

A lush garden pond with water lilies and various plants. The pond is filled with large green lily pads and several pink water lilies in bloom. The background is filled with a variety of green and yellow plants, including tall grasses and shrubs, creating a dense and vibrant garden scene.

# Sustainability in practice

**AYALA WATER & ECOLOGY LTD**

**Eli Cohen, M.Sc.**

**[www.ayala-aqua.com](http://www.ayala-aqua.com)**



**Sustainability =**

minimal human and technology  
involvement



Ecological systems base on two main principles:

Flow of energy

Cycle of materials



# Design criteria for sustainable system:

- All materials are degradable
- **Solar energy** is “yet” available and create no side effects
- **Gravity** as moving force
- Healthy environment support healthy **plants** which are a powerful supporters of **microorganisms** communities
- **Poly-cultural** systems are stable and stronger
- System **hydraulics**
- Landscape





# Ayala's Natural Biological System (NBS)

## Comprehensive hybrid system :

- **Hydrology methods: (gravity)**  
horizontal flow, vertical flow, up-flow, free-water and tidal-flow
- **Different types of plants - Larger variety of microorganisms, higher durability, better biological degradation of contaminants**
- **Variety of aggregates differ physically and chemically**



different Hydrological methods: horizontal flow, vertical flow, up-flow, free-water, tidal-flow, etc.

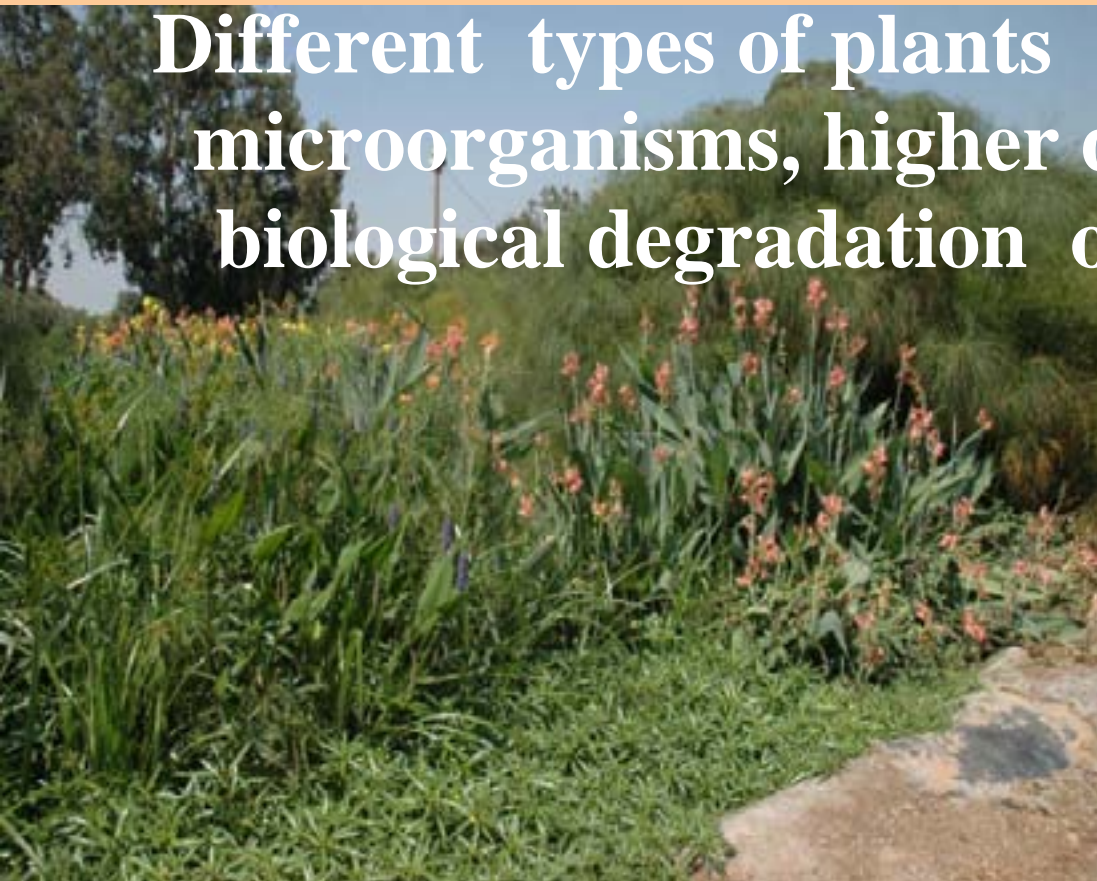








Different types of plants (bigger variety of microorganisms, higher durability, better biological degradation of contaminants)





different types of sediments varied physically and chemically,



# NBS advantages



- **Long lasting, self sustaining phyto-biological systems**
- **Very low maintenance costs with minimal energy involvement.**
- **High endurance under extreme water flows and contaminant loads.**
- **No by-products such as sludge or saline water**
- **Part of the local landscape and environment.**





# Local on-site small scale applications







# Green roofs



- Isolators
- Storm water buffers
- Sewage treatment
- landscape







# PUBLIC MALL

## REDEFINING PUBLIC SPACES





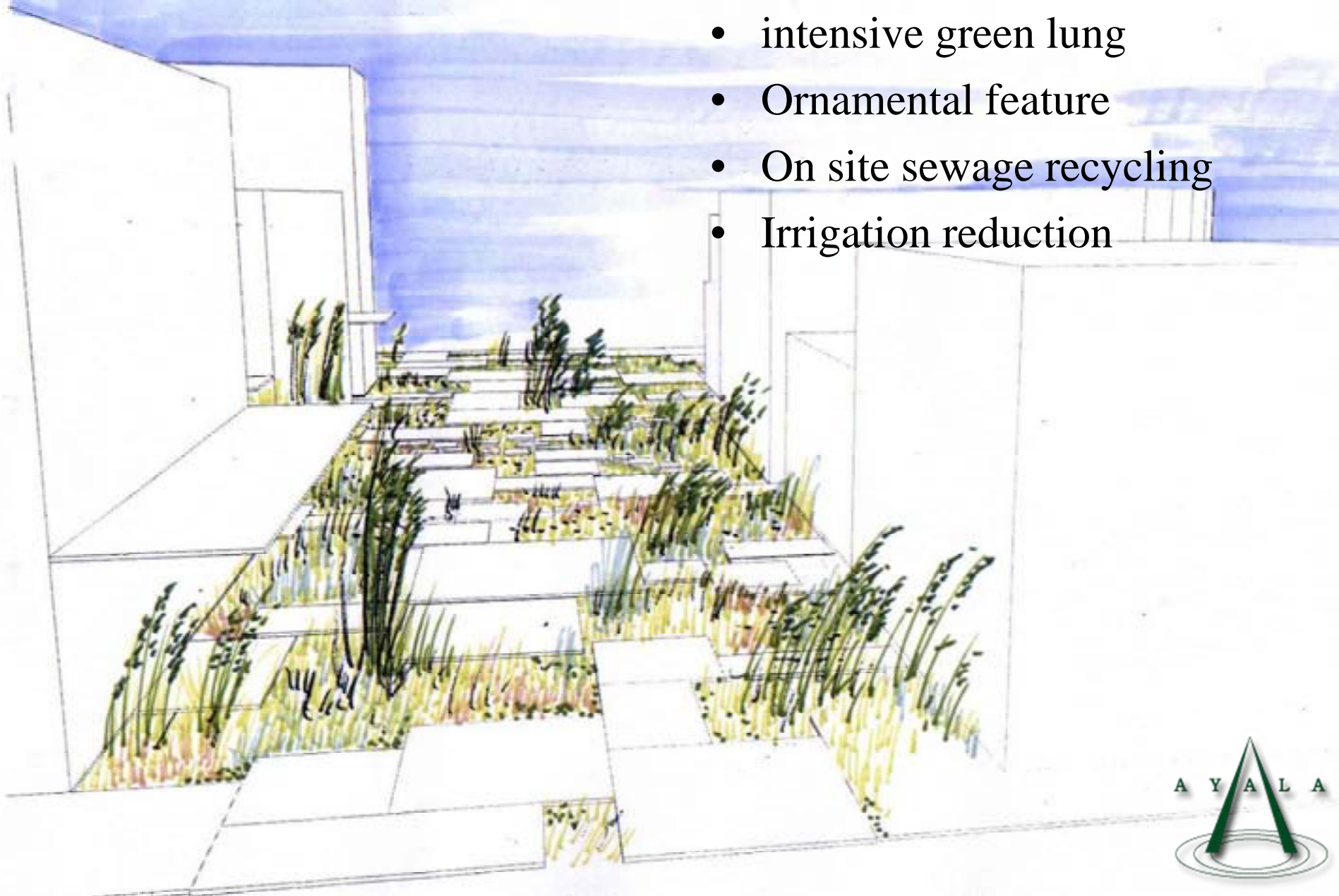
# Green walls

Santiago, Chile

- Isolator (strong radiation zones)
- Dust and aerosols buffer
- Land scape



- intensive green lung
- Ornamental feature
- On site sewage recycling
- Irrigation reduction



**Pedestrian Street & Wetland - View trough Walkway**



**Grey water CW plant  
centre of Tel-Aviv**





# Contaminants: BOD, COD, fats, detergents, boron, pathogens



Poleg residency – grey water CW





# On-site urban sewage recycling



**Gnei – Tikva, residential – •  
on-site recycling system**



# Amphorah – winery & olive mill







collectors



pump



CW3

CW2

CW1



# Industrial

## “AHAVA” cosmetic plant



# Industrial



# Oil factory

salinated water with high oils residues

3 month old







**Oil Tanks Depot – Crude oil degradation**  
**Reduction of hydrocarbons from high salinity water (2-3%)**





# “Hiria” – Ariel Sharon Park landfill leachate and raw garbage run off



TN, TP, salinity above limits, boron,  
Heavy metals, hydrocarbons, fats, etc.





