

Pov-er-ty (pö'v'er-tē)

The state of one who lacks a usual or socially acceptable amount of money or material possessions. Poverty is said to exist when people lack the means to satisfy their basic needs.

client + brief_01

client_

Client_ United Nations Food and Agriculture Organisation (UN FAO)
Funding: The World Bank and Member states of the G8

problem statement_

The major concern of the client, as outlined by the 2009 G8 Summit and the World Summit on Food Security, is the uncertainty of food availability in 2050. The UN FAO (2009) estimates that global food production needs to increase by 70% to meet the demands of the growing population by 2050. Apart from an estimated 2.3 billion extra mouths to feed

globally, current agricultural practices are not sustainable (Pfeiffer p39). Modern agriculture is dependent on fossil fuels (appendix 1) and inefficient in terms of produce per hectare, especially in Africa (UN FAO, 2009)

According to Shantayanan Devarajan, Chief Economist of the Africa Region at the World Bank, in 2008 food prices around the globe increased by 50%. This rise, coupled with the negative economy of 2009, resulted in a global food crisis and pushed millions of people into poverty. In 2009 an estimated high of 1.02 billion people are reported to be

living in poverty globally. Because Africa has the highest poverty rate in the world, it also suffers the most under the food crisis.

In light of these factors it has become evident that drastic short- and long-term plans needs to be formulated to support low-income nations in providing for themselves.



2b
ESTIMATED POPULATION SIZE IN BILLIONS FOR SUB-SAHARAN AFRICA BY 2050. 2005 POPULATION SIZE WAS ESTIMATED AT 770 MILLION PEOPLE.

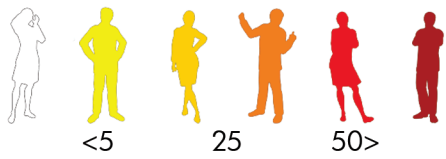
33m
ESTIMATED AMOUNT IN MILLIONS OF LESS THAN 2 HECTARE SMALL HOLDER FARMS IN SUB-SAHARAN AFRICA, REPRESENTING 80% OF ALL FARMS.

13kg
ESTIMATED AMOUNT OF kg FERTILIZER PER HECTARE OF FARMLAND, COMPARED TO 73kg IN THE MIDDLE EAST AND 190kg IN EAST ASIA AND THE PACIFIC.

30%
PERCENTAGE OF AFRICA'S POPULATION (218 MILLION PEOPLE) THAT ARE ESTIMATED TO BE SUFFERING FROM CHRONIC HUNGER AND MALNUTRITION.

1.2t
ESTIMATED CEREAL YIELDS IN TONNE PER HECTARE FOR SUB-SAHARAN AFRICA, COMPARED TO 3 TONNES PER HECTARE GLOBALLY.

3%
ESTIMATED PERCENTAGE OF AGRICULTURAL LAND WITH IRRIGATION IN SUB-SAHARAN AFRICA, COMPARED TO 20% GLOBALLY.



