Country / City	USA, ITHACA (NYS)
University / School	CORNELL UNIVERSITY
Academic year	2017-2018
Title of the project	POST REFUGEES LANDSCAPES. Landscape alternatives for forced migration, water scarcity and conflicts.
Authors	WENJUN XU

PERFORMATIVE NATURE

Barcelona International Landscape Architecture Biennial

September 2018 Barcelona

SCHOOL PRIZE

X International Landscape Architecture Biennial

Máster d'Arquitectura del Paisatge -DUOT - UPC
ETSAB- Escola Tècnica Superior
d'Arquitectura de Barcelona
Avenida Diagonal, 649 piso 5
08028 Barcelona-Spain

TECHNICAL DOSSIER

Title of the project	Post refugee landscapes -landscape alternatives for forced migration, water scarcity and conflicts
Authors	Wenjun Xu
Title of the course	Landscape Architecture
Academic year	2018
Teaching Staff	Jamie Vanucci + Kathryn Gleason
Department/Section/Program of belonging	College of argriculture and life science
University/School	Cornell University

Written statement, short description of the project in English, no more than 250 words

Along the 200 mm aridity line in Africa, conflict induced migration is the cause of environments degradation in this zone. Once registered as a refugee, one is displaced and resettled either internally or in a neighborhood country. Often, these host regions are already threatened by drought and have variable access to water and food. However, the arrival of refugees add pressures on fragile environments and trigger conflicts with host communities over the use of land and water resources. Due to the combined effect of continuous refugee influx and climate change, both population will soon live under insecurity due to continued land degradation and scarce resources including water and agriculture livelihood.

The thesis looks at underlying causes that lead to the humanitarian crisis as well as address immediate needs for food. It argues that settlement planning with low-technology irrigation strategies for herding and agriculture, seen in the context of the social structure, can ameliorate such conflicts. In the long run, a better living condition result in a more balanced relationship between local populations and refugees. The design part of the thesis The thesis explores the situation through the lens of the Kakuma camp, one of thee longest-lasting humanitarian settlements in Sub-Saharan Africa, as a test bed for the these technologies. It aims to create agriculture corridors as extensions of refugee settlements. With the adaptation of ancient arid climate and desert irrigation strategies, a minimal amount of water can be gathered for food harvesting as well as grazing.

For further information
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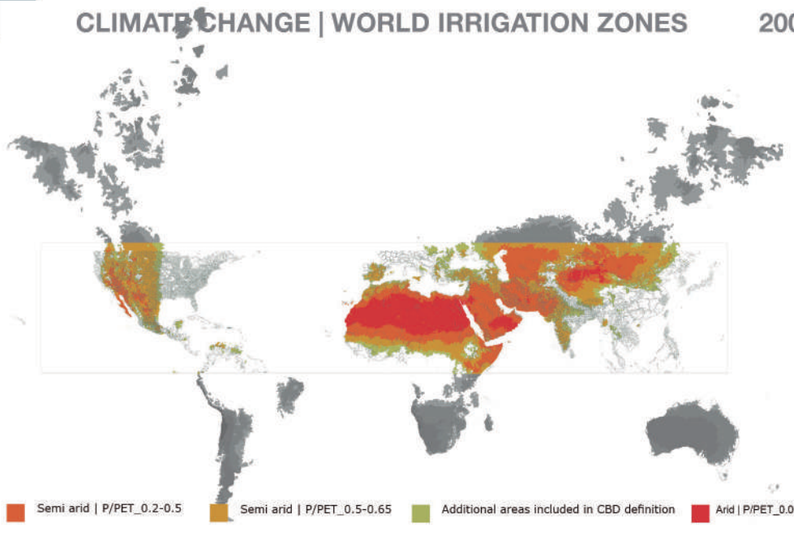
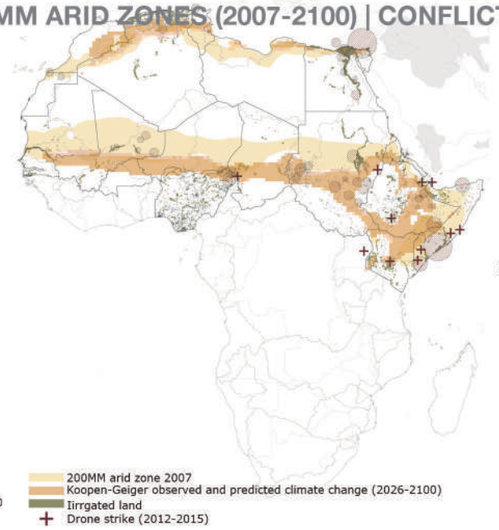
Consult the web page http://landscape.coac.net/

