Fields Of Tomorrow

By Mais Saadi

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Fields Of Tomorrow

Final Project

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Research Seminar

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TECHNION
Israel Institute
of Technology

Faculty of
Architecture and Town Planning

Men in traditional arabic outfits harvesting wheat in the 1930s.

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צו 8 לחקלאות: דרושים מתנדבים לקטיף. כך תצטרפו

מותג המיצים פריגת חובר לעמותת 'צו 8 לחקלאות' ומזמין את הצרכנים, יחידים וקבוצות, להתנדב להצלת החקלאות הישראלית באמצעות רישום דרך פלטפורמה אינטרנטית בשיתוף חמ"ל

המחסור בפירות וירקות כחול-לבן: התוצרת הזרה משתלטת על הסופרים

נגה ניר נאמן | 27.12.2023

פינוי עוטף עזה עלול לפגוע באספקת ירקות לשוק

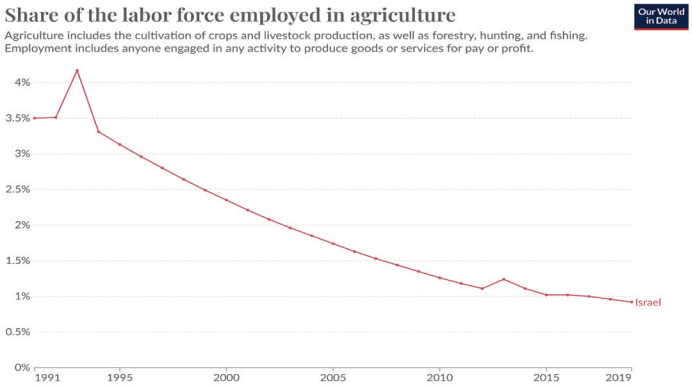
15.10.23 | שני אשכנזי

עוטף עזה נחשב לאסם הירקות של המדינה וגדלים בו 70% מהעגבניות בישראל, לצד עשרות אלפי דונמים של תפוח אדמה, גזר, בטטות, חצילים, כרוב, פלפלים ועוד. כעת, כשהעבודה בשדות הקיבוצים והמושבים שבטווח 0–7 ק"מ מהרצועה לא

לדברי נדות, ההתקפה של 7 באוקטובר השפיעה על נמל אשדוד, שטווח בידי חמאס. התפוקה באשדוד ירדה בכמעט 30%. עם זאת, מרבית הירידה נבעה מהסטה – אוניות שיועדו לאשדוד, פנו לנמלי חיפה במקום זאת. ונמל חיפה הצליח לעבוד בתפוקה מלאה, ולפרוק את כל עודף האוניות שהופנה אליו — ללא תורים ועיכובים.

אדום זה הזהב החדש: מאחורי הזינוק במחירי העגבניות

המלחמה בעזה, פגעי האקלים, הכוללה בירדן והאמברגו מטורקיה. התלכדות נדירה של נסיבות וזירות הובילה לזינוק במחירי העגבניות, שמטפסים ל–20 שקל לקילו וצפונה.



Chapter One | Introduction

The War between Israel and Gaza (2023-2024) has served as a distressing illustration of the nation's susceptibility to emerging crises. Besides the tragic loss of life, the war has had economic and environmental implications. One of these consequences is extenuating Israel's lacking agricultural system.

Geographically, Israel's agricultural centers are predominantly situated proximate to the Gaza Strip and along the northern peripheries, bordering Lebanon and Syria, characterized by a pronounced reliance on a sizable contingent of foreign workers. Notably, it is essential to acknowledge the geopolitical context, as Israel maintains strained political relations with these neighboring countries. The recent escalation of hostilities has highlighted the acute shortage of native laborers, emphasizing the vulnerability of local agricultural production, particularly in regions deemed geopolitically unstable. Consequently, the nation confronts a critical time, compelled to resort to the importation of essential commodities from overseas markets.

The reliance on imports in Israel's predicament is aggravated by its dependence on maritime trade routes for the facilitation of import and export activities. The vulnerability of these critical maritime nodes to disruption during periods of heightened geopolitical tension or conflict causes further inflationary pressures and economic instability.

How Revitalization Of Agriculture Landscape Into A More Productive Environment Could Impact The Urban Areas and foster harmony between agriculture and urban living? How to reconnect people to nature and encourage agricultural practices?

The importance of cities independence:

A wider view on the effects of extreme events on agricultural and food produce.

This confluence of circumstances mirrors analogous situations witnessed globally. For instance, during the Syrian civil war, the disruption of agricultural activities in conflict-affected regions resulted in acute food shortages and compelled extensive reliance on international aid and imports. Similarly, in regions plagued by natural disasters such as hurricanes or earthquakes, the consequent destruction of vital infrastructure often renders local food production untenable, compelling affected nations to seek external assistance and augment domestic supplies through imports.