% of population that suffers from malnutrition

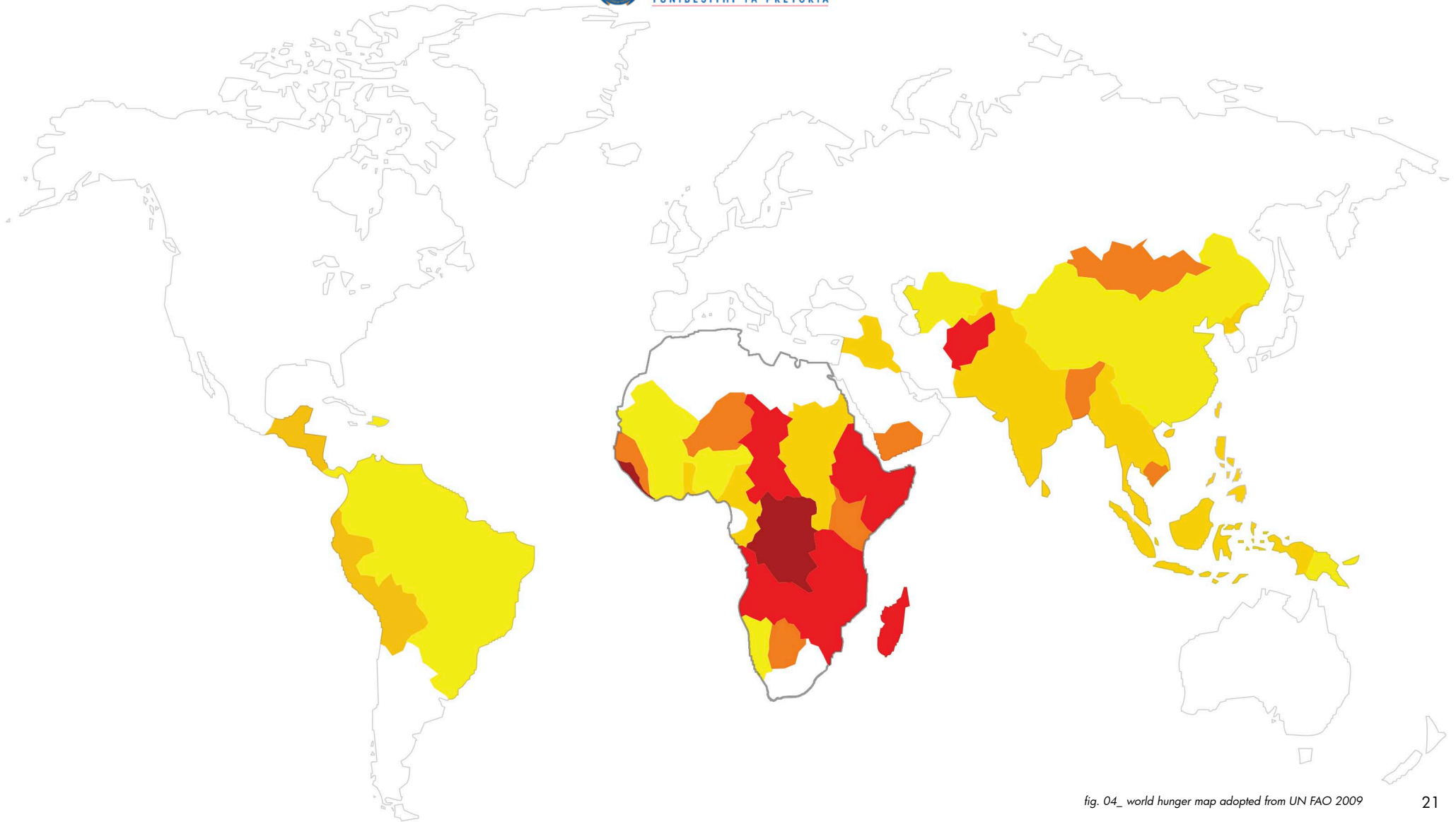


fig. 04_ world hunger map adopted from UN FAO 2009

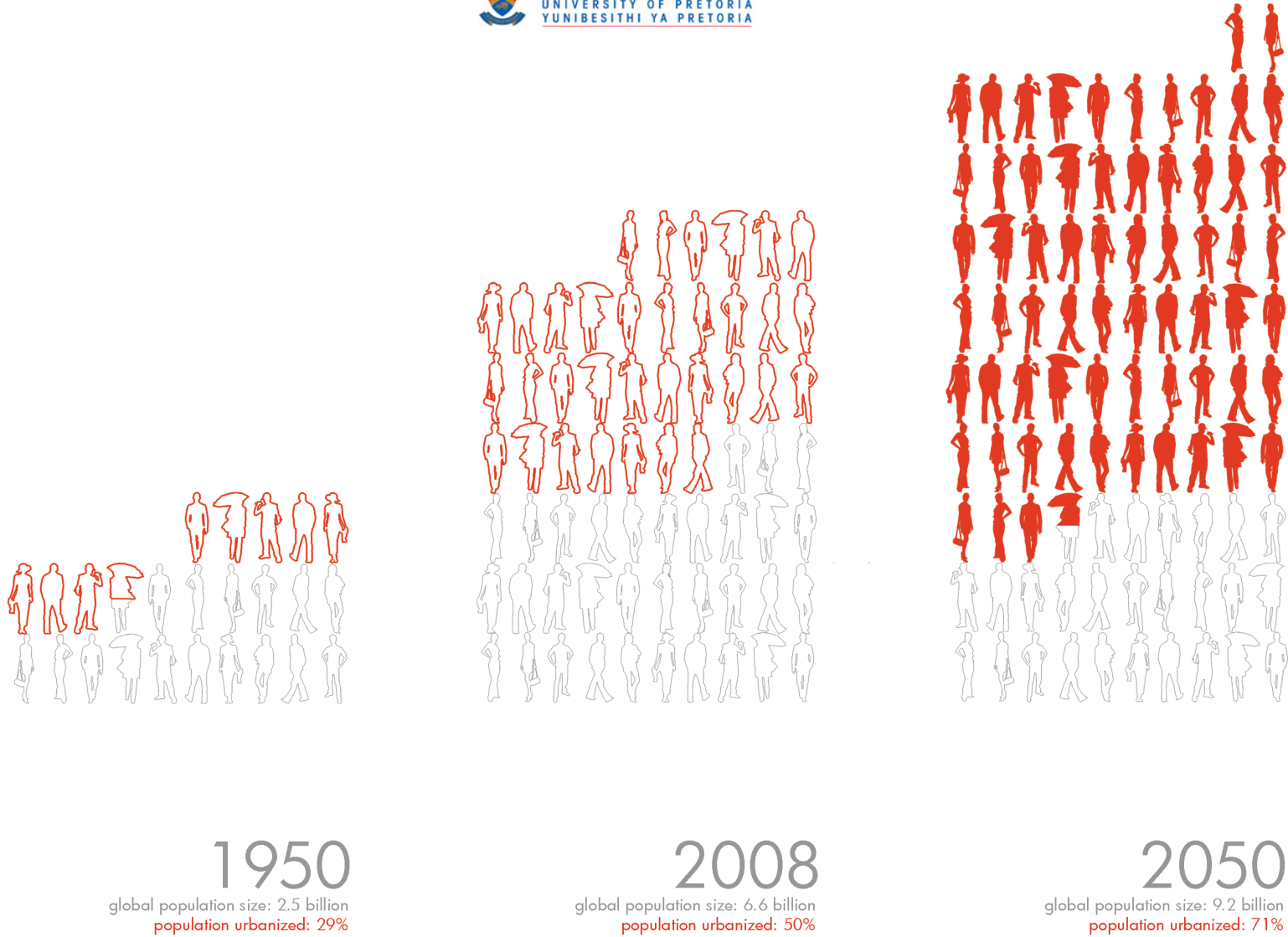


fig. 05_ population size and urbanization

“ The solution is to relocalize agriculture. We need to rebuild our local food production infrastructure. ”

response_

When mass urbanization statistics are considered, it becomes evident that the focus for future agricultural produce needs to be widened to include urban areas, since the predominant global population will reside in urban areas in the near future.

One of the proposed solutions, according to the World Bank (2009), would be to double the amount of spending on agricultural research and development to \$800 million over the next five years. According to UN FAO

-Pfeiffer
(2006, p 02)

(2009) one of the focus areas of future agricultural research should be plant breeding and biotechnology, as it has already proven to be very successful.

Another possible solution would be for urban areas to re-localize agriculture within the city boundaries. This will allow impoverished households and consumers to start providing nutritious food for themselves. According to the World Bank (2009), when disadvantaged people cannot afford food they either eat less, opt for cheaper food or stop spending

on education and health care. By securing a sustainable food supply, developing nations can focus their attention on other social and economic problems. Food security is the first step in eradicating poverty.

project aim_

_to invest in agricultural science, research, technology, education and innovation to ensure sustainable agricultural produce.

brief_

The role of the architect is to assist the client in choosing an appropriate site and designing an agricultural research facility that will focus on researching urban food production methods and solutions.

programmes_

- _research and development
- _support for urban farmers
- _public education

research and development_

The research fields focuses on improving sustainable urban agriculture, which includes bio-technology, educating farmers, growth medium and planting-method research and greenhouse technology.

The aim is to develop bio-technological advancements for urban agriculture that can easily be understood. According to the UN FAO (2009) farmers in Africa produce inefficiently because of a lack of technological farming methods and education.

support for urban famers_

The aim is to strengthen the role of the agricultural household and small-holder farms by providing legal aid to assist with leasing or the purchase of land, to provide policies to manage resources and local communities, and to provide adequate support for farmers in terms of training and risk management.