CLIMATE CHANGE | WORLD IRRIGATION ZONES



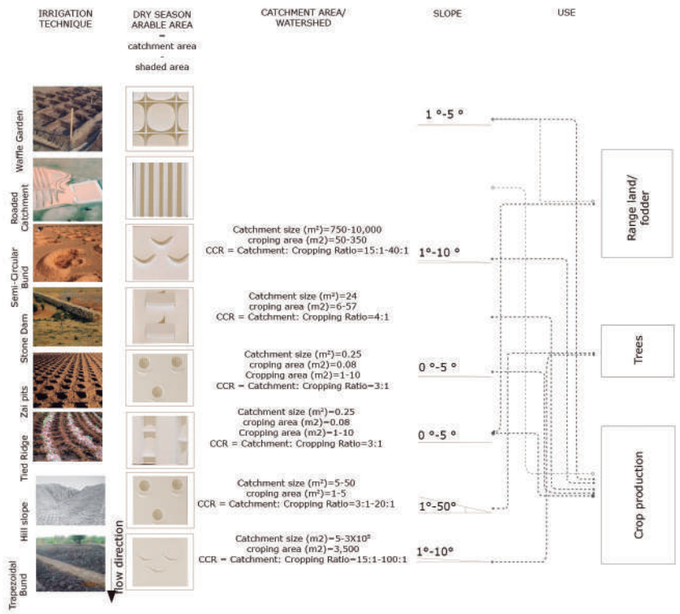
Semi arid | P/PET_0.2-0.5 · Semi arid | P/PET_0.5-0.65 · Additional areas included in CBD definition · Arid | P/PET_0.005-0

200MM ARID ZONES (2007-2100) | CONFLICT ZONES



200MM arid zone 2007
Koopen-Geiger observed and predicted climate change (2026-2100)
Irrgated land
Drone strike (2012-2015)