Another similar situation is the conflict between Russia and Ukraine, which has not only caused domestic shortages and instability but also affected global agricultural markets, particularly due to Ukraine's significant role as a major exporter of grains. As a key supplier of wheat, corn, and barley, Ukraine's disruption in agricultural production and logistics has triggered global concerns regarding reduced exports and supply chain disruptions. The conflict has impacted crucial Black Sea ports, essential transit points for agricultural exports not only from Ukraine but also from neighboring countries like Russia and Kazakhstan. Consequently, the conflict has induced shifts in global trade patterns as countries seek alternative sources for agricultural commodities, leading to increased price volatility and concerns about food security in regions reliant on Ukrainian grain imports.

These situations highlight the importance of cities being independent in food production, resource management, energy, and maintaining productivity.

Population growth and agriculture:

According to the United Nations Department of Economic and Social Affairs, the current population of the world is 7.9 billion people. The land area of the world is around 130 million km², of which about 49 million km² are considered agricultural areas (37.6% of the land area). Out of this, 19.1 million km² is cropland. By 2050, the population is expected to grow to 9.8 billion, with 6.2 billion living in urban areas. As all major areas become urbanized, there will be a decrease in rural farmland, causing cities to face increasing pressure on food, water, and ecological resources.

The total amount of farmland in Israel is close to 4.1 million dunams. As of September 2021, Israel's population is 9.48 million people. The population growth is high and is estimated to reach between 14.5 and 19.7 million people by 2050.

According to the International Trade Administration, Israel's scarcity of land and water resources impacts its agricultural sector. Due to these limitations, Israel cannot produce enough food to meet its needs, leading to imports of feed for poultry and other agricultural products. In 2021 (last official Israeli figures), imports of agricultural products (HS codes 1-24) reached $8.79 billion. Thirty years from now, the Israel Central Bureau of Statistics predicts that imports of produce will be essential for the population to survive.

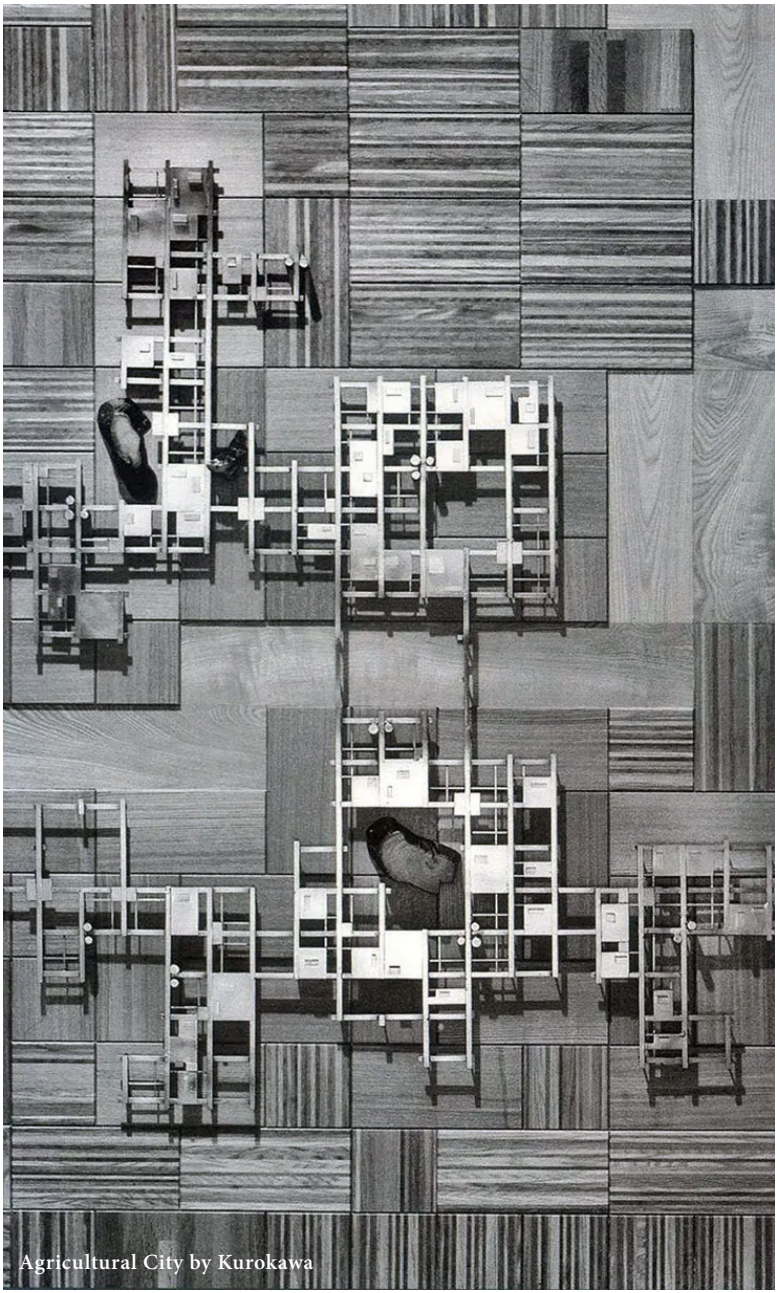
Beyond the effect of the rise in population numbers, climate change is also expected to impact the agricultural sector in multiple ways, through increased variability with regard to temperature, intensity of extreme weather events, changes in rain patterns, floods, and water availability, and through perturbations in ecosystems.

