves. The water they pollute, can create unwanted bacteria colonies in the water, which are extremely harmful to humans. The bacteria dishes below show the development of bacteria in different waters in New York City within a week.

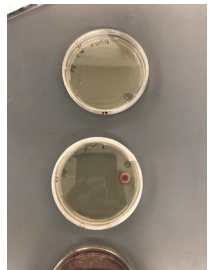
Environmental conditions are controlled in lab experiments, and as the bacteria experiment was held in a lab, we can actually see that there are no other factors involved in the formation of the colonies. We can understand how bacteria are in certain conditions, and maybe apply it to our design. Many bacteria cannot resist very hot temperatures, and involving features like that in our designs can ensure the quality and strength of the designs. Experiments involving the reaction of bacteria to certain temperatures, substances, or pressure could all be held to understand how certain bacteria are and can create ways for us to stay protected from them through our designs.



From bottom up: 1st and 2nd bacteria dishes



From bottom up: 3rd and 4th bacteria dishes



From bottom up: 5th and 6th bacteria dishes

Biomimicry

The very common termite mound, is an example of natural architecture. But the termites need to be a colony to achieve their houses because individually they do not have the capacity. And I think the same can be applied to the structure I'm building. By joining more and more structures, the colony that would be build would be far more strong than how the structures and the people living in them would be. Although the look of a termite mound is solid, it is infact very porous. The idea of ventilation here is very simple. Using simple and traditional ideas like opening the window can provide proper air circulation and make no need

for anything else, and I have applied similar ideas on my structure. Humans can sometimes overcomplicate things but just actually thinking less and organizing ourselves more, like the termites and so many more insects and animals, we can build better things. Maybe, the colony that would be build using my structure could be more organized. There could be categories within the colonies i.e. agriculture, solar panels, which would also increase the efficiency of the solar panels due to larger surface area, human interaction, sleeping, and activities. But starting small with individual structures and adapting as needed would be the priority for now.



Termite Mound; www.flickr.com;

Just imagine a colony we build and other living organisms copying our structures, just like we are mimicing termite mounds.