KNOWN WATER HARVESTING TECHNIQUES



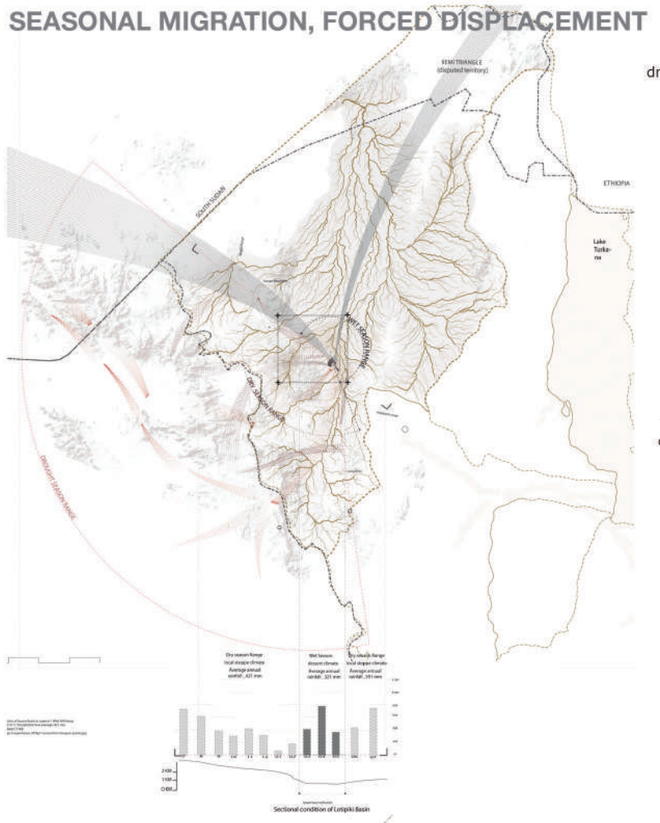
Host community

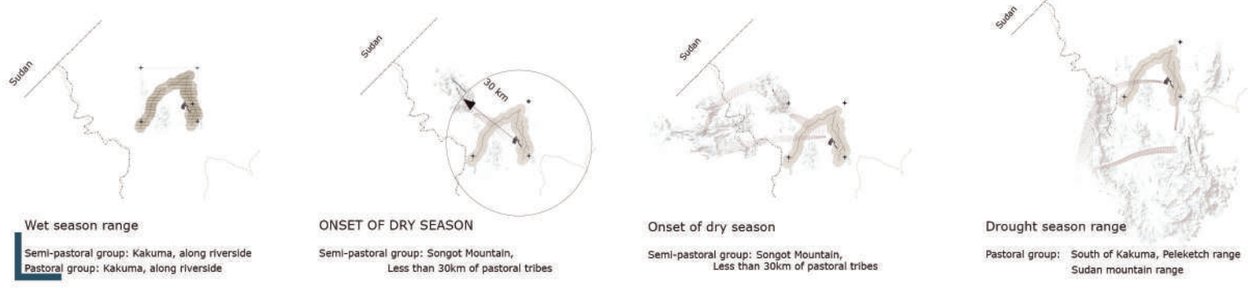
Turkana number 855,399 in 2009, or 2.5% of the Kenyan population

Sudanese refugees

The camp receives between 500 and 800 South Sudanese refugees daily.The camp has 45,638 in 2009. South Sudanese number of 35% of total population in Kakuma camp

SEASONAL MIGRATION, FORCED DISPLACEMENT





Wet season range

Semi-pastoral group: Kakuma, along riverside
Pastoral group: Kakuma, along riverside