These changes are subsequently affecting agricultural production, experiencing increased variability, reduced yields in specific regions, and alterations in the geographic distribution of farming lands.

With the predicted rise in population by 2050 and a continued acceleration in urbanization, there is a critical need to enhance agricultural productivity by 70% to meet demand. Addressing food waste, which currently stands at approximately 35%, is also essential. Leveraging Israel's agricultural technologies and adopting sustainable practices will be key strategies to ensure food security and environmental sustainability in the coming decades.

“It contested the prevailing assumption that urban and rural environments were inherently antagonistic, instead promoting harmony between agriculture and urban living[...] there exists a city versus village concept with an emphasis on cities. We say “the flow of agricultural population into cities” or “dispersion of urban population.””

- Kisho Kurokawa



Agricultural City by Kurokawa

City, village and agriculture:

The rapid development of society during the industrial era has brought about various challenges, resulting in systemic issues affecting economies, societies, and the environment at both local and global levels. Historically, the distinction between “urban” and “rural” areas has been significant, contributing to the concept of the urban-rural divide. Bealer et al. (1965) identified three dimensions of “rural”: ecological, occupational, and sociocultural, each highlighting different aspects of rural life2.

The rapid development of society during the industrial era has brought about various challenges, resulting in systemic issues affecting economies, societies, and the environment at both local and global levels. Historically, the distinction between “urban” and “rural” areas has been significant, contributing to the concept of the urban-rural divide. Bealer et al. (1965) identified three dimensions of “rural”: ecological, occupational, and sociocultural, each highlighting different aspects of rural life.

The spatial dimension, as defined by Bealer et al. (1965), forms a fundamental part of understanding rural areas. Concepts like the rural-urban interface and continuum explore how boundaries may help us understand similarities and differences between rural and urban areas, including the forces that draw and reshape these boundaries.

Rural communities are often defined as what lies beyond (or is left out of) the urban, highlighting the contrast in perception.

Linda Lobao, in her work on rural sociology (Lobao 1996), delves

into the idea of a rural-urban continuum, suggesting that rural and urban areas are not separate but exist on a spectrum with various levels of interaction between them. This perspective emphasizes the importance of geographical space, particularly the outskirts, in understanding rural communities. Lichter and Ziliak (2017, p. 11) have explored social divisions such as race, class, values, and culture associated with changes in spatial boundaries (Lichter and Brown 2011), articulating the dynamic interplay between spatial and social boundaries and identifying that "changing rural-urban boundaries reflect ongoing social processes of shifting, crossing, and blurring."

However, Kisho Kurokawa advocates for the idea that harmony should exist between agriculture and urban living, challenging the prevailing assumption of inherent antagonism between urban and rural environments.

Blurring the boundaries further, a solution for cities to overcome extreme circumstances such as food insecurity and environmental challenges would be building a space for agri-urban development, challenging the assumption of inherent antagonism between agriculture and urban living, integrating agricultural activities and rural values within urban environments, emphasizing the interconnectedness between urban and rural areas rather than viewing them as separate entities.

Sahl Al-Batuf - January 2024

Chapter Two | Case Study

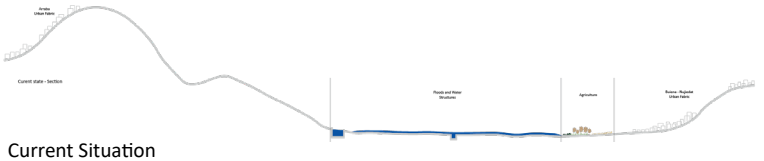
Site - Sahl Al-Batuf:

This project aims to suggest a new productive environment to enhance the city's self-sufficiency, Taking al-Batuf valley, Lower Galilee region, Israel as its case study.