# “Hiria” landfill – NBS & visitor center



landfill leachate and raw garbage run off





# gas stations

sanitary, restaurants, oil spills





Neot smadar –  
residential and agricultural sewage  
output: irrigation quality

Extremely arid zone



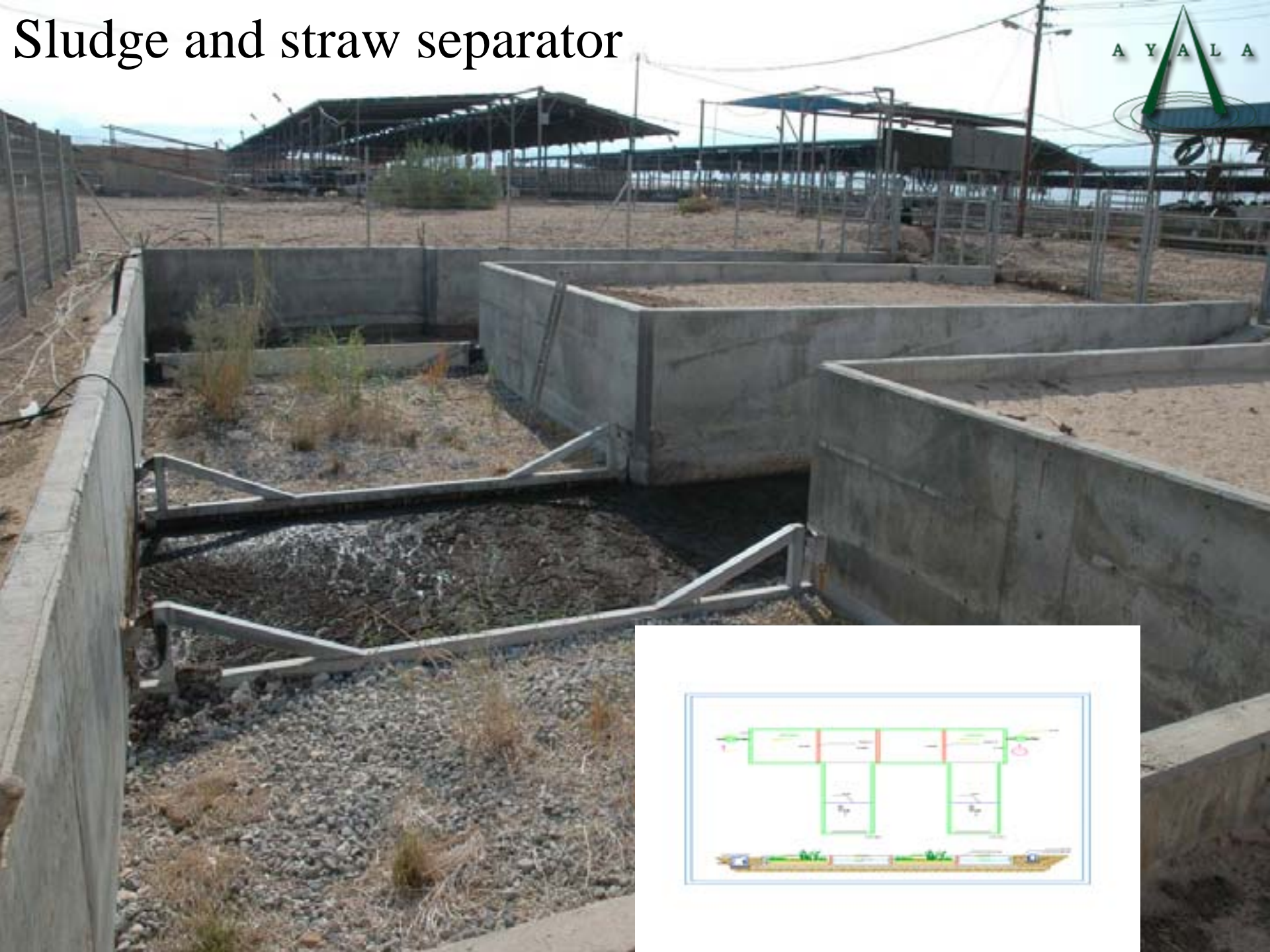


Kibbutz Lotan –  
Dairy & residential sewage  
Extremely Arid zone

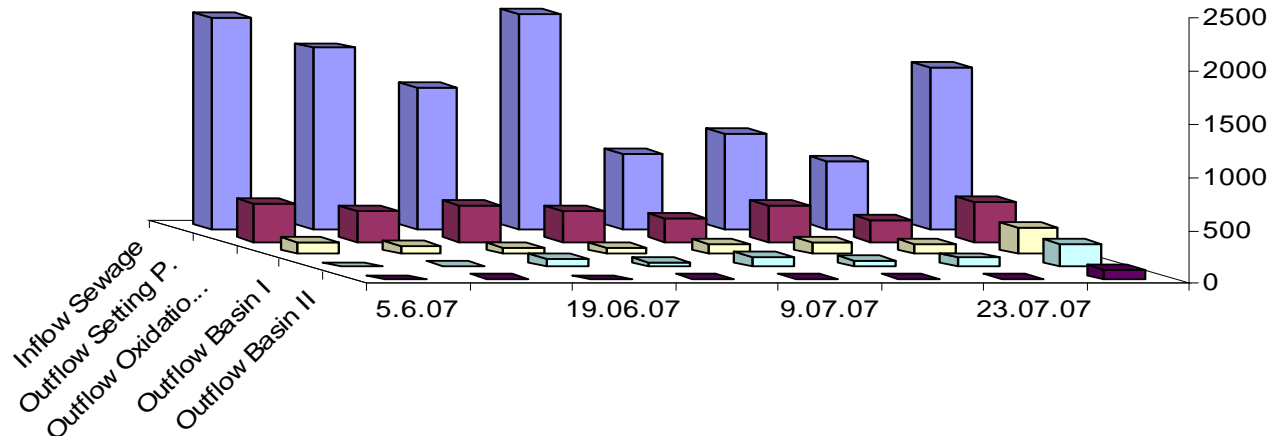




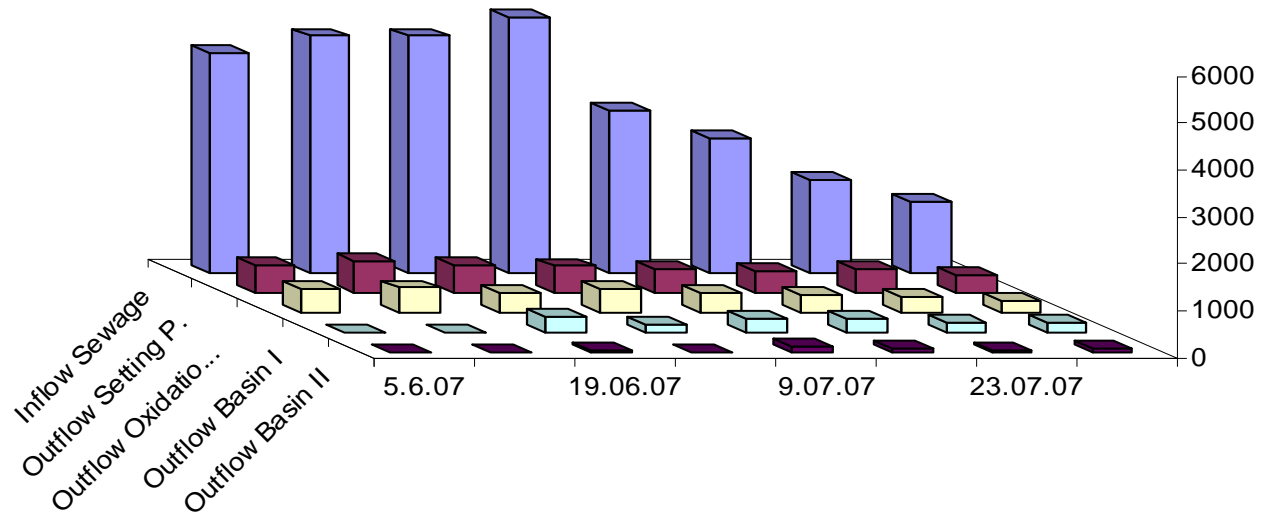
# Sludge and straw separator



### BOD

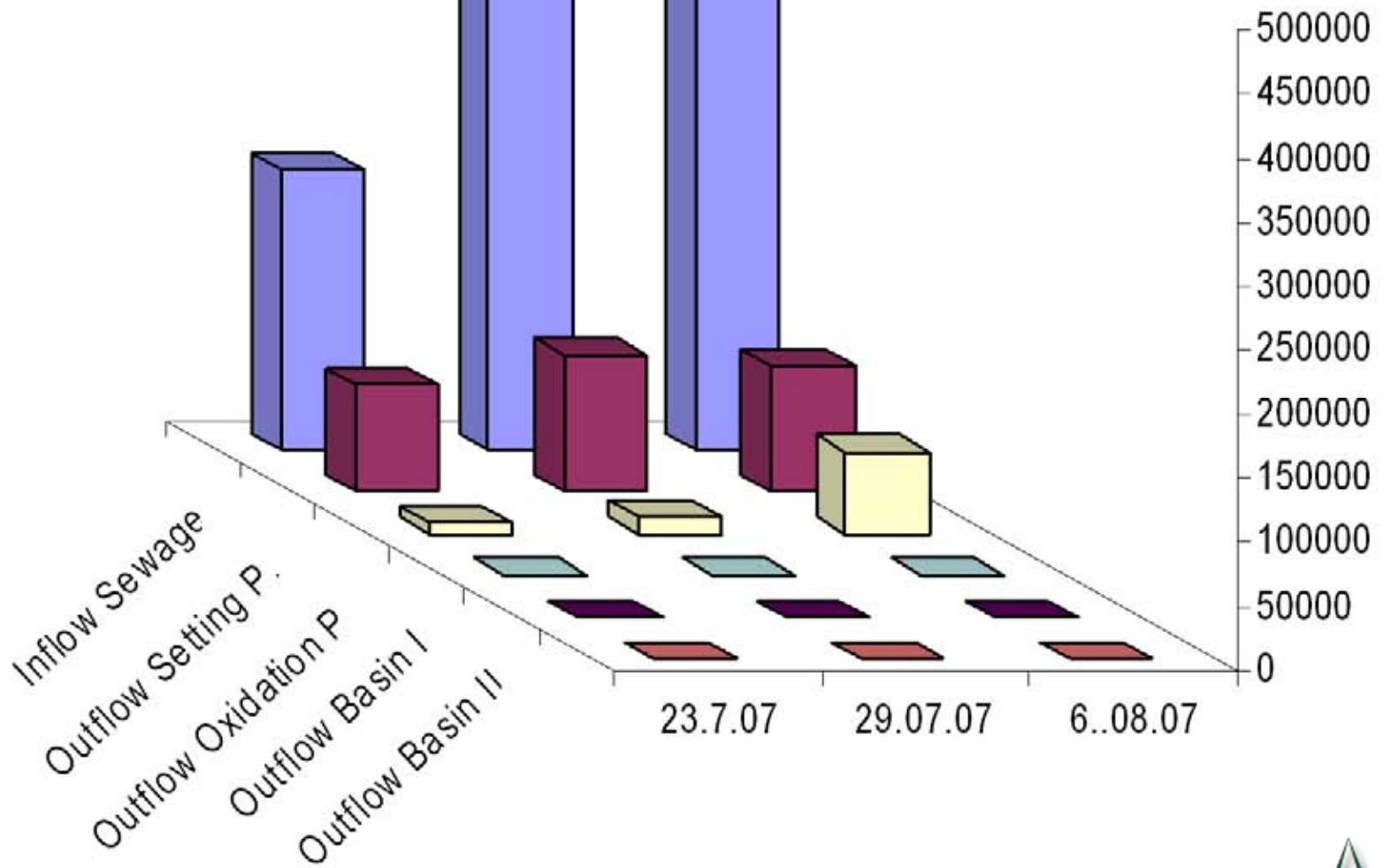