ONSET OF DRY SEASON

Semi-pastoral group: Songot Mountain, Less than 30km of pastoral tribes

Onset of dry season

Semi-pastoral group: Songot Mountain, Less than 30km of pastoral tribes

Drought season range

Pastoral group: South of Kakuma, Peleketch range Sudan mountain range

DRY SEASON ARABLE AREA
=catchment area-shaded area

Water/moisture collection capability

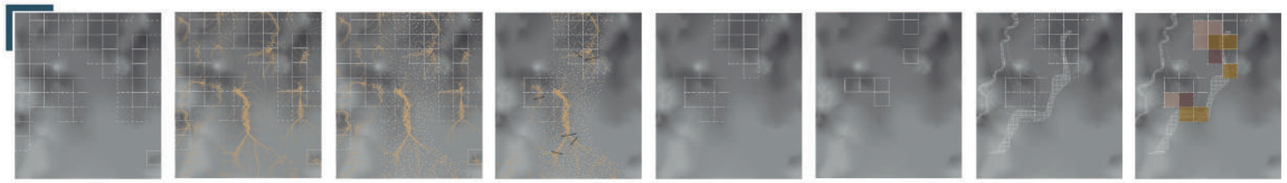
High — Low

Rainwater catchment

FINDING DRY SEASON ARABLE AREAS OF KNOWN TECHNIQUES

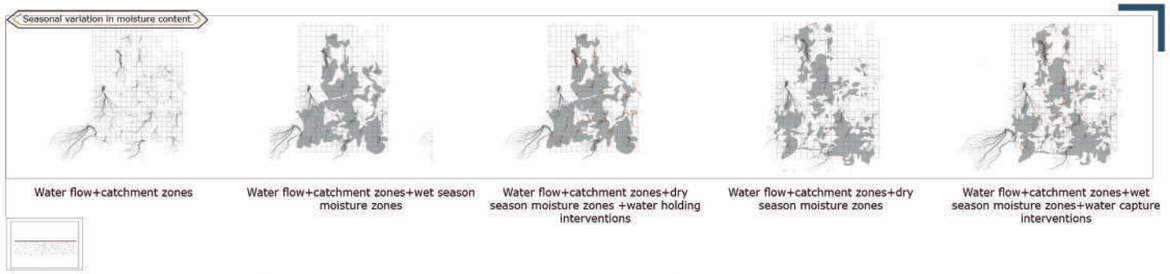
The study begins with the examination of the of water holding capacity of a given water harvesting techniques in the dry season is based on the understanding of shading performance. It is assumed that the types of techniques which are less shaded, are more likely to contain less water content than the ones that are well shaded due to higher evapotranspiration rate under the exposure of the sun. The Rhino grasshopper Sun path analysis provides the basic shade patterns over the course of the year is an effective tool to help understand which technique receives more shade than the other. As a result, we see that Zai pits are receive most of the shades whilst trapezoidal bunds receive least shades among all the model techniques. The next step of the experiment attempts to simulate the hypothetical conditions on surface runoff over the model techniques with sand. Dropping sands directly on the models enable us to understand the catchment area of each model techniques. This experiment also takes into account wind resistance capability. In the second round of the experiment, sands were blown in face of the catchment area.

10

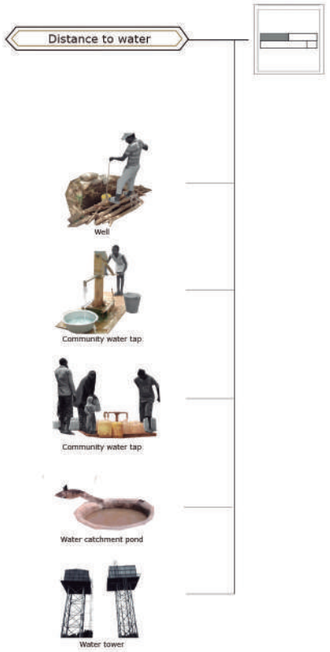


Define low points/ areas > Runoff flow directions and paths > Area with water content > Deployment of water harvesting interventions > Sites with development potentials > Catchment area > Distance to water resources > Land use planning

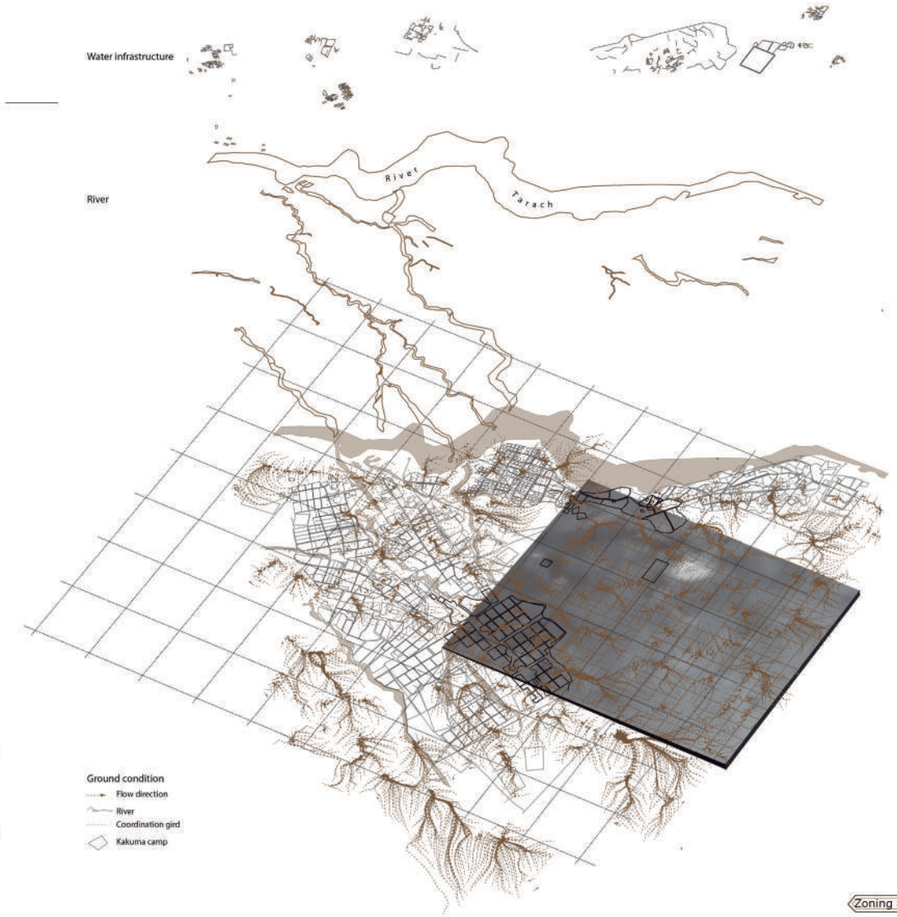
* Each cell represents an area of 200M²x200M²