Sahl Al-Batuf - January 2024

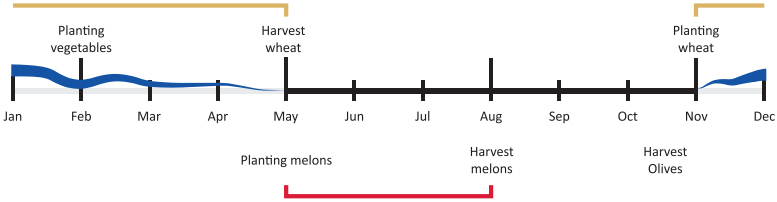
Sahl al-Batuf is an agricultural terrain of 60,000 dunums located in the lower Galilee. Its valley, surrounded by escarpments of 350 meters, creates a basin. Most of the agricultural land in this area belongs to Palestinian-Arab citizens of Israel who reside in eleven neighboring towns with a collective population of nearly 100,000 inhabitants. Until the 1970s, agriculture was a main source of income for these communities, but its economic role has decreased due to a few interlocking factors: a decline in the status of agriculture in Palestinian-Arab society, an increase in labor opportunities outside of Palestinian-Arab towns, winter floods, and land dispossession experienced by these communities since 1948.

The unused power of onsite agriculture, the locals' connection to the land, and the problems associated with the area highlight the importance of taking action in this place.

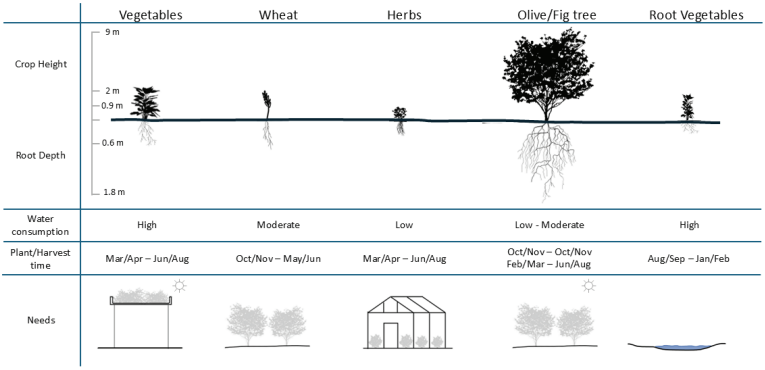


Current Situation

Site's Future



Floods Timeline



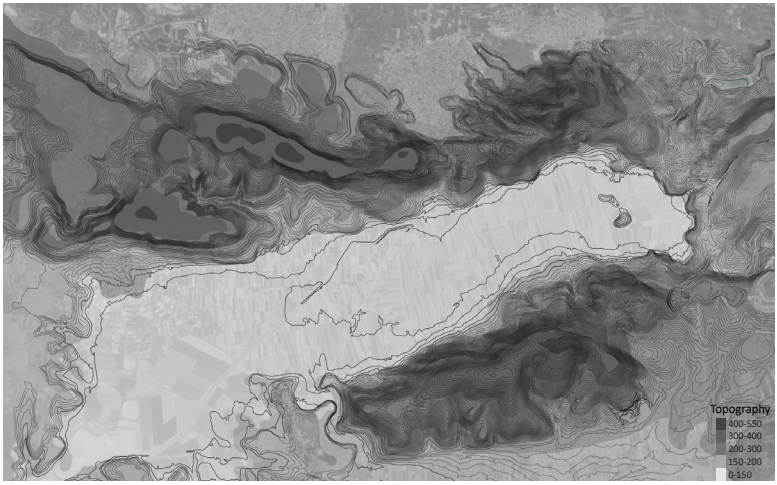
Crops Essential Needs

4

JUN 4, 2015 AT 5:00 PM – JUN 6, 2015 AT 8:00 PM IDT

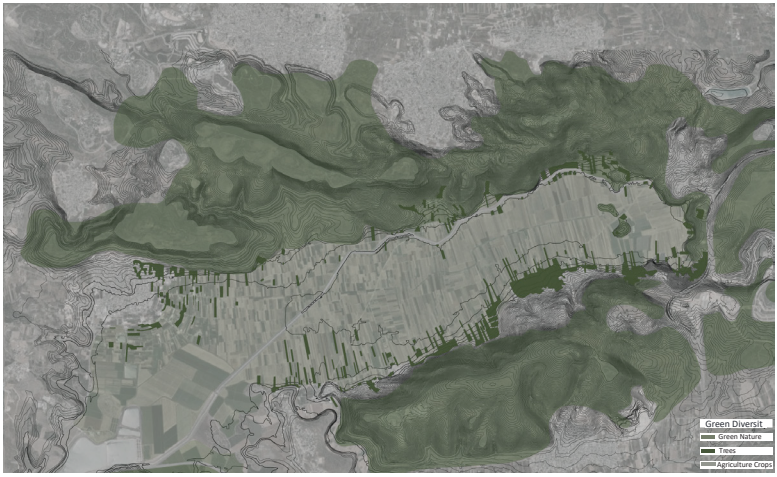
מהרגן بطوفنا الاول פסטיבל בטופנא הראשון

Al Battouf Valley lies between Al-Shaghour Mountain (Yodfat) to the north and Tur'an Mountain to the south. Around the valley, there are the Arab villages. In additin to some Jewish settlements on the hills that overlook the valley.