### COD

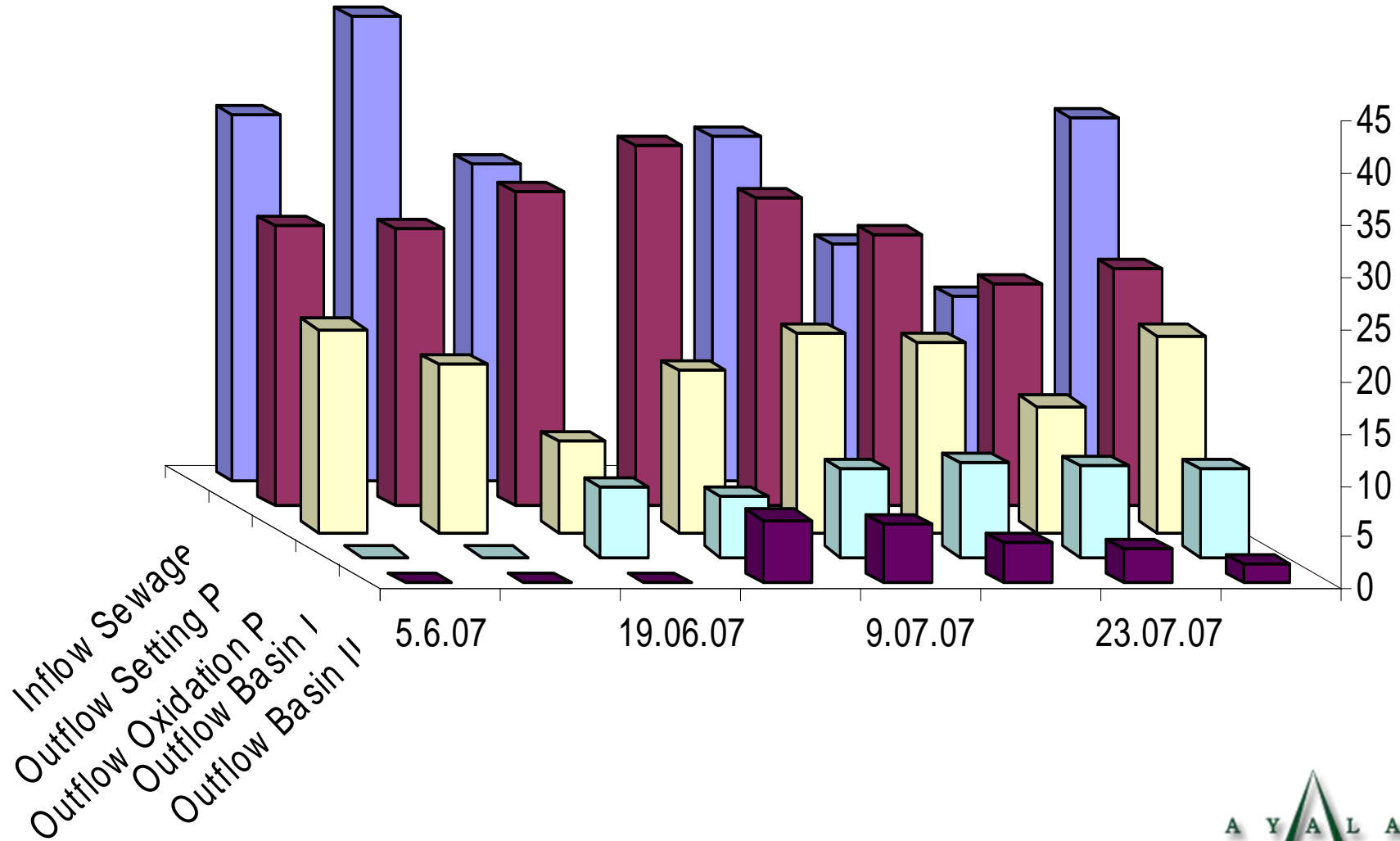




# Ecoli



# T.P





# Rivers and lakes rehabilitation

## Contaminants:

**BOD, COD, TSS, TN, ammonium, Na, oils, pathogens, hormones, heavy metals**



Organic Fish Plant





# Neot Smadar, Negev desert



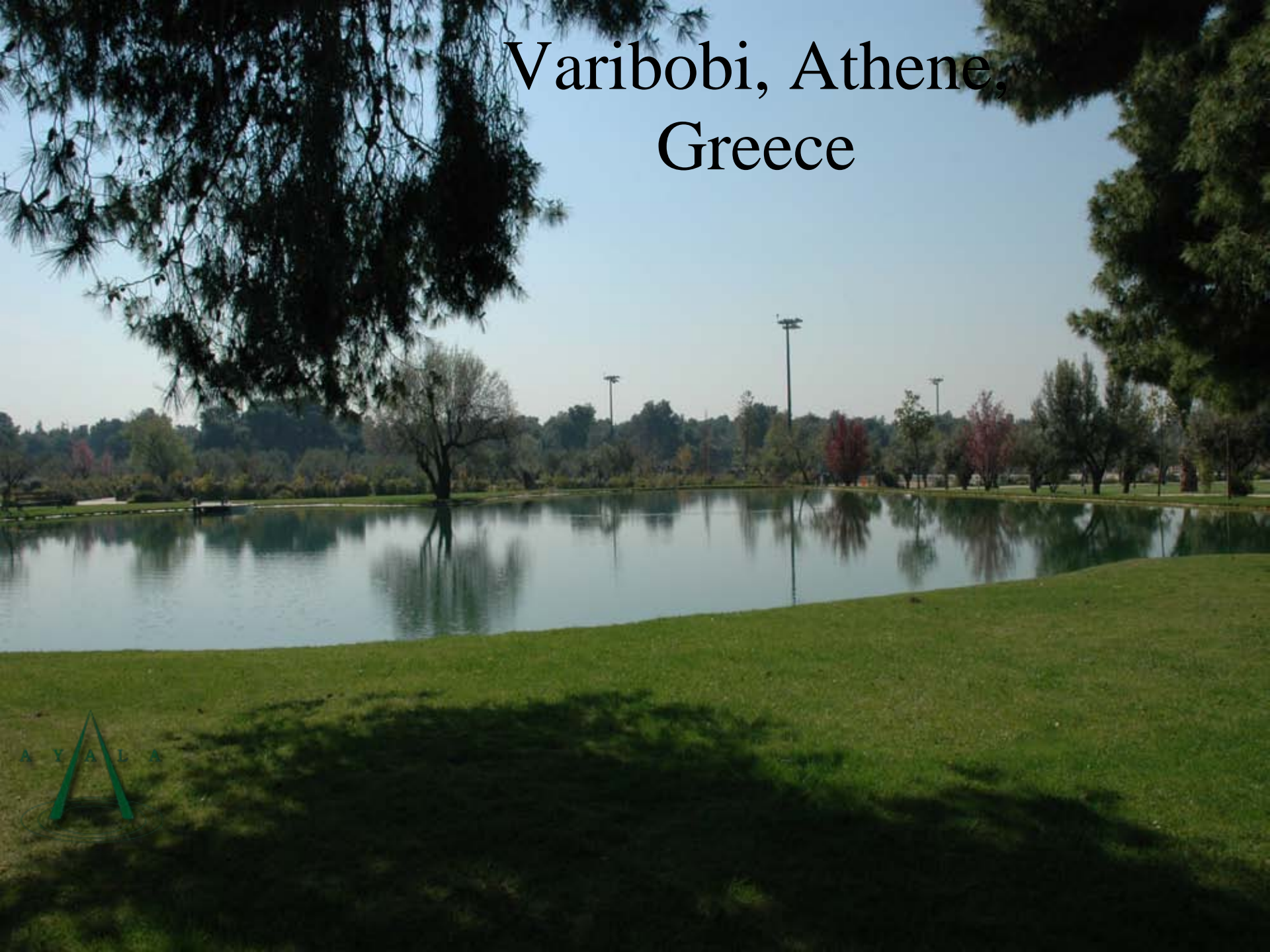


# Rivers and lakes rehabilitation





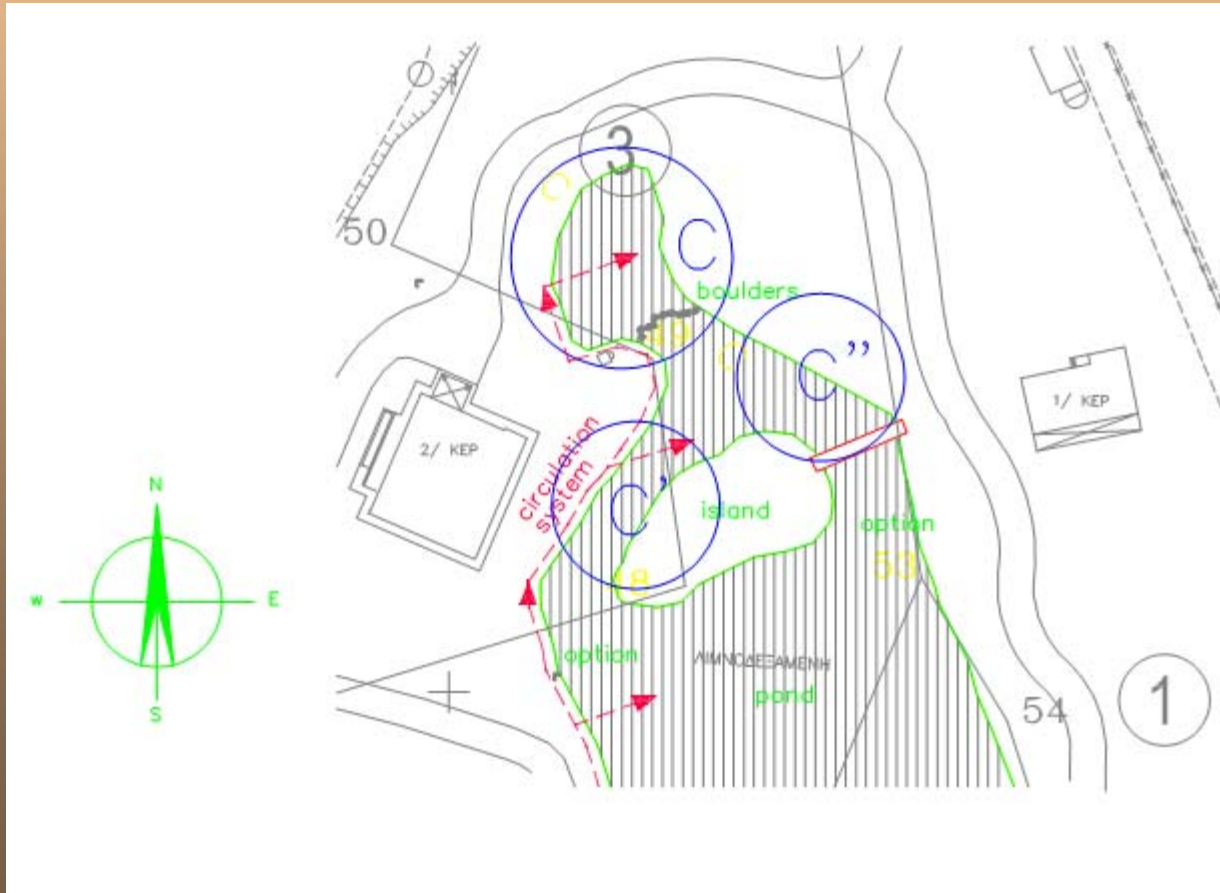
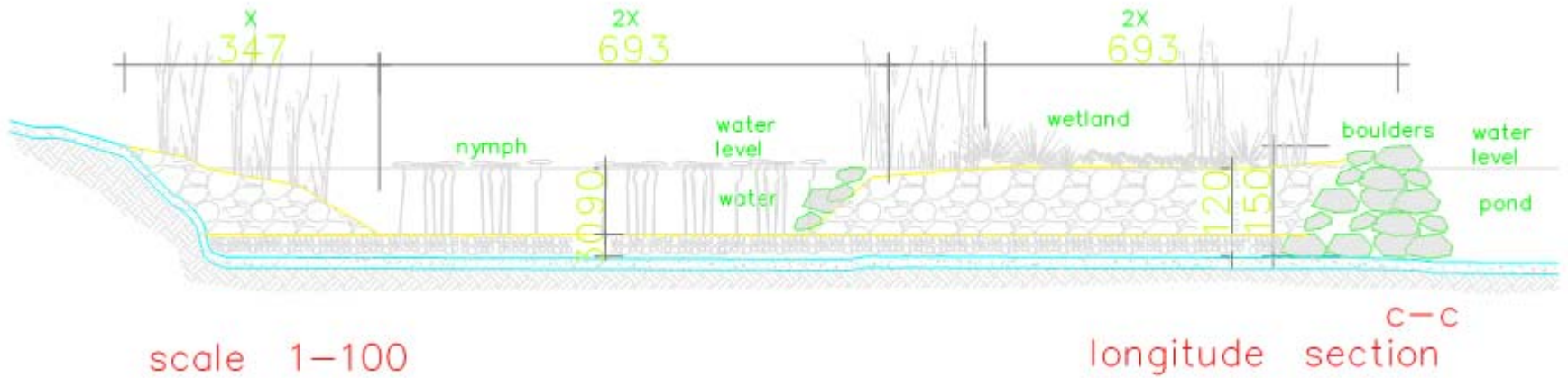
# Varibobi, Athene, Greece