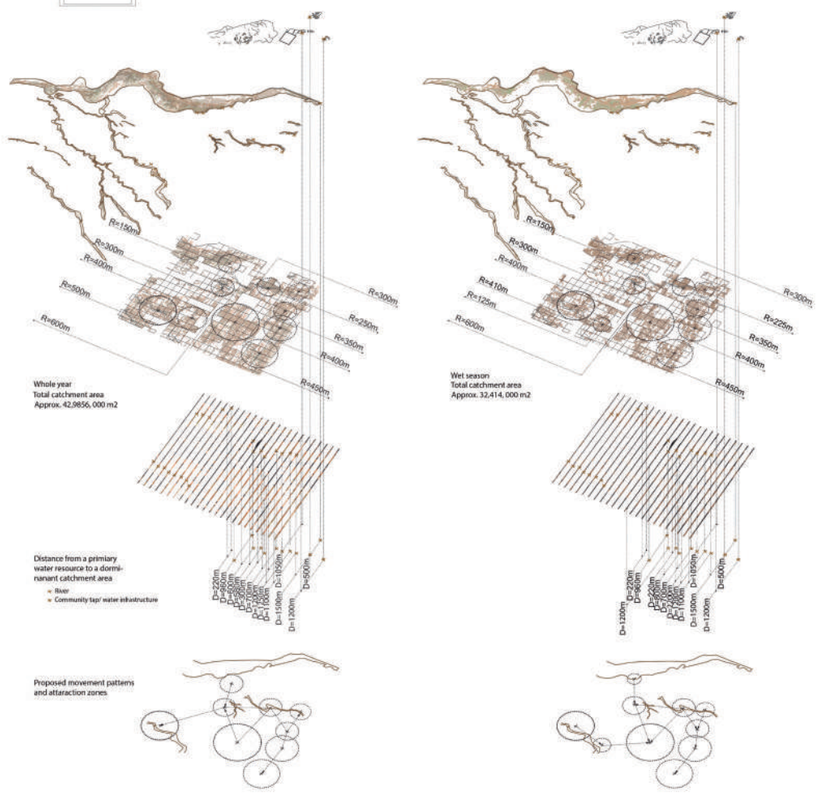


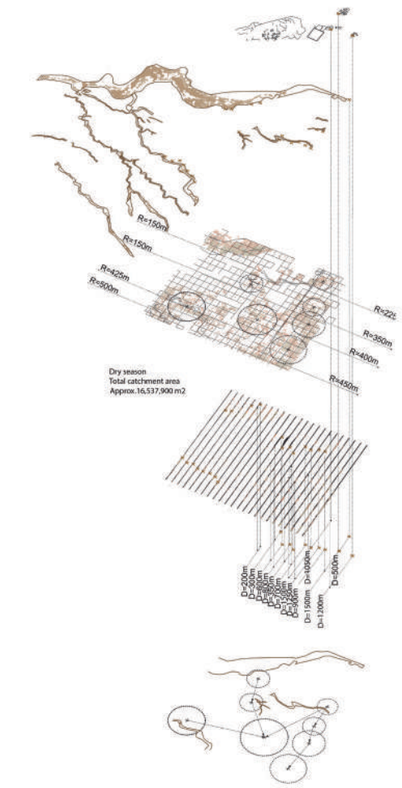
DESIGN GUIDELINE



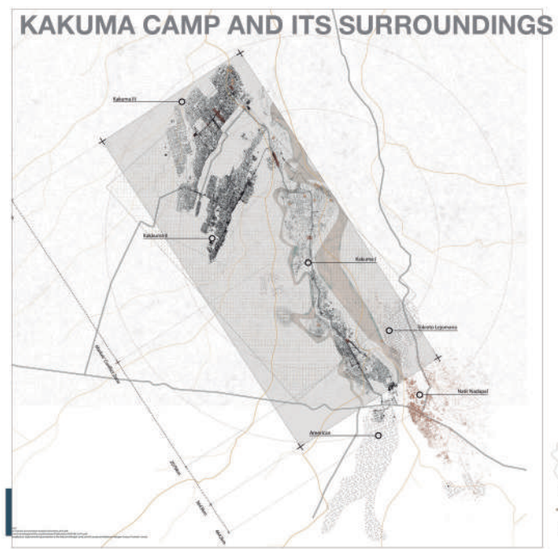
The set of drawings illustrate the seasonal changes of distance between the moisture zone and the nearest water resources. On site the water resources are comprised of a series of infrastructures wells, water towers and bore-holes. Only in a few days (2-3 days), the dry rivers are filled up with water. The distance tend to be smaller in the wet season and big in the dry season.



