**AXIS-ponics**

1) CONCEPT

This project is visioning a big infrastructure on the Fly Ranch, reimaging a model for **self-reliant food production practice** in the given extreme conditions which can also echo some of the valuable images inherited from the site’s historical impacts, cultural influences, and unique landscapes. The attempt is integrating scopes of the 21st-century engineering and the next generational infrastructure with sustainability on-site and expressing with a ritualistic manner which can commemorates and prospects the significance of the site.

2) SYSTEM

The proposal’s infrastructural system focused on food production, where groundwater extraction and geothermal energy are the two main infrastructural inputs in the axial system’s constitution. Both production and processing rely on water, electricity, and heat from these two systems.

Food is produced in the **NFT aquaponics technique**, where linear tubes are used for growing peppers, kale, and spinach. Rainbow trout is used as the supporting fish component. The assembly of the farm unit consists of a rainbow trout tank in the underground where heat and light can be controlled. Then the main NFT farm level spins in clockwise for optimal sun lighting and it closes off during the colder night for better insulation. The structure can also lift itself where the central core stays so that it creates windows/rooms for ventilation. Therefore, geothermal energy is utilized to produce electricity and support mechanism that is operating the seasonal structural shift and the pumping of water recycling throughout the site.

**AQUAPONICS** REFERENCE

The initial water input is***sustainable*** in the system. Only minimal seasonal input is needed to ***compensate*** forthe water loss to evaporation.

Total initial water input = **29720 gallons of water.**

total annual yielding season: 2 seasons

total number of people could supply per season: 450 people

total rainbow trout harvested per season: 225 rainbow trout

The main vegetables produced on-site are three that are ***water consumption-light*** hydroponics plants and are ***cold-enduring***.

 water & temperature requirement

|  |  |  |  |
| --- | --- | --- | --- |
| plants | water (m3) /growing season  | daytime temp / F | nighttime temp / F |
| kale  | 350-500 -> 7-10 | (32)60-65 | 37-55 |
| peppers | 600-900 -> 12-18 | (55)65-70 | 65- |
| spinach | 350-500 -> 7-10 | (40)60-65 | 60- |

3) INTEGRATION & EXPRESSION

In the context of two cultural and historical imprints on sites -- Burning Man Culture and Paiute Tribe Culture -- their values and characters of living and organization overlap greatly in the condition of living in the extreme environment. In terms of resources, Burning Man’s values relate to sustainability, and Paiute Tribe’s value relates to rituality.

Their connection and struggle with food and water inform the context of **the binary of extremes** for this design and inspire the project’s infrastructural system and program to be integrated into **a two-gradient axis** connectingextreme conditions offered by the site, maximizing their efficiency and recycling capacity.

One gradient is temperature, as the need for geothermal heating decrease the further away from Geyser. This gradient decides the order of the specific plant unit from less cold-resilient to more cold-resilient. The second gradient is the experience, where the further away from Geyser, the more human-manipulated experience or intervention with the site.

Located in the field closest to the Fly Geyser, geothermal source, and existing groundwater well, the project expands in a linear axis. Three round and structural units of aquaponic farms are at your first perception, leading your view towards the project’s low-lying scape where Fly Geysers distantly being marked by their signature up-rising steam. You would enter the aquaponic farm unit by a descending path towards the core which reveals the vertical cycling process between the aquaculture and hydroponics from the bottom.

Connected with the aquaponic farms, the path ascends a little onto a semi-circular arena square made of earth is open for public gatherings and events that celebrate the harvest. On the opposite side, a research lab is nested in the ground and framed by the transparent glass to presents its act of processing and research on aquaponic vegetables and rainbow trout production in front of the public square. The lab also functions as a factory where workers and researchers would achieve stocking harvests and look to improving the on-site aquaponics and other future possibilities.

Further down, geothermal plants are fully embedded underground with only a glanced view of its inside. The top is featured with sitting areas that you could rest and have a view of the Fly Geysers, which vividly emphasize the geothermal resources’ value on site.