# varibombi-lake1





# Botanical Garden, Jerusalem



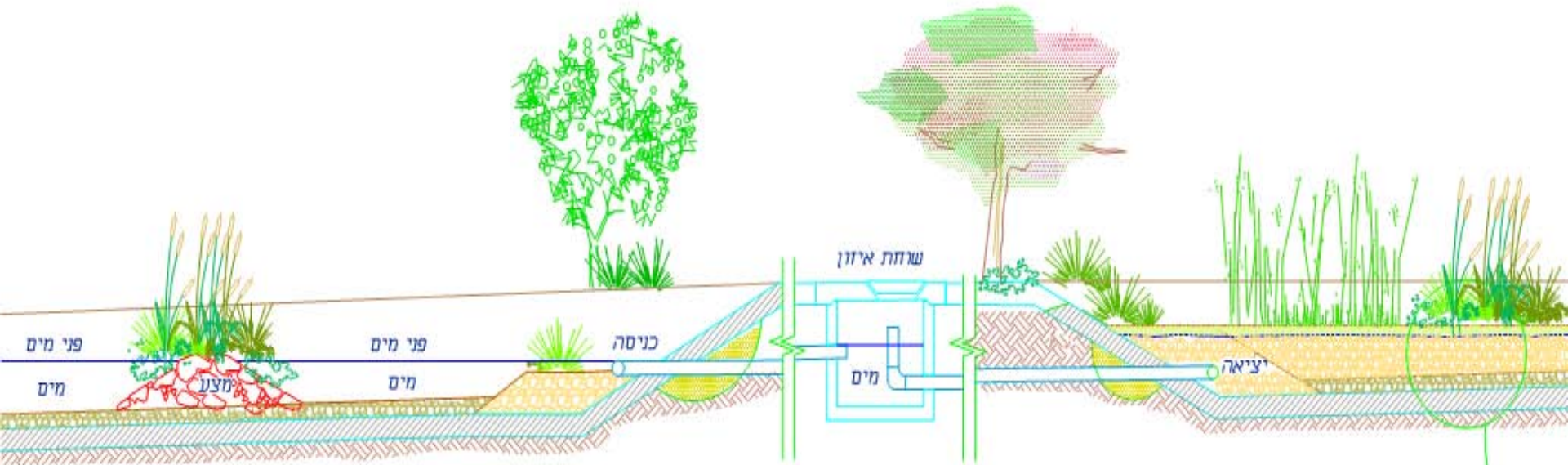




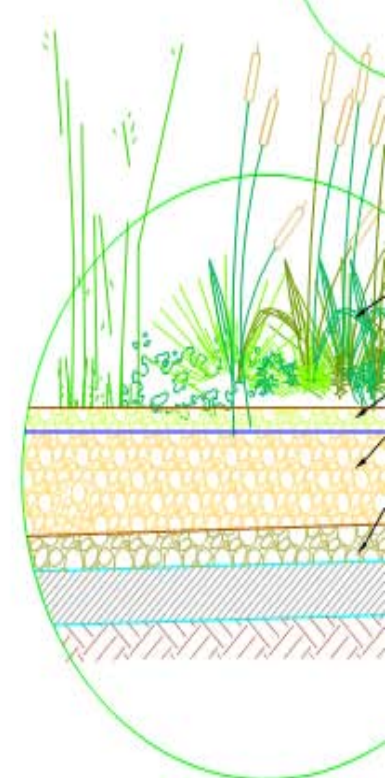


# Rivers and lakes rehabilitation Inside metropolis zone





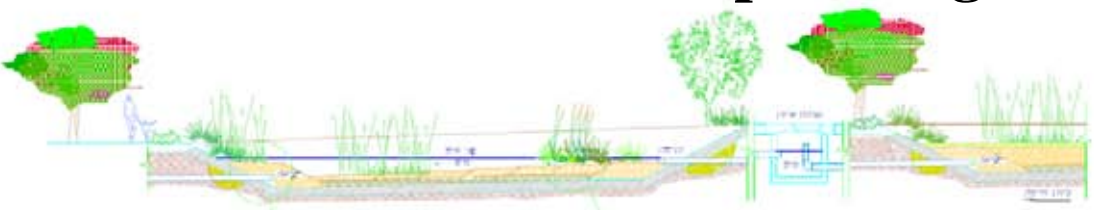
Yarkon river system – typical cross section



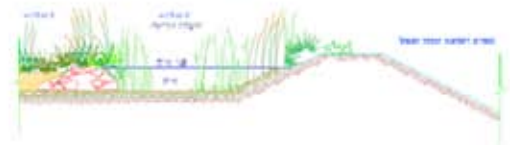
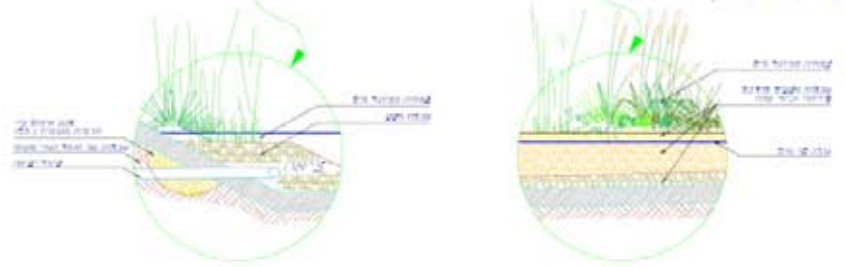
מערכת טירור מים צמחית



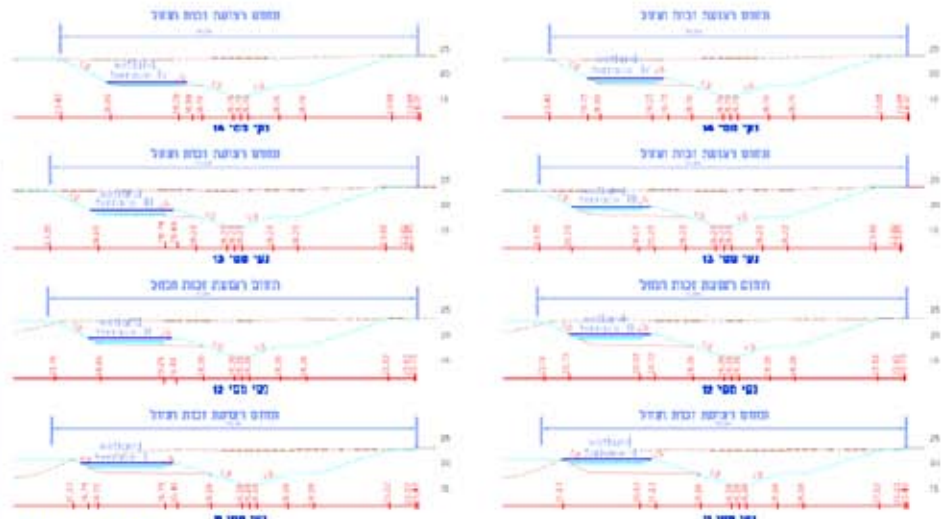
# Ayalon River – on-site water polishing



מערכת טיהור מים עמונית – נול אילון  
חוד ארבע



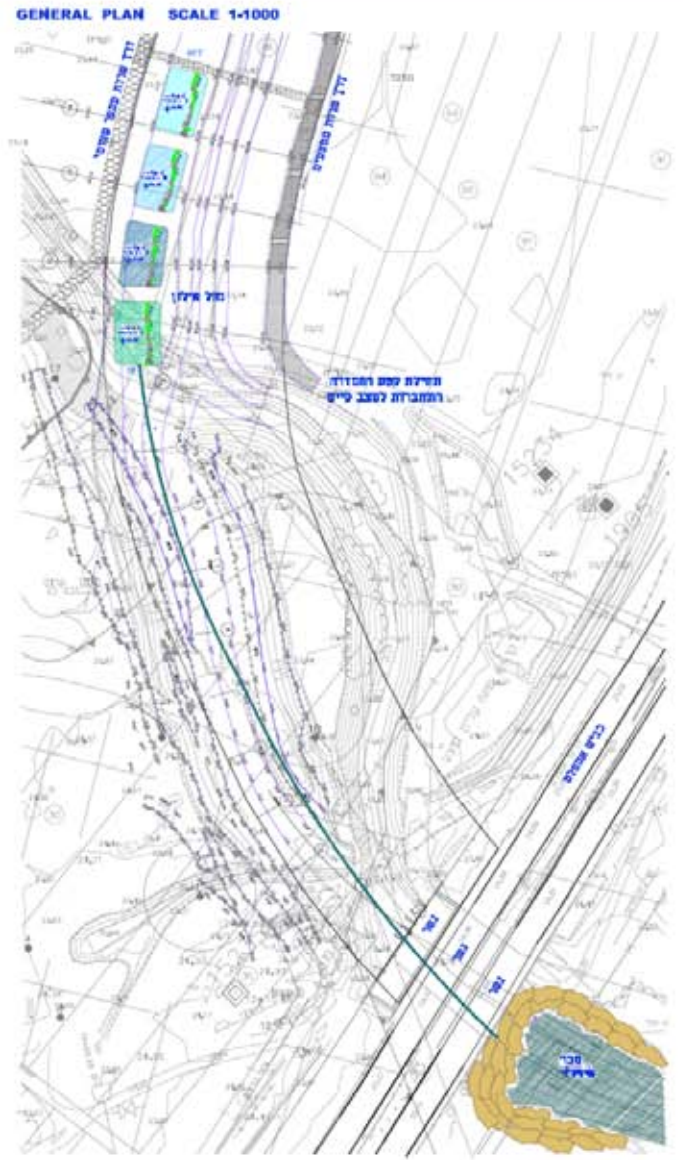
מערכת טיהור מים עמונית – נול אילון  
חוד ארבע