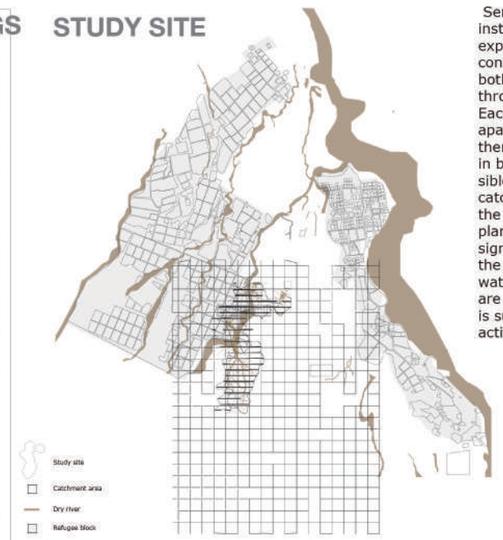




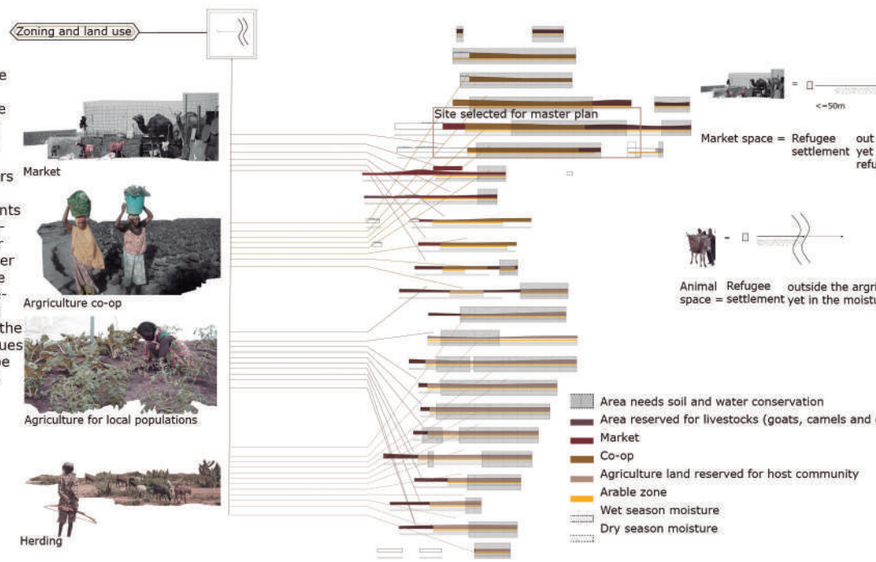
KAKUMA CAMP AND ITS SURROUNDINGS

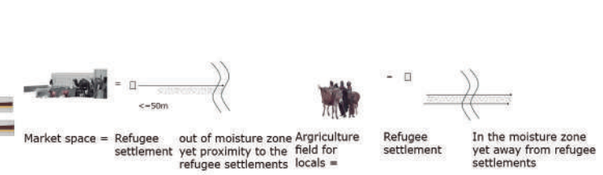


STUDY SITE

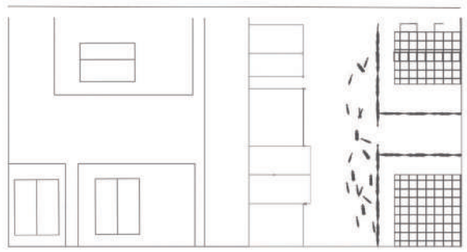


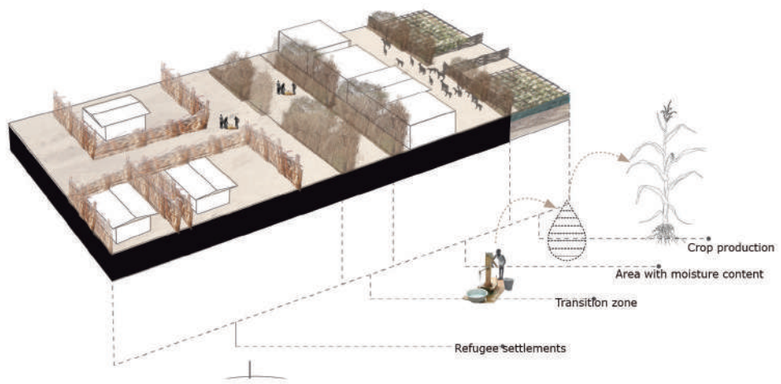
Serving as a constructive instrument, the drawing explores the soil moisture contents of study area in both dry and wet season through 23 section cuts. Each section is 200 meters apart. Spatially, where there the moisture presents in both seasons, it is possible to employ the water catchment techniques over the landscape. Landscape planning and