Two types of agriculture (household vegetable and community gardening) will need to co-exist to ensure sustainable food production within the city boundaries and that skill is transferred from one individual to the other.

household vegetable gardening_

The primary focus will be to inform and educate impoverished households on micro-agricultural techniques and benefits, so that each household can produce enough vegetables to sustain themselves. With correct information and technological advancements, micro-gardens can be successfully managed on rooftops, balconies, inside a window sill or on communal ground available (e.g. The communal garden of an apartment block). Skills can effectively be transferred between household members.

community gardening_

Unskilled or unemployed individuals can receive training on small to medium scale agricultural techniques, and co-manage larger community gardens or small-holder farms on vacant lots within the city. Vacant lots and servitudes can be used free of charge through a municipal agreement or a municipal incentive with the landowner. Produce can be shared between individuals involved, or can be sold at a nearby market.

public education_

It is imperative that the general public has access to scientific knowledge since the success outcome of applied bio-technologies depends on society. The manner in which skills are transferred from institutions to individuals are important, as agricultural concepts should be easily understood. The objective would be to introduce easy to follow, step-by-step guide and hands-on experiments to educate the public on urban agricultural methods.

case study_

Havana, Cuba

After the fall of the Soviet Bloc in 1989, Cuba's economy was crippled and the country lost 85% of its trade. Its industrial agriculture was to a large extent dependant on fertilizer imports and Cuba imported half of the country's food. Subsequently, the decrease of these imports led to mass food shortages. The country was challenged to produce more food with fewer resources.

Cuba responded by restructuring their agriculture into localized 'city farms' or 'city gardens'. This typology of farming relocated

production closer to consumers and provided a wider variety of fruits and vegetables to its people. People were encouraged to grow fruit and vegetables in their back yards, and were allowed to sell the goods on the property or nearby market. The initiative aimed at utilizing all available arable land for food production to ensure maximum return. The success of these gardens, to a large extent, relieved Cuba's food crisis.

Pfeiffer (2006, pgs. 53-65)

The concept of small-holder farms is not new to Africa, as it makes up 80% of the farms in sub-Saharan Africa (UN FAO, 2009). The focus, thus, becomes to support individuals in their transition from rural to urban farming. Urban farmers will therefore receive support regarding the relevant technology and education to ensure that productive agriculture can take place.



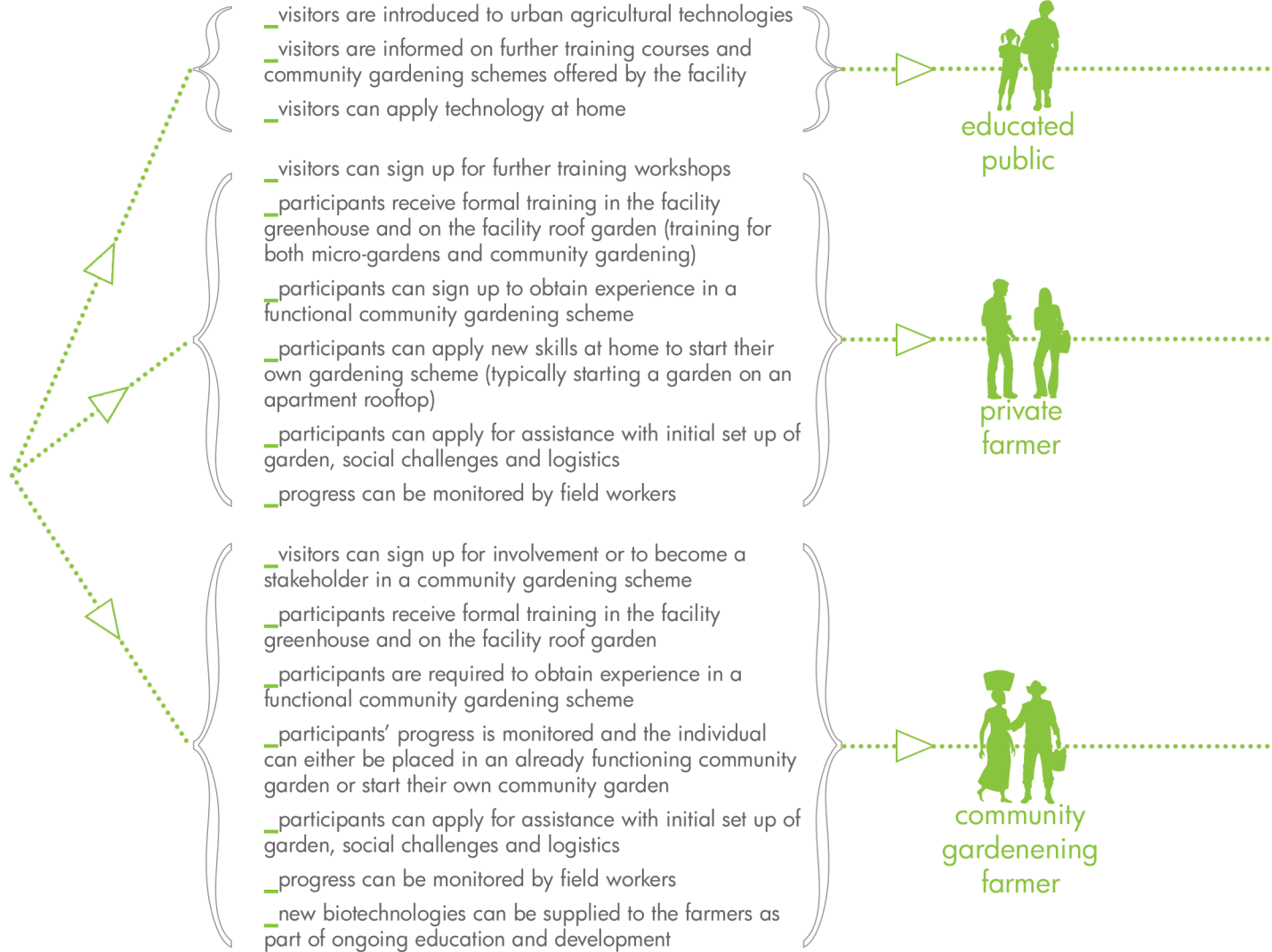
UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
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general public proposed facility