CROSS SECTION  
SCALE 1 - 500

OPTION 1

OPTION 2



AYALA WATER DESIGN  
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 מנחם אשפור  
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 TEL. 072-77-00810  
 FAX. 072-77-00816

AYALA  
 82/ פת  
 1918/ 072  
 072-77-00810  
 072-77-00816

משרד המים והביוב  
 מנהל מחוזות מים  
 מנהל מחוזות ביוב

Project Title: **PARK AREL RECYCLING SYSTEM**

Drawing Title: **SCHEMATIC SYSTEM**

Scale: 1:1000

Sheet No: 01

Revision: 0

# R&D

## Pharmaceutical residues and hormones reduction



**R&D constructed wetland system financed  
by the Italian Government**



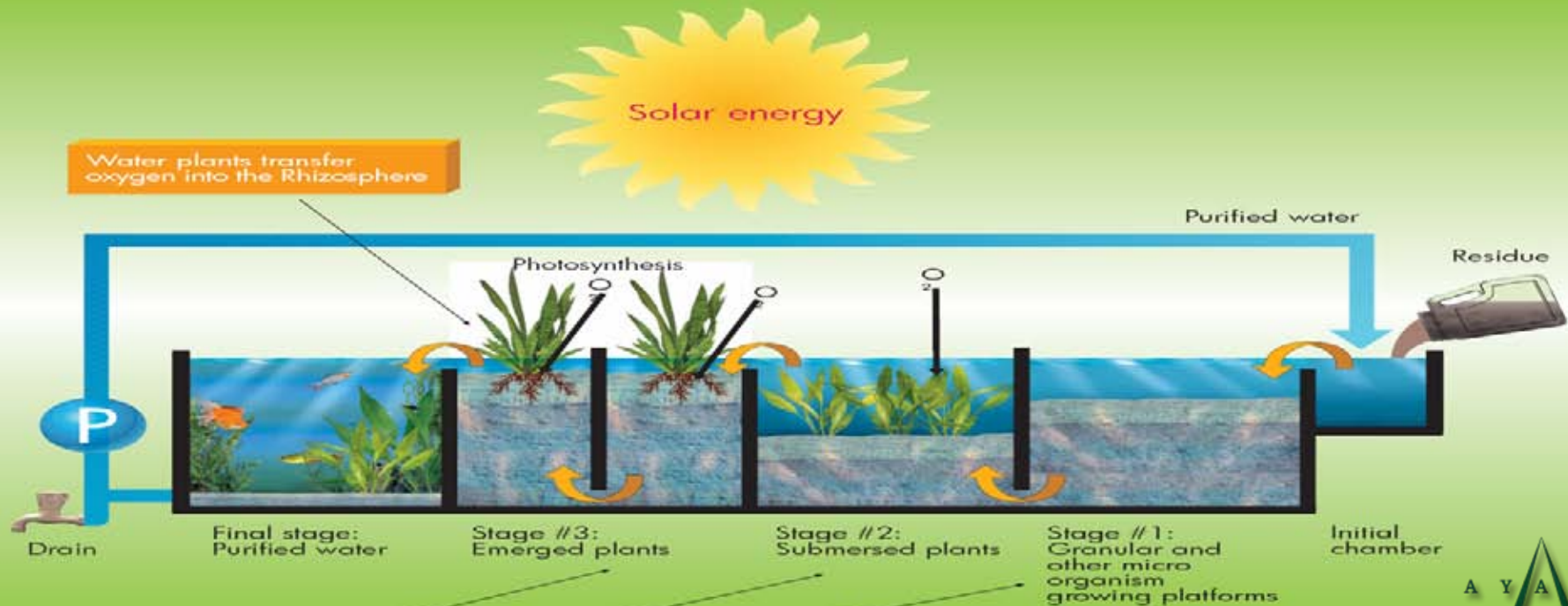


# A peek into the future:



Experimental project for handling organic residues from the ink manufacturing process, using a phyto-bioremediation technique

Adapting Nature's own proven techniques for recycling organic materials



A saturated oxygen environment accelerates the aerobic processes and aids the development of thousands of types of microorganisms

Microorganisms digest the organic byproducts, producing materials that can be used by the plants

NBS – The Natural Biological System developed by AYALA Water & Ecology Ltd. uses natural, biotic and a-biotic components to purify diverse types of organic & inorganic materials







# Hp experiment – sludge treatment



Raw Sludge



Experiment containers

Pigments and Hydrocarbons



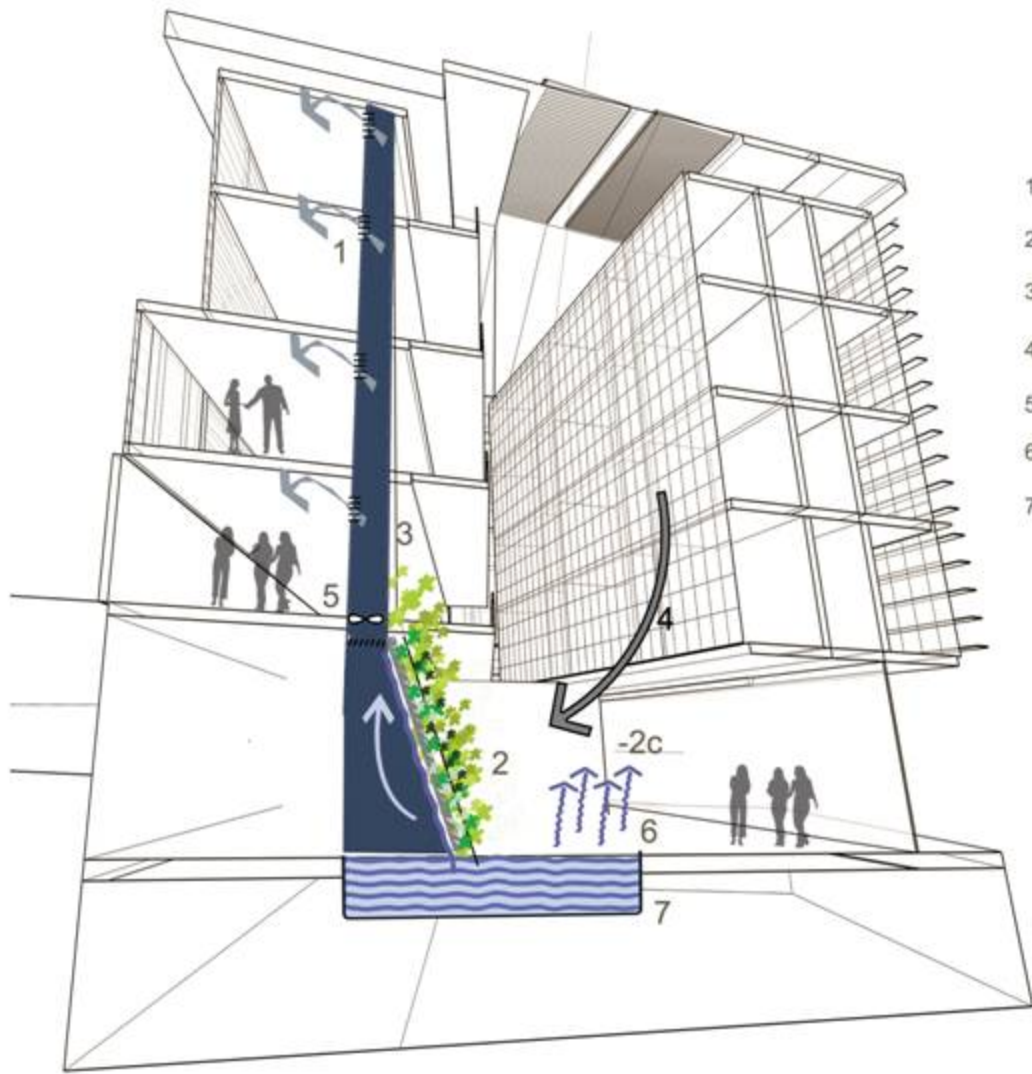
Sludge & soil mix



5 month later







- 1 ■ ventilation shaft
- 2 ■ green curtain
- 3 ■ water curtain
- 4 ■ polluted air
- 5 ■ purified air
- 6 ■ fan
- 7 ■ humidity
- 7 ■ pool