land use design is heavy determined the by distances. Where the water catchment techniques are located, the landscape is suitable for agriculture actives.





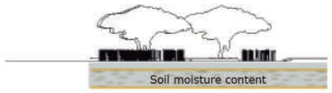
WATER DELIVERY AND TERRITORY FORMATION

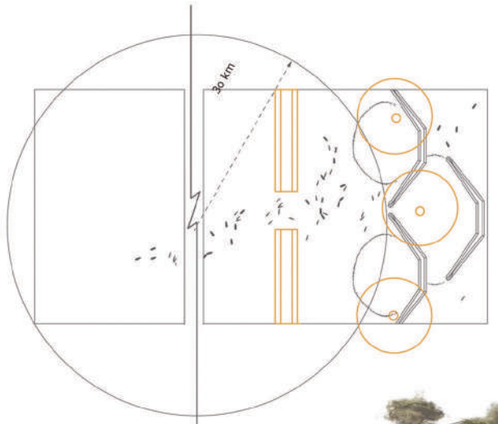


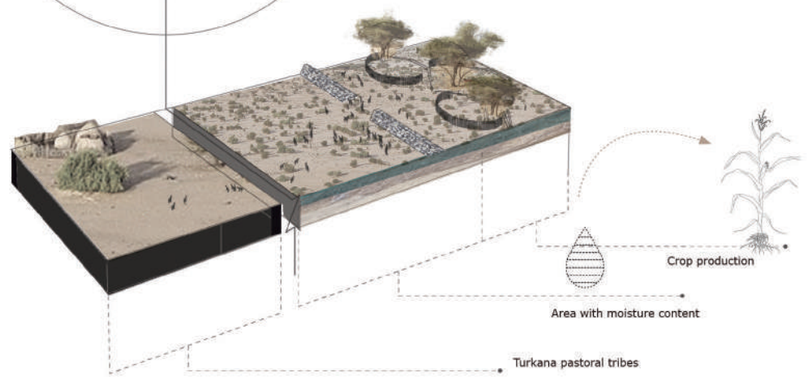


+ Adopted from Refugee camp planning standard, the maximum distance between any shelter and a water point will be 100 meters.

+ Community taps are encouraged to be placed at the in between camp zones while co-op space play a vital role in water delivery to the co-op area.