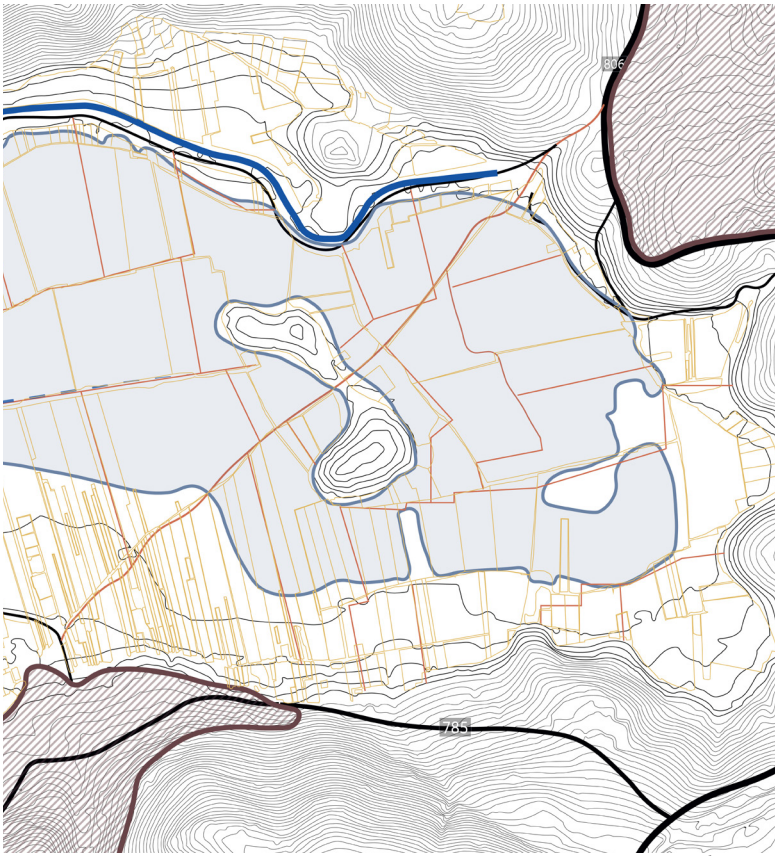


Due to the hills and elevated topography that sourrounds the region, it forms a basin.

The National Water Carrier cuts through Al Battouf Valley region on its route from the Sea of Galilee to the Negev. In addition, aproximatly every year floods accure in this region despite the “0-canal” built to prevent it at 1995.



Its lands are considered among the most fertile agricultural lands in the area. containing olive trees, grains and vegetables.



Suggested area

Canal
Agriculture Parcels
Dividers
Topography
Roads
Cities

Project Methodology:

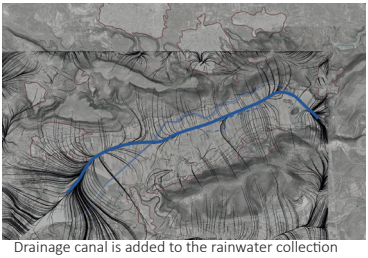
The project's methodology focuses on creating a productive city by seamlessly adapting to the landscape, efficiently using the ecosystem, and integrating urban, rural, and agricultural areas. The main strategy is to preserve agricultural lands while accommodating urban expansion through mixed-use developments that blend residential spaces, open areas, community, and agricultural facilities.

For that purpose, it is essential to use adaptive land and resilient infrastructure by designing flexible and dynamic spaces, such as using flood zones for recreational, ecological, or water management functions during wet seasons, and incorporating features that ensure durability and safety. To facilitate this urban-rural integration, it is imperative to address the transportation infrastructure, enabling mobility and accessibility, linking the surrounding communities.

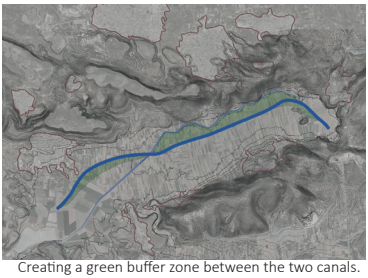
By restoring the relationship between the land and the community and enhancing agricultural productivity through modern techniques and sustainable practices, the project seeks to improve the overall sustainability and quality of life in the region. This comprehensive approach will create a resilient, interconnected, and vibrant community that harmonizes urban development with rural and agricultural landscapes.

Concept Section- integrating urban, rural, water and agricultural areas.

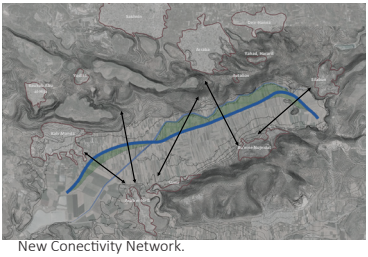
Integrating all categories seamlessly using agriculture.