View from the atrium

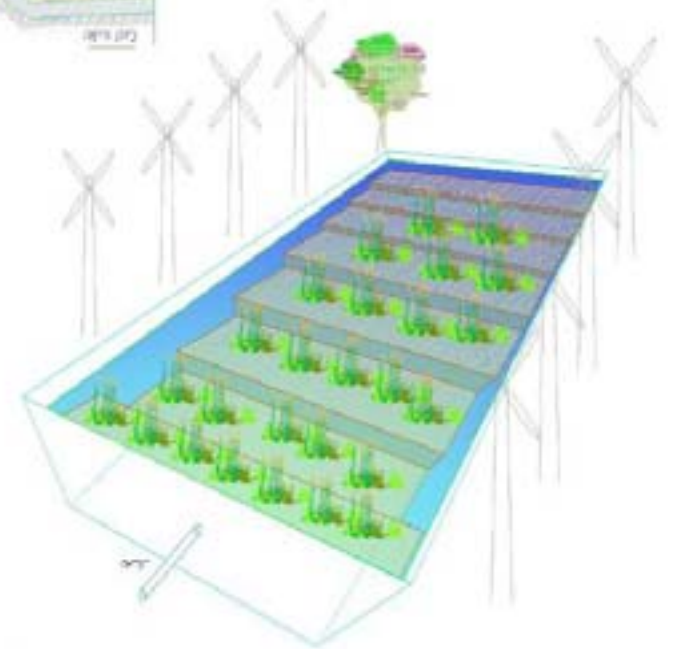
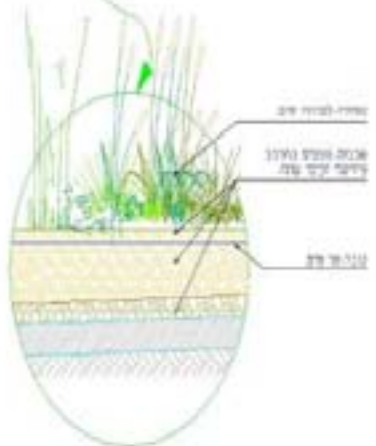
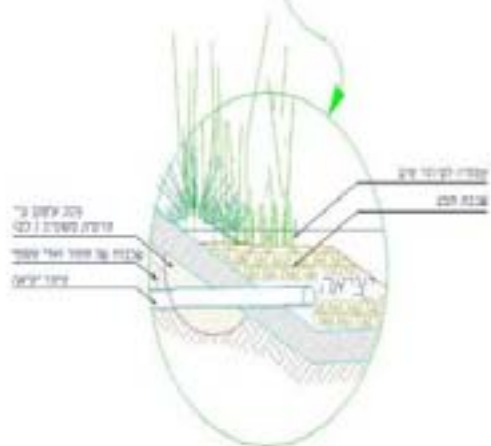
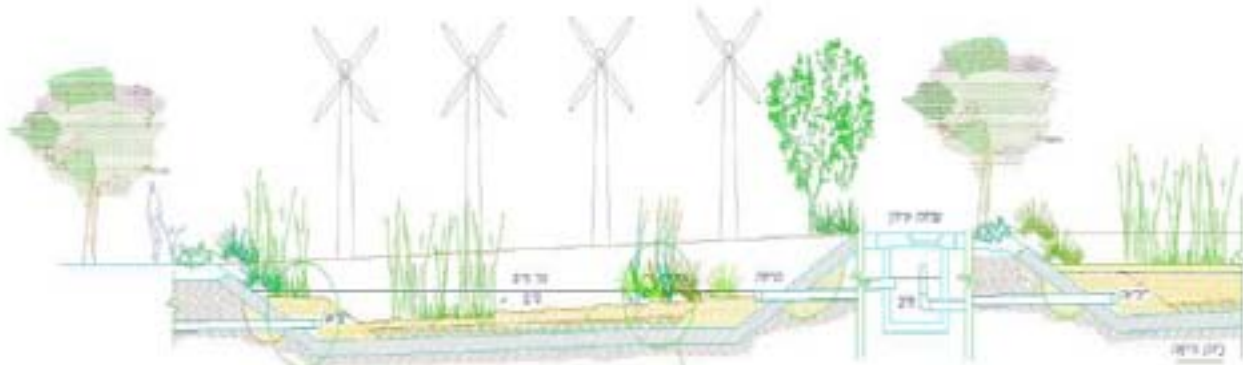
Air purification diagram





# Hybrid systems

## alternative energy: wind mills



AYALA - WATER & ECOLOGY  
 ישראליים וטכניקאים  
 1994  
 1997  
 2000  
 2003  
 2006  
 2009  
 2012  
 2015  
 2018  
 2021  
 2024

מערכת טיהור מים צמחית - מט"ש קצרין

# Sustainable solutions – on the Macro







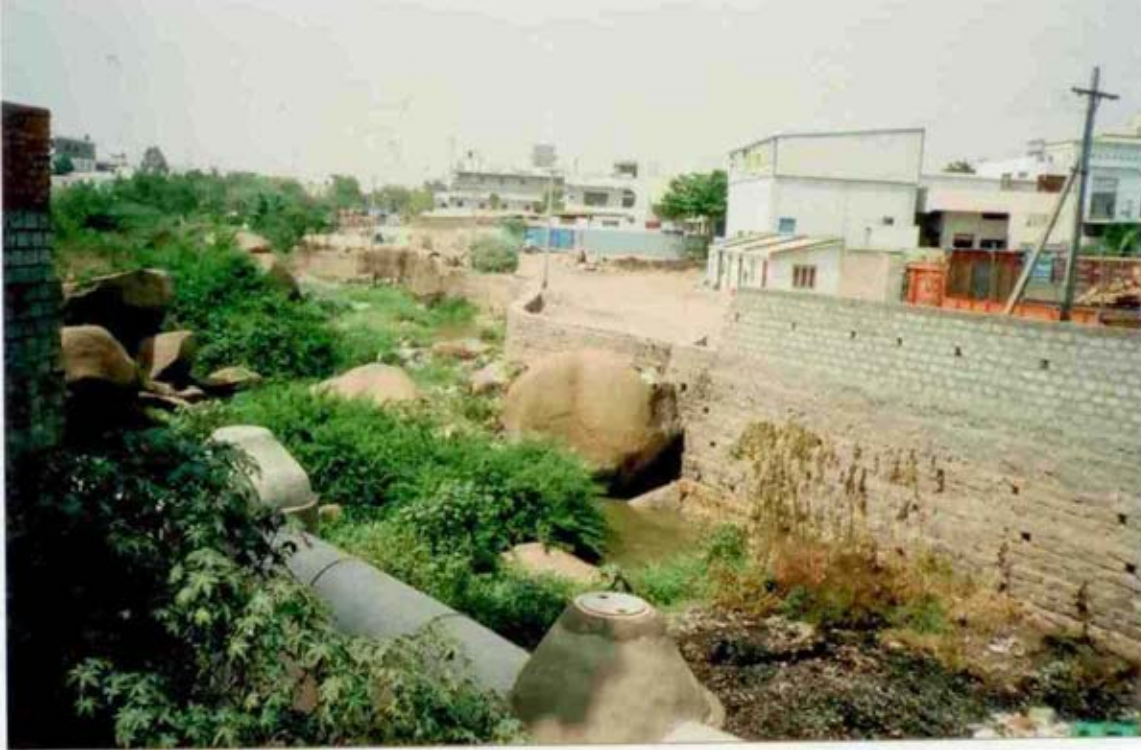
# Hyderabad metropolis on-site sustainable solution



# Sagar Lake revitalization – Hyd., India







Effluent pipes , Metal ,Paints & Plastic Industries







Metal Industry, powder coatings and Paints discharging into nala







Nala Flow at Begumpet



KURATPALLY NALLA

Bypass

Bypass

Bypass

Wetland Bypass



KURATPALLY NALLA



KURATPALLY NALLA

FATHE NAGAR Bypass

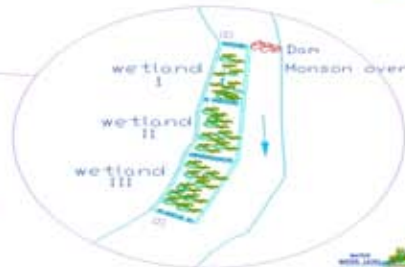
DAM

PUBLIC SCHOOL

BEGUMPET ROAD

VARUN MOTORS

Bypass



NECKLACE ROAD

SANJIVAIYAH PARK

HUSAIN SAGAR LAKE

BUDDHA STATUE

BALKAPUR NALLA

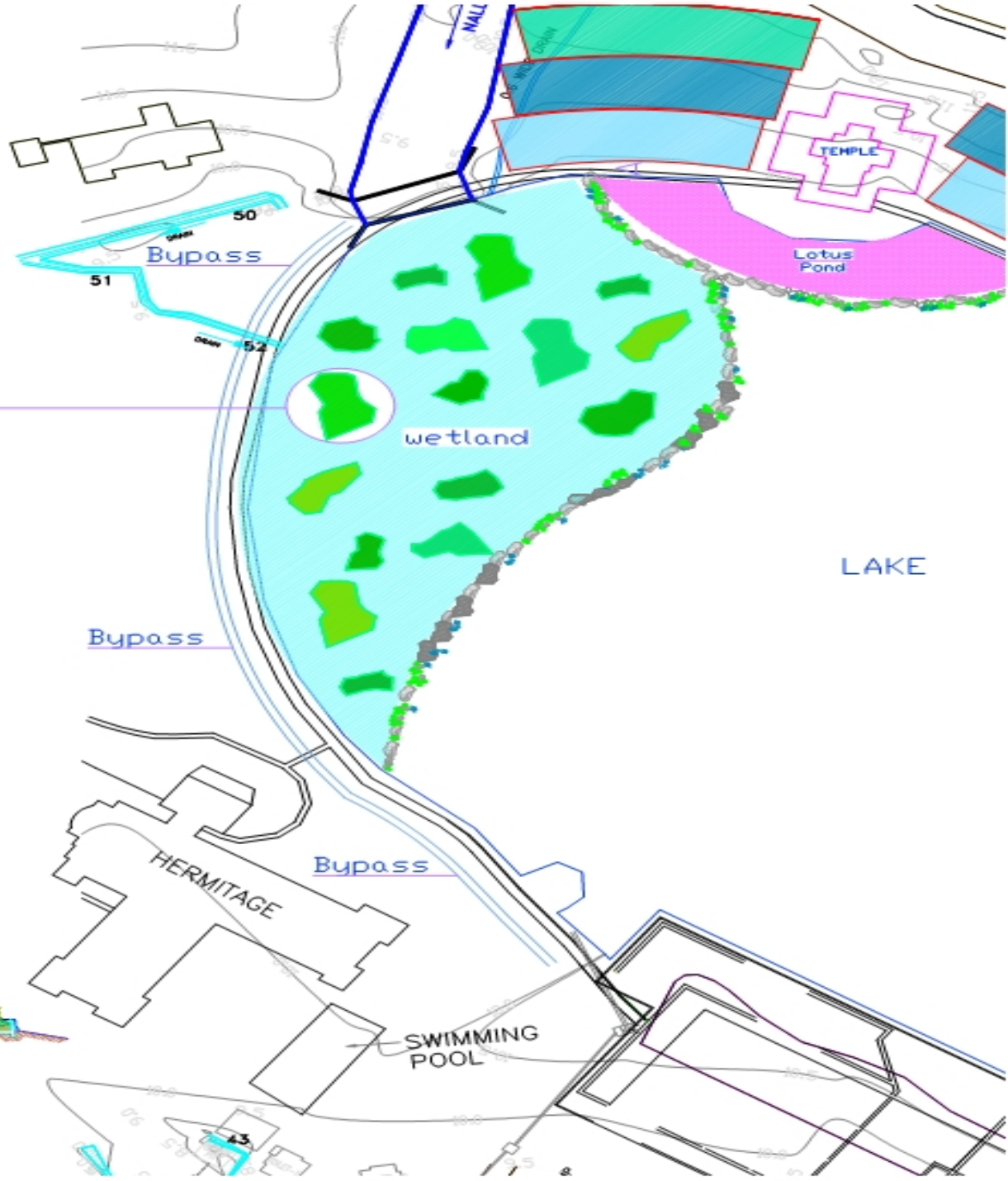
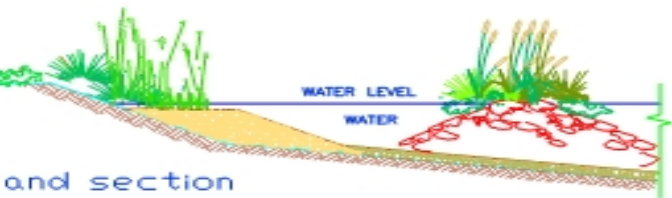