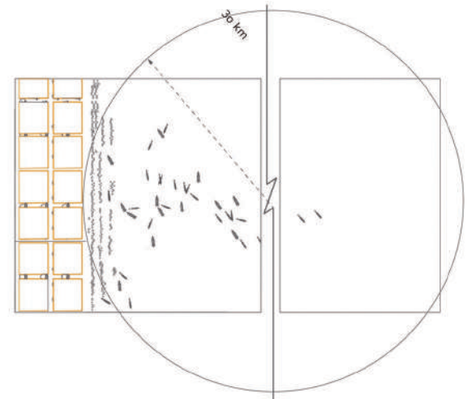


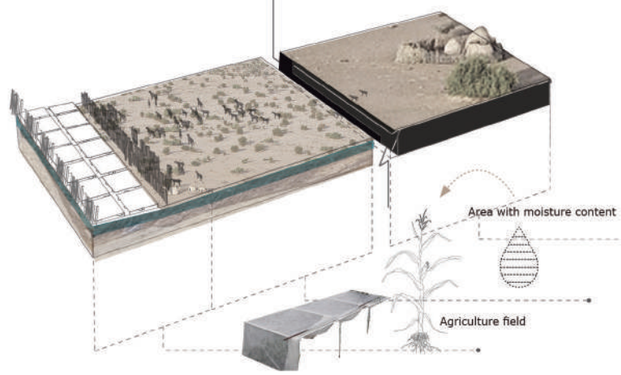
+ Where soil contains sufficient moisture, soil and water conservation techniques shall not be placed farther than 30kms away from the nomadic settlements

+ Trees with wide crowns provide sizable shaving area are encouraged to adapt near/adjacent to the interventions

+ To prevent animal ruination of soil, when necessary, wood fences are encouraged to be installed sound age large sized techniques such trapezoidal bunds

+ Earth bunds are necessary when land subjective to wind erosion.

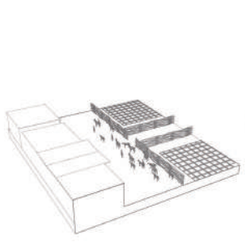




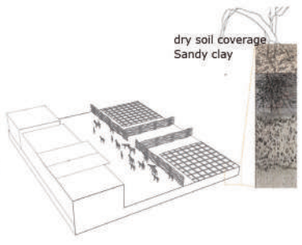
+ Where trees are not employable,shade structure is a good alternative for shading, ideally to be placed over the small scaled water harvesting techniques such as Zais

+ Fences are suitable structures for vines. Sweet photo vines are proved to be a good resources for goats

COMMUNITY DEVELOPMENT

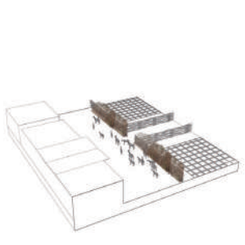


Tied Ridge



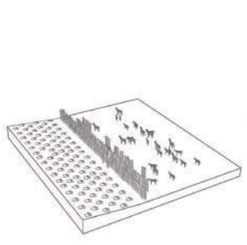
Tied Ridge

Dry soil treatment

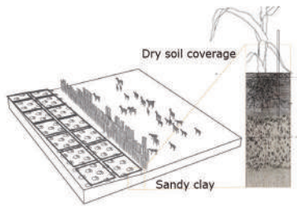


Tied Ridge

wind fences

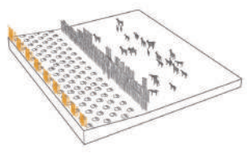


Hill slope



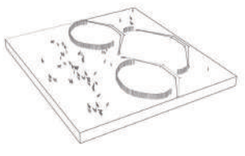
Hill slope

Dry soil treatment
+
shading



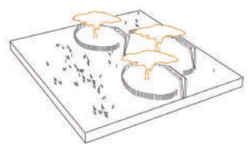
Hill slope

Dry soil treatment
+
shading
+
Fencing between lines



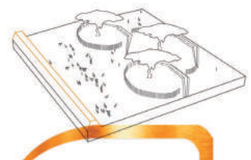
Trapezodial Bunds

fencing in between crop lanes for crop and livestock segregation



Trapezodial Bunds

Fencing(crop and livestock segreation)



Trapezodial Bunds

trees/shading
+
Earth Bund
(serve as wind wall)