Drainage canal is added to the rainwater collection area.



Creating a green buffer zone between the two canals.



New Conectivity Network.

The area can be separated into four different categories; Urban, agriculture, nature and water flooded area. Today these categories are spatially separated further contributing to a divide between urban areas of nature and agriculture. One of the key strategies of the project is to integrate these four categories within the same space and physically connect them by creating new roads and connecting networks. This integration aims to create a more cohesive environment where urban development, agriculture, and natural areas coexist.

The strategy focuses on optimizing the use of flooded areas not by preventing the floods, but by adapting through the creation of an additional level of agricultural lands. This approach allows for the cultivation of crops year-round, even in areas prone to flooding. The project leverages natural flooding cycles to enhance productivity, while using the flood season to cultivate crops that thrive in high water levels. This method increases resilience and maximizes agricultural yield in challenging environments.

Ensure a method of implementing with careful consideration to minimize alterations to the natural appeal of the area. The goal is to seamlessly integrate the construction into the landscape, ensuring that the valley's visual integrity remains largely intact, preserving the area's scenic value while allowing for necessary improvements.

First, a drainage canal is added to the rainwater collection area. Based on the water flow map, the canal is strategically placed to optimize water drainage, directing it efficiently to the most flooded area. This will help reduce water levels during flooding events. Additionally, a green public space is created in the area between the two canals (the carrier canal and the drainage canal), creating a green buffer as a connection zone.
Create a new circulation network will be developed to connect the surrounding settlements with the valley, improving accessibility and integration.

Current Situation

Suggested Intervention

Intervention's Key Elements:

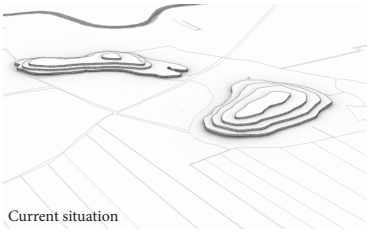
Identifying two existing hills, located in a flood-prone area, between the cities Eilabun and Bu'eine Nujeidat, with an unpaved road (al-matruka) passing through the middle of both hills. I choose to focus on this specific area within the valley as a case study.

As a planning tool, I chose to thicken the two hills and the terrain in between creating another artificial hill, subsequently producing a new ground at a higher level, while still allowing access through the street in the middle, and create a hierarchy with the rest of the dirt roads turning them into secondary passages while preserving the area's scenic value. By digging in the hills or the added fill, buildings are integrated seamlessly, ensuring minimal impact on the valley's natural scenery. The new elevated agricultural land also contributes to the area's visual appeal.

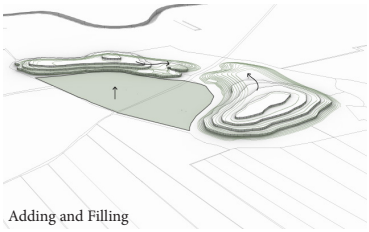
The buildings in the new artificial hill will follow a hierarchy of heights, starting at one floor on the sides and gradually rising to three floors at the center. Theses buildings are constructed on pillars, allowing for the natural flow of floodwaters beneath them. Most importantly, the creation of new agricultural land on the rooftops of the buildings, maximizing the use of space for both building and agriculture while maintaining the natural surrounding environment.

The intervention in the hills was by thickening and subtracting inside it, ensuring that the outer appearance remains undisturbed, making the buildings hidden and invisible. The buildings on the existing hill are arranged to create a community public area that serves as a connection point between the park, the canal, and the valley buildings. On the other side, the agricultural roofs are connected to a community market.

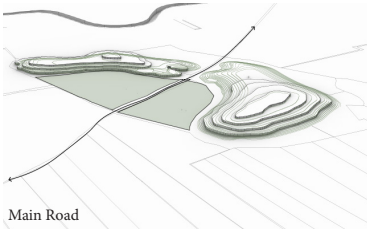
The connection between the existing hill and the artificial hill is achieved by providing access to the rooftops of the new hill and establishing a market on the third floor of the artificial hill. This design transforms the rooftops and public areas on the existing hill, along with the market, into a social center. By integrating these spaces, the project creates a continuous flow between the two hills, allowing community interactions.



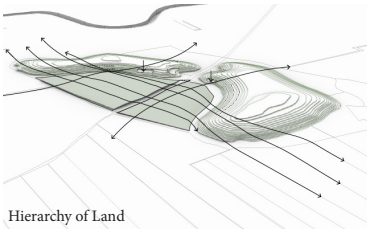
Current situation



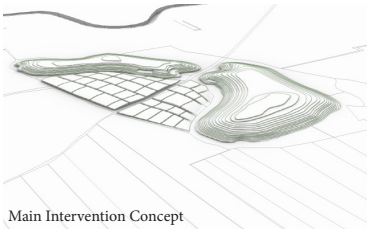
Adding and Filling



Main Road



Hierarchy of Land



Main Intervention Concept

The main focus of the project is on agricultural land and housing. The housing complexes are divided into two categories:
1. Private rural houses
2. Urban housing

The project dedicates approximately 600 dunams for agriculture, with 420 dunams allocated for crop cultivation and 180 dunams set aside for research and workshops. Additionally, 200 dunams are designated for housing, and 180 dunams for education centers and markets.