Potential locations for on-site treatment











## Design and work principles:

- Locating sources of pollutions and treatment on-site
- Survey and construction is being done by local professionals
- Using local sediments and plants
- Using local labor as much as possible
- Minimal use of electricity
- Recycling of non-degradable elements



# Plaine du Var & town of Nice project

**West8** architects, Rotterdam - leading office





# Main issues to be confront by designing team:

- Flooding hazards
- Contamination of the upper and lower level aquifers
- Rehabilitating the Mediterranean nature of the valley
- Preserving wild life and vegetation
- The concept should be based on sustainability approach which means using as much as possible only natural solutions



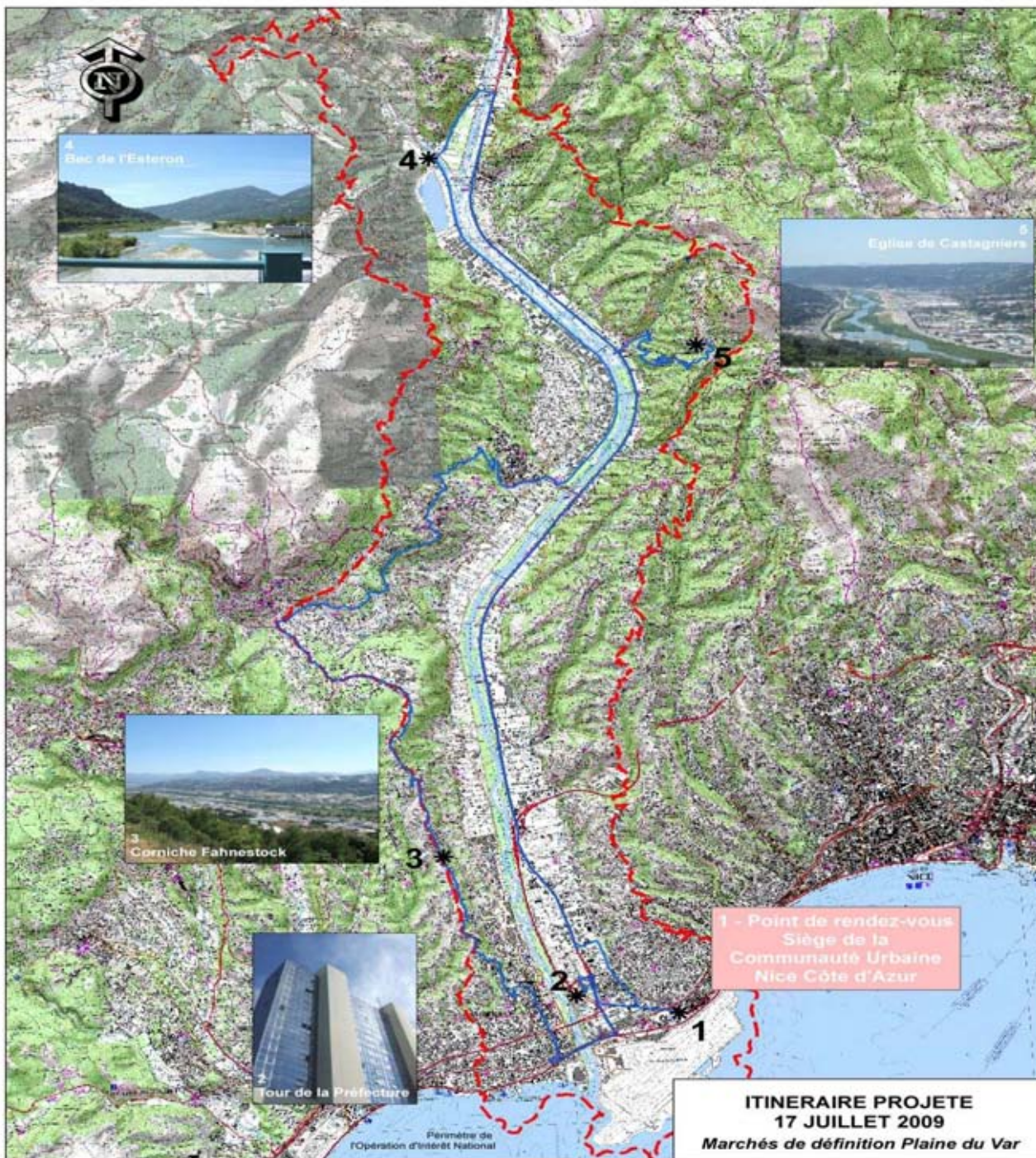


Design concept:

On-site sustainable solutions:

- Storm & surface water buffers
- Water harvesting and infiltration to upper aquifer
- On-site sewage treatment as part of parks and landscape
- Redesign of river bed,



