

THE LOCAL LOOP FARM

THE CITY'S SYMBIOTE

WESTERN
SUSTAINERS

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Our current food system is cradle to grave. We mine the earth for its resources, ship them around the country, refine them, ship them again, grow our food, ship it to consumers, and create vast amounts of food waste in the process. Using currently available technology, we can do better for the people & the planet.

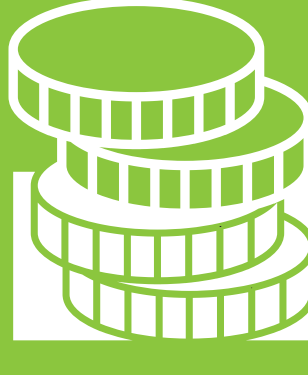
DESIGN INTENTIONS


This agricultural system was designed using whole systems thinking to be a symbiote with the surrounding community. Using complementary systems, the economic, environmental, and biological efficiencies of the overall whole are increased. These increased efficiencies allow the production of fresh, healthy, local, and sustainable fish and vegetables that are affordable to the community, and eliminate many of the negative impacts associated with existing food production and consumption. Designing a two-acre facility that is representative of the average city block, the system is both modular and scalable enough to feed any size city, while mimicking a food production system and method of access most people are familiar with. The facility is intended to foster greater interaction among community members and develop a greater sense of connection between people and their food.


PROBLEMS ASSOCIATED WITH FOOD PRODUCTION & CONSUMPTION

 **95,000 tons**
of food is wasted everyday in the United States, equivalent to 1,357 two story homes

 Ocean fisheries have had declining returns for the past five years, resulting in higher prices

 On average, **50%** of the annual expenses of aquaculture are feed related

 We poison our water and land with fertilizers, pesticides, and herbicides.

 Water can be used **90%** more efficiently than more traditional forms of agriculture using hydroponics

SYSTEM IMPACT

Weekly onsite, this system:

- Converts 28.38 tons of food waste into fish feed
- Produces 19,036 heads of lettuce
- Produces 997 lbs of tilapia
- Composts 100 tons of agricultural waste
- Produces 1.35 tons of fish feed

DAILY OPERATIONS

HOW FOOD GOES FROM FARM TO PLATE TO FARM AT THE LOCAL LOOP FARM

MARBLED CRAYFISH

The crayfish are fed a diet of spirulina, black soldier fly frass, and fish waste solids. Each of these are collected and transferred to the crayfish daily. Excess crayfish not used for breeding are harvested and pelletized into fish feed.

SPIRULINA

Spirulina is grown in a separate recirculating system, and fed compost teas and concentrated fish waste. Harvested spirulina is processed with black soldier flies and crayfish into a pelletized fish feed.

FOOD WASTE REDUCTION

Everyday, food waste is gathered from the community, which is then distributed to the black soldier fly larvae (BSFL) bins. Excess liquid is used as a fertilizer for spirulina growth, the frass used either as feed for the marbled crayfish or fertilizer, and the larvae used as a feed component.

HOT COMPOST WATER HEATER

Unwanted yard waste and animal manure from the community goes into the compost heating system, generating heat for the fish tanks and providing a rich, composted soil for local farmers and gardeners.

FISH CULTIVATION

After the initial stages of life, fish are transferred from the warehouse hatchery to the cultivation area where they mature and grow to market size. The hot compost water heater keeps water in the tanks at optimal temperatures for tilapia growth.

HYDROPONIC GROW BEDS

Using hydroponics, plants are grown for human consumption in trays that float above the aerated, nutrient dense water supplied by the fish tanks and biofilters. The plants simultaneously clean the water before it is sent back to the fish.



FOOD WASTE REDUCTION

Black soldier fly are a small non-pest insect native to North America, capable of solving a number of sustainability issues involving fertilizers, animal feeds, and organic waste management. BSFL have a quicker composting rate than more conventional methods of composting, such as hot composting or vermicomposting (composting using worms), and will happily eat most organic matter. They act as a nutrient dense food, high in protein and fat content, and are fed to the fish. The residual waste, called frass, is also nutrient dense and can be used as animal feeds or plant fertilizers.

FISH CULTIVATION

Tilapia are widely researched and proven aquaculture candidate, and come in a variety of colors. They have a shorter life cycle and reproduce quicker than other cultured fish. They are also a hearty fish, tolerant to a wide range of temperatures and water qualities. Being a white fish, they are easy to cook with and thus highly sought after in the market.

HYDROPONIC GROW BEDS

Plants that require high levels of nitrogen work well in this system. Roots hang into the aerated water beneath the floating rafts and absorb nitrogen in the form of nitrates, which is converted by bacteria that process waste ammonia. Lettuce, mixed greens, and herbs have proven predictably successful in this type of system, and the demand for fresh, local, clean, and sustainable grown produce is on the rise. Roots and other plant waste are composting through either the black soldier fly or hot compost pile after harvest.

MARBLED CRAYFISH

Marbled crayfish are a recently discovered species of crustacean, that reproduce through parthenogenesis, making all crayfish genetically identical clones. They are less aggressive than other crustaceans, making them ideal for tank environments. They are fed black soldier fly frass and spirulina, but being omnivorous scavengers, they process undigested fish waste as a supplemental feed source. In this system they are used in as a feed component, but could be raised for human consumption if market demands are present.

SPIRULINA

Spirulina is a nutrient dense photosynthetic bacterium, high in protein and amino acid content. The spirulina is cultivated in a separate recirculating system, consisting of cylindrical tanks and airlift pumps that provide aeration and ensure even access to light. The spirulina culture is supplemented with fish waste and compost teas that provide the necessary nutrients and create a highly alkaline environment ideal for growth. The spirulina is pelletized along with the black soldier fly and marbled crayfish, and fed to the fish.

HOT COMPOST WATER HEATER

Hot compost piles can accept any type of organic material, making it a valuable addition to any area that produces excess food or animal waste. The composting process produces heat up to 170° F effectively destroying harmful pathogens that may be present in the feedstock. The heat generated in from the compost process is contained primarily as hot water and air vapor. This heat is transferred through a heat capture pad and radiant, and the heat then pumped to the fish tanks.

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