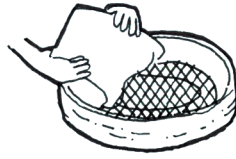
social aim_



typical application_
tire garden



cut tire

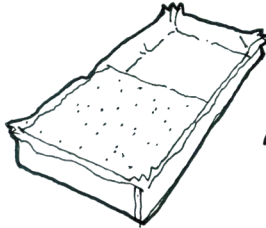


wire and plastic



fill with soil

typical application_
micro garden



line box with plastic
fill with dried grass or leaves



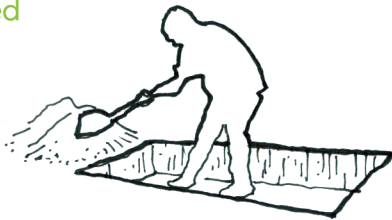
punch holes for plants
cover with plastic

typical application_
feed sack garden

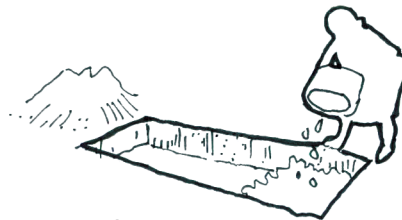


feed sack gardens

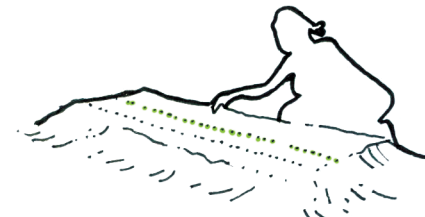
typical application_
door frame bed



dig 1m x 2m
knee deep



fill with organic waste



plant seeds in rows

future projection_

A concept that has emerged in recent years, especially in developed countries, is that of the 'Vertical Farm' or 'Sky Farm'. The concept is formulated around the idea of exclusively building tower buildings for agricultural produce. The concept focuses on producing food under artificially monitored conditions, thereby maximizing productivity. Countries such as Japan, with densely populated cities, has already started exploring this idea.

Pasona O2 is an underground farm in Tokyo. The facility explores high-tech food production methods by means of artificial

light and hydroponics. LED's, metal halides and high-pressure sodium lamps are used to cultivate herbs, rice and lettuce underground. According to Dr. Dickson Despommier of Columbia University, it is merely a matter of time before such proposals will be realized in densely populated cities around the world.

Alter (2007)

"...the vertical farm should be a thing of architectural beauty as well as be highly functional, bringing a sense of pride to the neighborhoods in which they are built. In fact, the goal of vertical farm construction is to make them so desirable in all aspects that every neighborhood will want one for their very own."