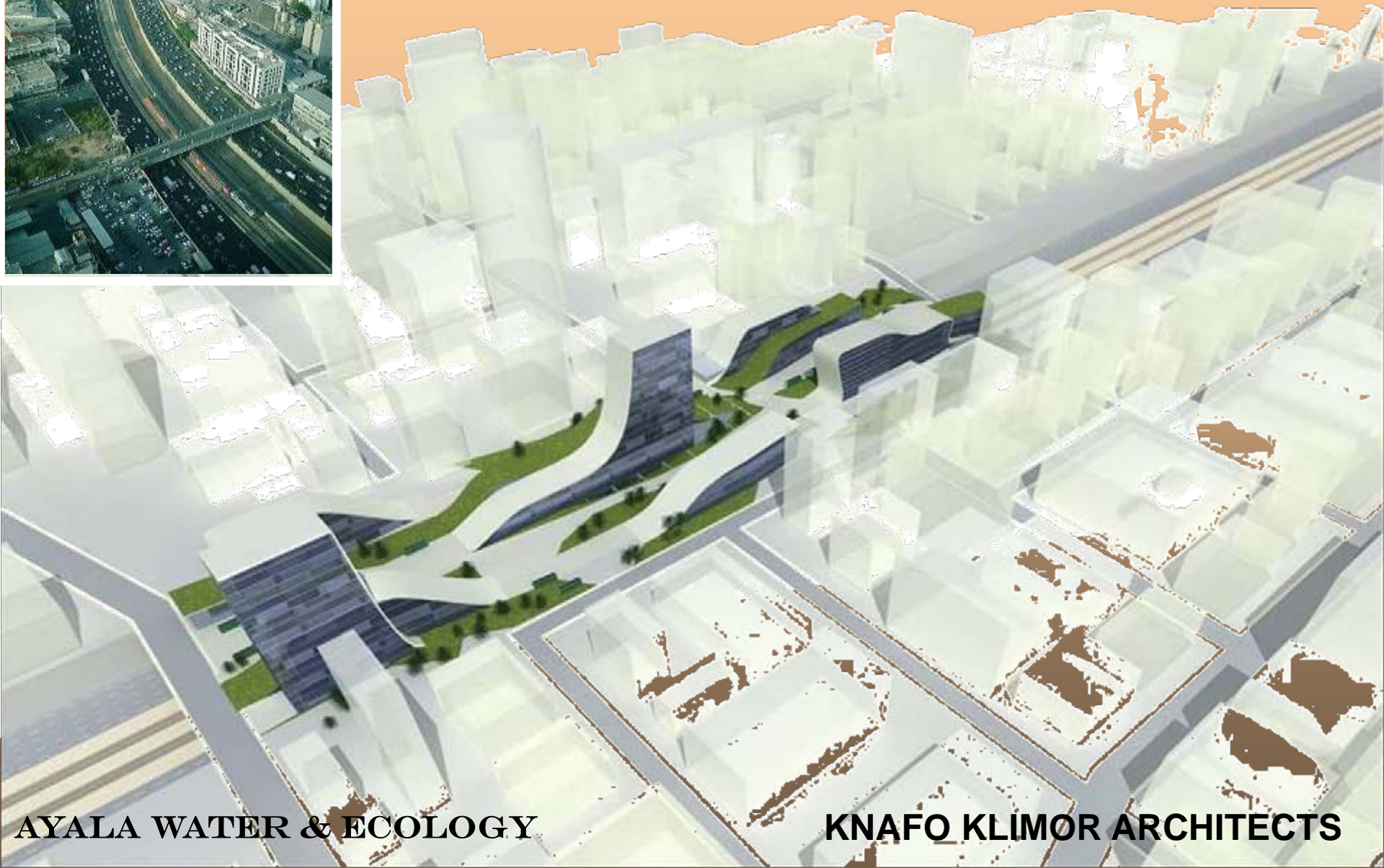






# HIGHWAY HABITAT

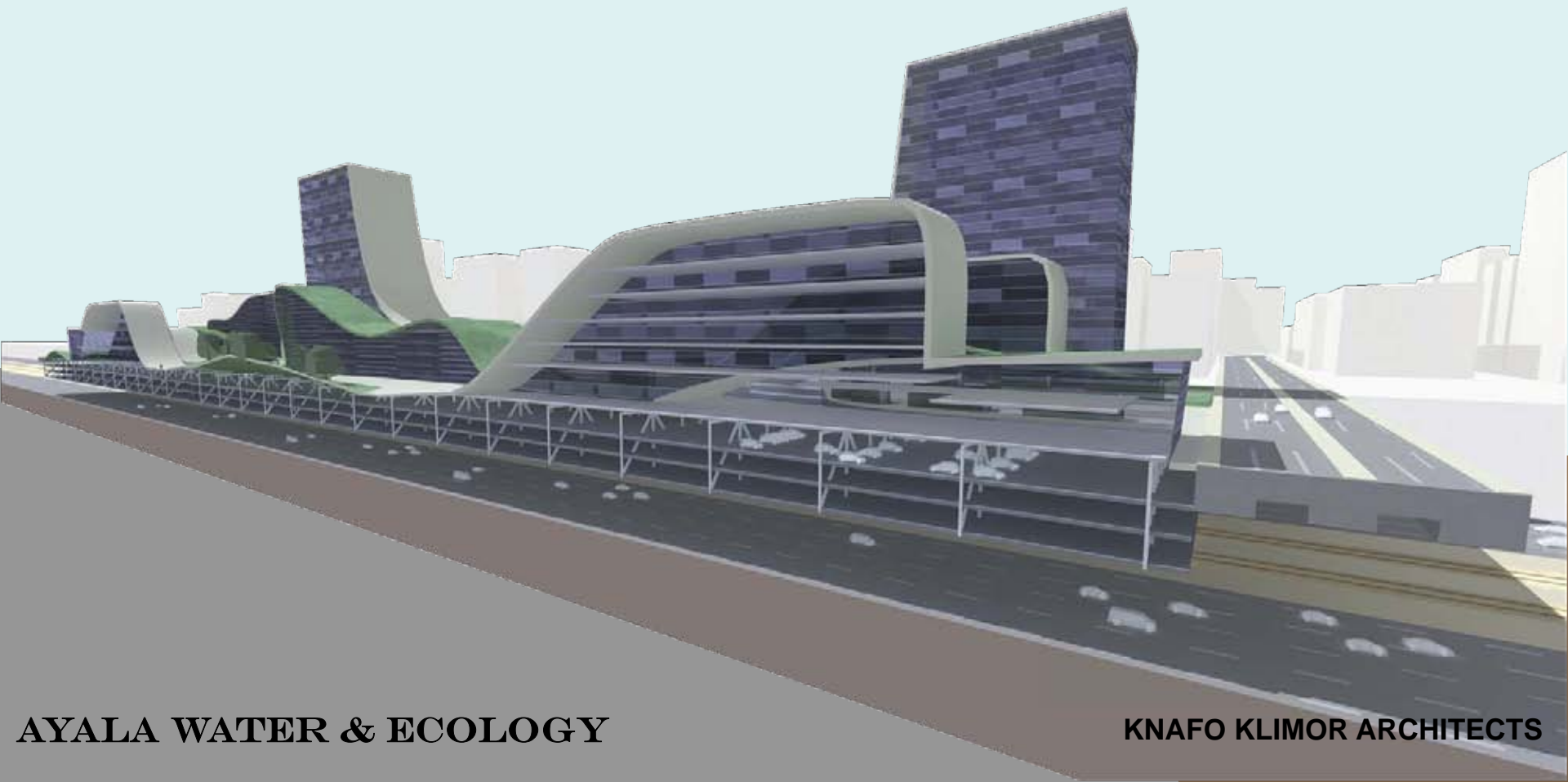
REDEFINING HIGHWAY SPACES



**AYALA WATER & ECOLOGY**

**KNAFO KLIMOR ARCHITECTS**





**AYALA WATER & ECOLOGY**

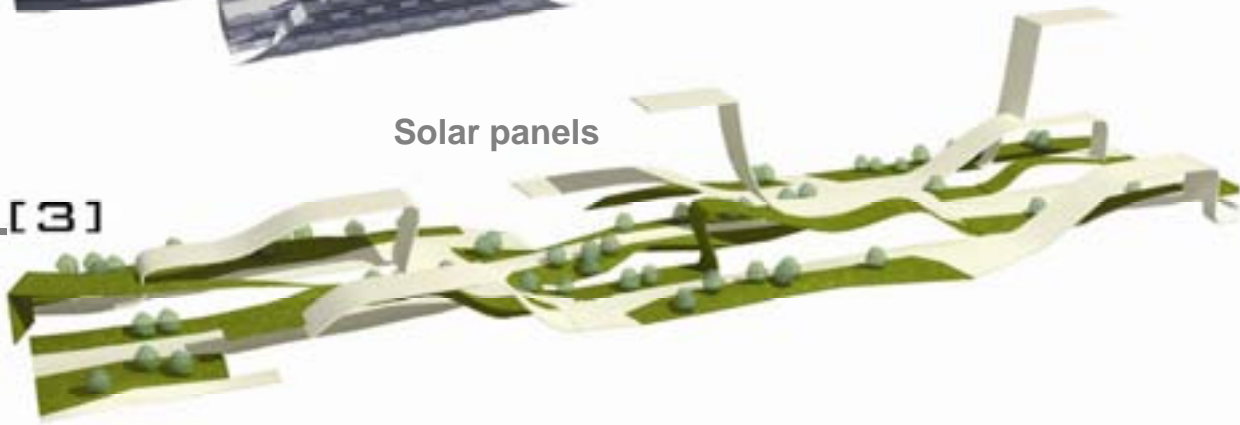
**KNAFO KLIMOR ARCHITECTS**



**Offices, Dwelling, Commercial, Public [4]**



**Urban Park [3]**



**Air Filters [2]**



**Parking [1]**



**AYALA WATER & ECOLOGY**

**KNAFO KLIMOR ARCHITECTS**

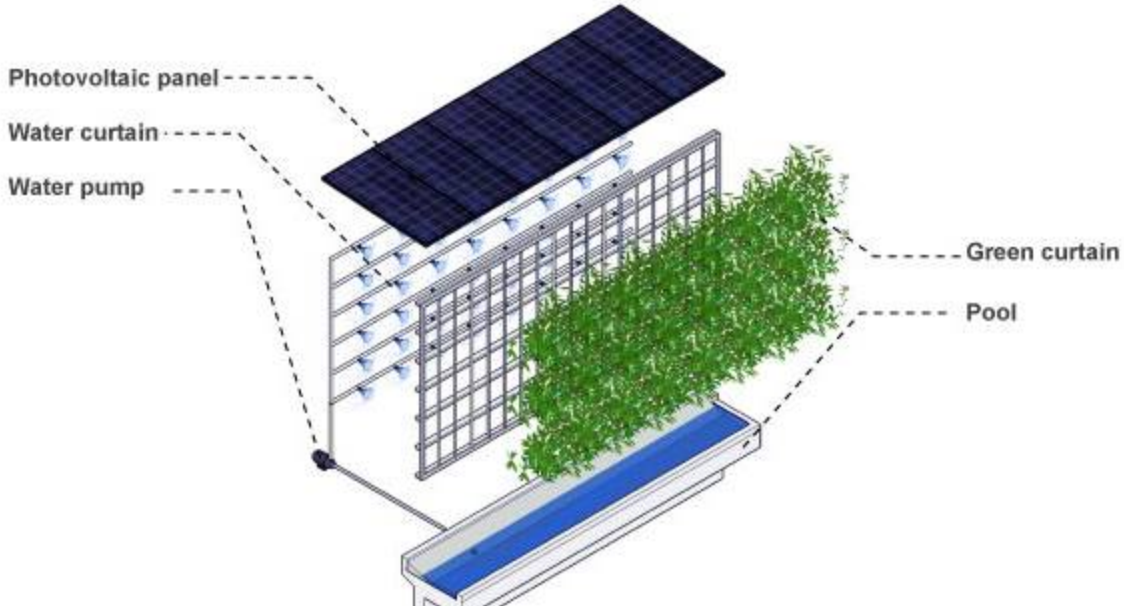
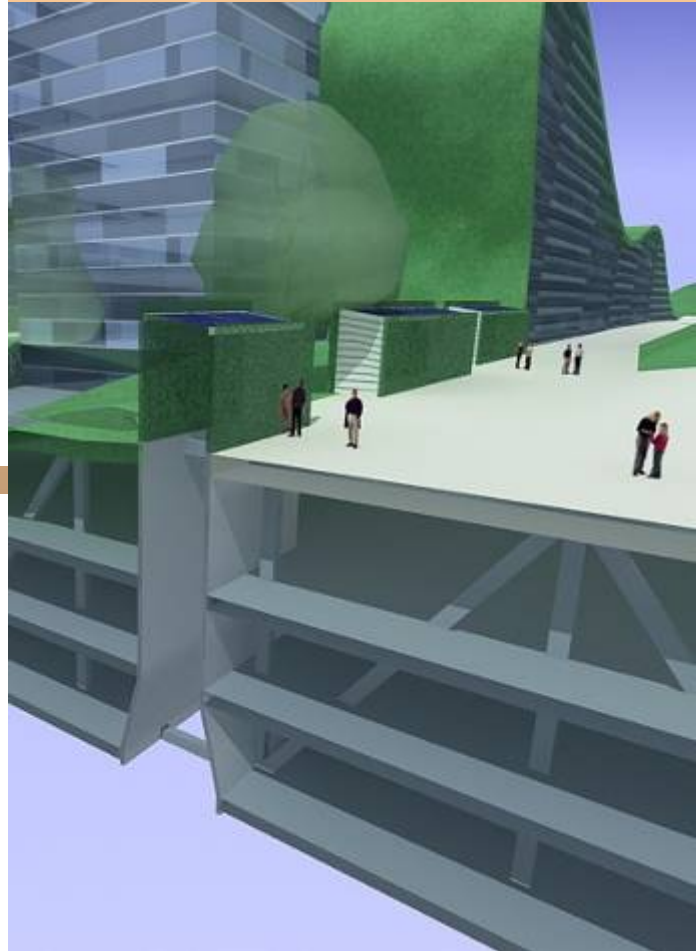
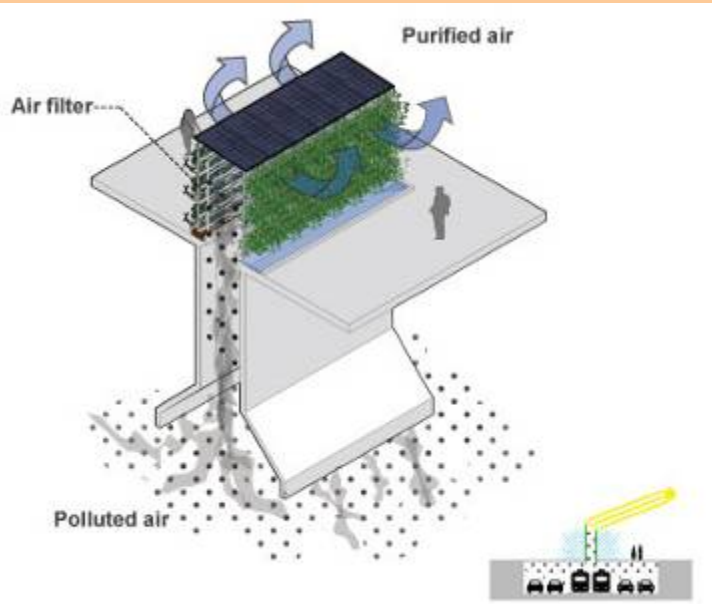
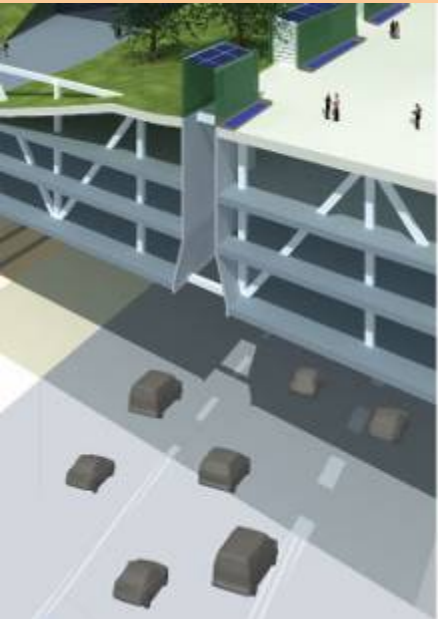
Highway





**AYALA WATER & ECOLOGY**

**KNAFO KLIMOR ARCHITECTS**





# The Company



**AYALA Water & Ecology was created from the belief that nature's laws can control and cure the environment with minimal involvement of human and advanced technologies.**

**Since 1989, we have planned, designed and constructed hundreds of self sustaining natural-ecological water bodies.**

## Questions regularly asked:

Do natural systems are feasible any where and to any pollution?

Are they economical?

Are they easily marketed and well excepted?







Sustainability –

design with nature

inevitable approach for healthier  
environment





[www.ayala-aqua.com](http://www.ayala-aqua.com)

Thank You