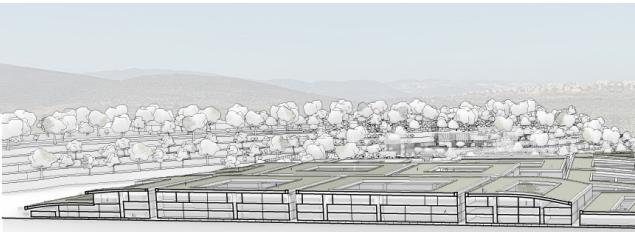
The project also includes around 220 dunams for social open spaces and a river park, providing recreational areas that enhance community engagement and interaction with nature.

Master Plan - 1:2500

Plan 0 - 1:2500

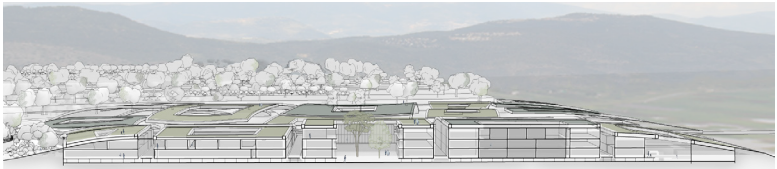
Plan 1 - 1:2500

Section 4,4 - Community Center



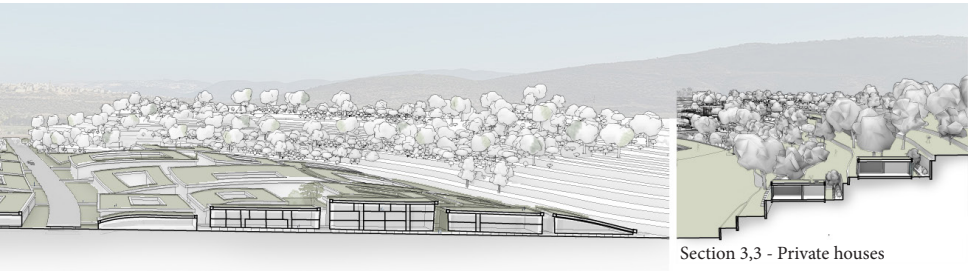
Section 4,4 - Resedential Block

Plan 2 - 1:2500



Section 4,4 - Resedential Block

Beyond the addition of housing complexes, the project also achieves a significant increase in agricultural land that was previously unproductive due to floods, making this land available for cultivation. As a result, there is a substantial rise in agricultural yield. Previously, 57.79 dunams of agricultural land, calculating an average yield of 4kg per square meter, produced 231,160 kg of yield annually. After the expansion, the newly usable land has increased to 97.35 dunams, with a yield of 389,418 kg per year. Altogether, this results in a total yield of 695,794 kg per year, marking a threefold increase in yield compared to before.



Section 3,3 - Private houses

Current Situation

Suggested Intervention

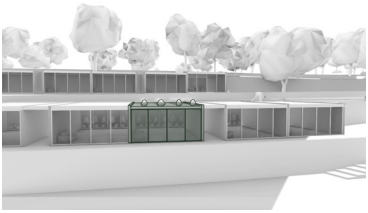
There are three typologies of residence, each one consists of a private agricultural land and a warehouse.

Type A: This residence is dug into the hill, resembling a terrace. It features a private rear garden and agricultural land on the roof, allowing residents to cultivate both behind their home and above it.

Type B: This residence is located on the first floor of a three-story building within the artificial hill. The apartment has private agricultural land in the inner courtyard of the block, offering residents access to gardening space directly connected to their living area. In addition, the residents of Type B share the agricultural land on the roof.

Type C: Positioned above Type B within the artificial hill, this residence spans two floors on the second and third floors of the building. The first floor of the apartment serves as the main living unit, while the second floor includes a warehouse and a terrace. The terrace can be used for agriculture and as a market for the settlement. In addition to the terrace, the residence share the roof's agricultural space with other residents.