Despommier
(2008)

The proposed research facility can provide invaluable information and research about urban agricultural techniques, which could be used by a Vertical Farm in the future.

fig. 08_ a subterranean rice fields at pasona O2



fig. 09_ transgenic tomatoes at pasona O2



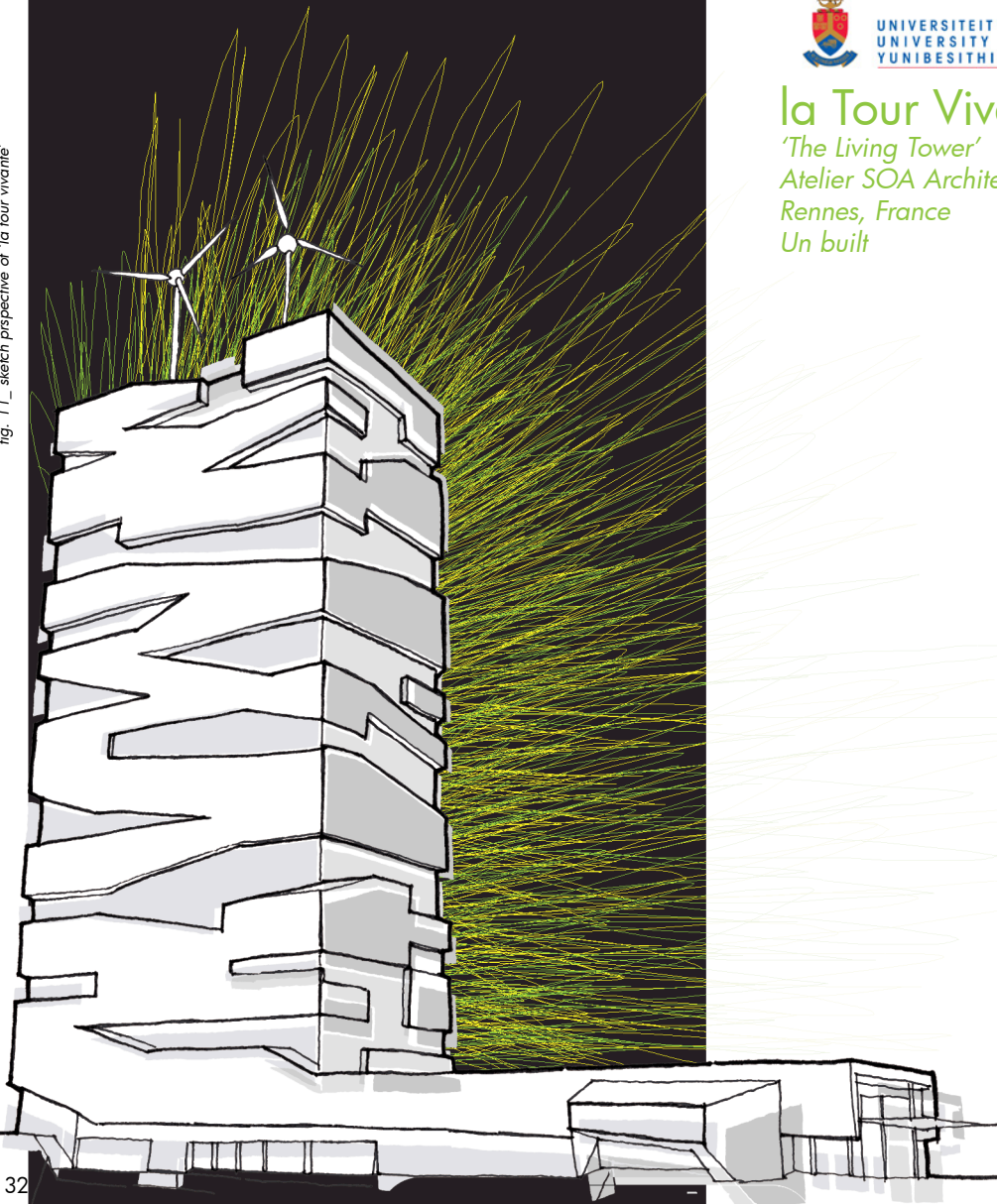
fig. 10_ lettuces are grown under artificial light at pasona O2



la Tour Vivante

'The Living Tower'
Atelier SOA Architects
Rennes, France
Un built

fig. 11_ sketch perspective of 'la tour vivante'



The building is 30 storeys high and conceptually based around a core system. The core is made up of residential units in the bottom half and office space in the top half. Space for producing crops is wrapped around the core in a continuous ramp that spirals from the bottom to the top. The tower is anchored to the landscape by a plinth that is partially sunk into the ground. This 'plinth' connects the building with the street and also houses a variety of retail stores, a media centre and a nursery.

“...the Living Tower is designed as an autonomous ecological machine which associates places of production, places of consumption with spaces of life.”



fig. 12_ 'la tour vivante': planting zones wrapping up the facility



fig. 13_ 'la tour vivante': internal planting zone



fig. 14_ 'la tour vivante': planting zones are visible in the façade

