ROOF WATER-FARM

Blue-green infrastructure of water-sensitive cities

Dr. Grit Bürgow

TU Berlin, Department of Urban & Regional Planning (ISR)
Chair of Urban Design & Urban Development
ROOF WATER-FARM

__1 WHAT IS IT ABOUT

__2 URBAN VISION & INTERMEDIATE RESULTS

__3 COMMUNICATION & NEXT STEPS
WHAT IS IT ABOUT?
AIMS – LEVELS – PRODUCTS

ROOF WATER-FARM is a design-concept and a flexible infrastructure for building-integrated water-reuse combined with food production. We develop and test the technology and envision the integration into the urban realm.

TECHNOLOGY

pilot plant water and farming technology
test site: Berlin-Kreuzberg/ Block 6 –
IBA project 1987 „social-ecological housing“
+ integrated water concept 2006/2007

CITY + ACTORS

design & case studies at urban micro & macro scale,
>> building-typologies & model districts in Berlin

media for communication & training
>> different target groups („makers and developers“)
APPRECH

“RWF as cross-sectoral infrastructure”

- REUSING 2 WATER SOURCES FROM THE BUILDING
  - process water from greywater (practical > RWF test-site)
  - process water from rainwater (theoretical > design studies)
- + REUSE OF NUTRIENTS AND MINERALS
  - via plant fertilizer production (NPK) from blackwater or fish water

- IRRIGATING & FERTILIZING 2 TYPES OF WATER-FARMS
  - ON THE ROOF or BUILDING-RELATED
    - aquaponics (fish + plants) // local plant fertilizer = fish water
    - hydroponics (plant) // local plant fertilizer = NPK-fertilizer from blackwater

= 4 RWF-VARIANTS // BLUE-GREEN INFRASTRUCTURE
CHALLENGE

“Rethinking the city from the single water pipe to the whole city”

__playing all scales: FROM PROCESS-TECHNOLOGY with nano-, microgram dimensions (micro pollutants) via milligrams (usual water parameter) and L/m3 (water quantities) TO THE URBAN SCALE incl. single buildings, neighbourhoods and the city

__rethinking local value chains & actors’ constellations, responsibilities, operation models

__adapting institutional framework (regulations, standards, qualities...)

__creating acceptance, attractivity & use of decentralized water and farming technologies as „new banalities“ (ReUse, ReDesign, prosuming, daily life & business)
2_____URBAN VISION & INTERMEDIATE RESULTS
URBAN FRAMEWORK + VISION

STATUS-QUO
„Linear City“
fossil-energy based & centralized urban water management and urban food supply

VISION
„Loop City / Kreislaufstadt“
regenerative & decentralized water and food cycles
(e.g. World Future Council & HCU: 2010)

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INTERMEDIATE RESULTS__technology

spring 2014 startup of greenhouse test module 1: aquaponics (fish – tench and catfish, strawberries, seasonal salads, ...)

since spring 2014: measurements –
process water house/greywater treatment and test-greenhouse

MEASUREMENTS KEY QUALITY PARAMETER

Which RWF-key parameter are obligatory for treatment of process water from greywater and blackwater? (cooperation Prof. Dott / BMBF-RISKWA project)

>> hygienic parameter
>> heavy metals
>> organic trace substances/micro pollutants
>> anionic surfactants
>> ecotoxicity
INTERMEDIATE RESULTS__technology

1. RWF-season 2014:

MEASUREMENT RESULTS GREYWATER + PRODUCTS AQUAPONICS

__How safe is the reuse of process/service water (from greywater) as irrigation source for fish and plants?

>> safe! (e.g. better than EU-Bathing Water Directive = = below several potencies with power of 10)

__How safe are the products from aquaponics (fish, plants)?

>> analysis of pollutants harmless

MEASUREMENT RESULTS BLACKWATER AT LAB SCALE

>> Variant 1: mechanical-chemical: hygienization via membrane filtration proven

>> Variant 2: mechanical-biological: tests started
INTERMEDIATE RESULTS__technology

COSTS-BENEFITS?

__Cost estimation for greywater:
  >> 2. pipe system: ca. 500 €/apartment
  >> systems engineering: ca. 500 €/P
  >> process water price: < 3 €/m³

LIFE CYCLE ASSESSMENT RWF-SYSTEM

__finalization Water-Footprint, Carbon-Footprint,
  primary energy expenditure (life cycle) for greywater treatment
__definition and collection of data of RWF-reference greenhouse
  in process...
GIS working model RWF-Berlin:
- model areas (inner city, border area – large housing estate; transformation area)
- theoretical flat-roof potential
- wastewater flows according to building typologies/ uses
- type of canalisation
- preliminary nutrient flows of the RWF-variants

Source:
Umweltatlas Berlin, Geoportal Berlin, Senatsverwaltung für Stadtentwicklung und Umwelt
INTERMEDIATE RESULTS __city //
building + operation model

First findings:

__1. prototype building study „RESIDENTIAL“ shows technical
transferability of the RWF-concept due to the modularity &
variability of the technology

__Selection and characterisation of RWF-building-typologies and
optional operation models as transferable prototypes
INTERMEDIATE RESULTS __ city // neighborhood

First findings:

___ Neighborhood as important interface between technology and urban realm → Test-/Learning field
___ Actors’ interviews & „What if?-Approach“ >> RWF-networks, actors constellations +++

Figure: RWF model area „border area“/neighbourhood Marzahn-Hellersdorf © ROOF WATER-FARM, Graphics: Tim Nebert, TUB-ISR

INIS – Verbundprojekt ROOF WATER-FARM
COMMUNICATION
PARTICIPATIVE LEARNING
OUTLOOK
COMMUNICATION WEB: roofwaterfarm.com

__Produkte
__Wasser
__Infrastruktur
__Menschen
__Stadt

__broad target group, campaign design
__process documentation, information
__networking
__to evolve as online tool for users & makers, (creative citizens & developers...)
PARTICIPATIVE FORMATS: LEARNING BY DOING

__experts (planning, design, architecture) 
__makers („creative citizens and developers“) 
__children, students, „future users“
OUTLOOK

__INTERACTING RESOURCE CYCLES AND INFRASTRUCTURE SYSTEMS

# further linkages between water resource cycles + food production + ??? (e.g. energy)

# discovering spatial impact of multifunctional infrastructures - can be seen, felt, lived....

# playing with scales and perceptions (at the surface, beneath..)

# need of tools and formats of participation & education enabling to foster acceptance
OUTLOOK

__COURAGE OF LEARNING-BY-DOING & LEARNING-FROM-MISTAKES

# new operation models and urban communication formats are to be tested

>> challenge of the living urban context

>> need of real-life labs/„Reallabore“ for the future city/“Zukunftsfriedhof“ as part of research + education
IMPRESSIONS FROM THE RWF-PILOT IN KREUZBERG

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NACHHALTIGE WASSERNUTZUNG
Badespaß bei der Fische- und Erdbeeren frisch vom Dach


Der Tagesschau.de Artikel

"Roof Water Farming" in Berlin

Obst- und Fisch von Kreuzbergs Dächern

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THANK YOU °°<)))>< °
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FRESH WATER, FRESH FISH ....
“UP FROM THE ROOF...
....DOWN TO THE RIVER“!

Feel free to contact:

Dr. Grit Bürgow
g.buergow@isr.tu-berlin.de
t. +49 (0)30 314 28 093

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