Plan - 1:500



Type A

Total Area: 258 m^2

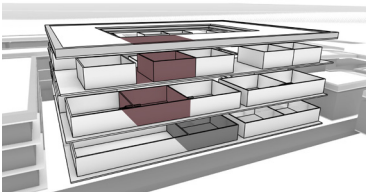
Apartment: 90 m^2

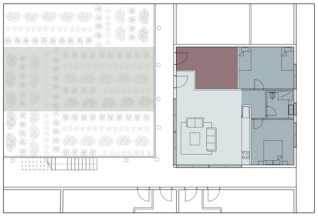
Storage: 30 m^2

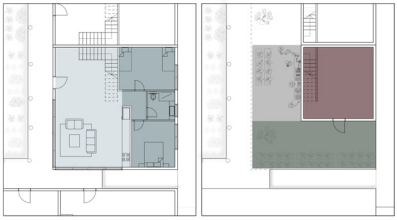
Private Yard: 138 m^2

Crops Per Year: 552 Kg

- Storage Room
- Private Yard
- Private Space
- Public Space







Type B

Total Area: 175 m^2

Apartment: 85 m^2

Storage: 15 m^2

Private Yard: 75 m^2

Crops Per Year: 300 Kg

- Storage Room
- Shared Yard
- Private Space
- Public Space

Type C

Total Area: 249 m^2

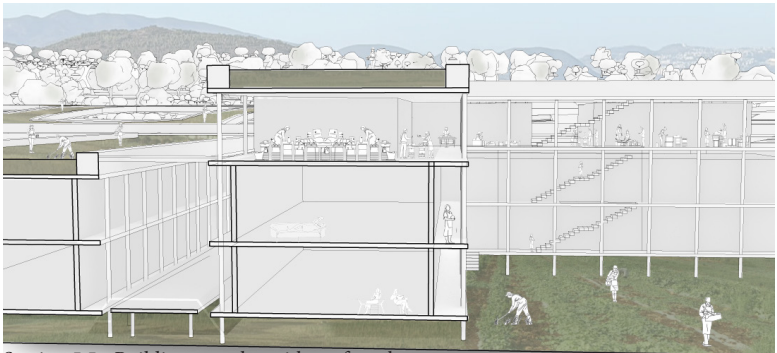
Apartment: 100 m^2

Storage: 36 m^2

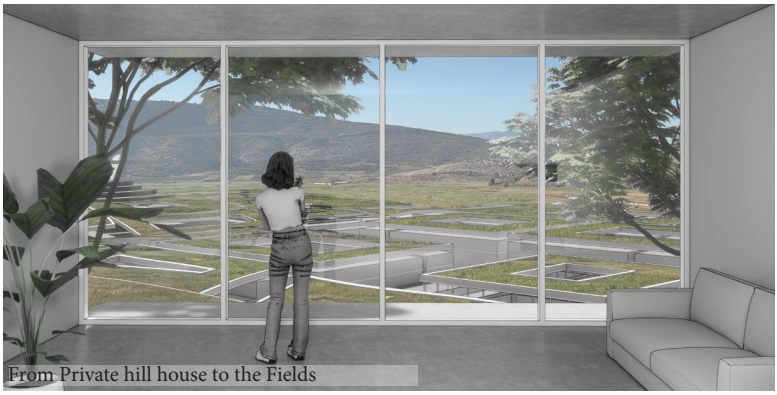
Private Yard: 113 m^2

Crops Per Year: 452 Kg

- Storage Room
- Semi-Private Yard
- Community Space
- Private Space
- Public Space



Section 5,5 - Building complex with roof market



From Private hill house to the Fields

From a building's roof to the community center

Building inside the resedential complex during floods season

Main road entrance From Buiena-Nujedat

Community Center

Building inside the resedential complex

Chapter Three |

Summary:

The predicted rise in population by 2050, coupled with the accelerating trend of urbanization, underscores the urgent need to enhance agricultural productivity by 70% to meet growing demand. Israel's advanced agricultural technologies and sustainable practices are vital tools to ensure food security and environmental sustainability in the coming decades. These solutions will also serve as critical safeguards against the nation's vulnerabilities, particularly in times of instability.

How Could The Revitalization Of Agricultural Landscape Into A More Productive Environment Impact The Urban Areas And Foster Harmony Between Agriculture And Urban Living?

This project aims to suggest a new productive environment, that positively affects human, environmental, and economic aspects, enhancing the city's self-sufficiency Taking al-Batuf Valley, Lower Galilee region, Israel as its case study.

Sahl al-Batuf, historically recognized for its fertile agricultural lands, holds immense potential for being a prominent agricultural hub. However, the extended periods of flooding experienced in Sahl al-Batuf make it challenging to utilize it.

The methodology is to substantially increase agriculture and enable the expansion of the surrounding villages with minimal disruption of Sahl al-Batuf's natural landscape while ensuring an increase in agriculture.

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This project seeks to foster harmony between agriculture and urban living with minimal disruption to the natural landscape of Sahl al-Batuf, while restoring the region's agricultural potential and strengthening the connection between rural and urban areas, ensuring lasting benefits for both the environment and the community, and setting an example for similar regions worldwide.