The biodiversity of Green roofs : From research to action –

Switzerland

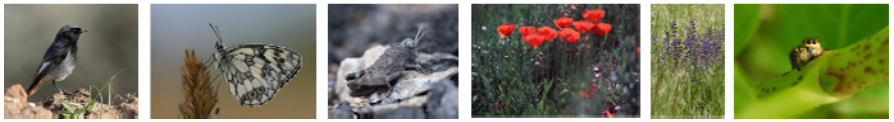
Zürcher Hochschule
für Angewandte Wissenschaften

zh aw

Life Sciences und
Facility Management

IUNR Institut für Umwelt und
Natürliche Ressourcen

Dr. Stephan Brenneisen
Zürcher Hochschule für Angewandte Wissenschaften ZHAW
Forschungsgruppe Stadtökologie



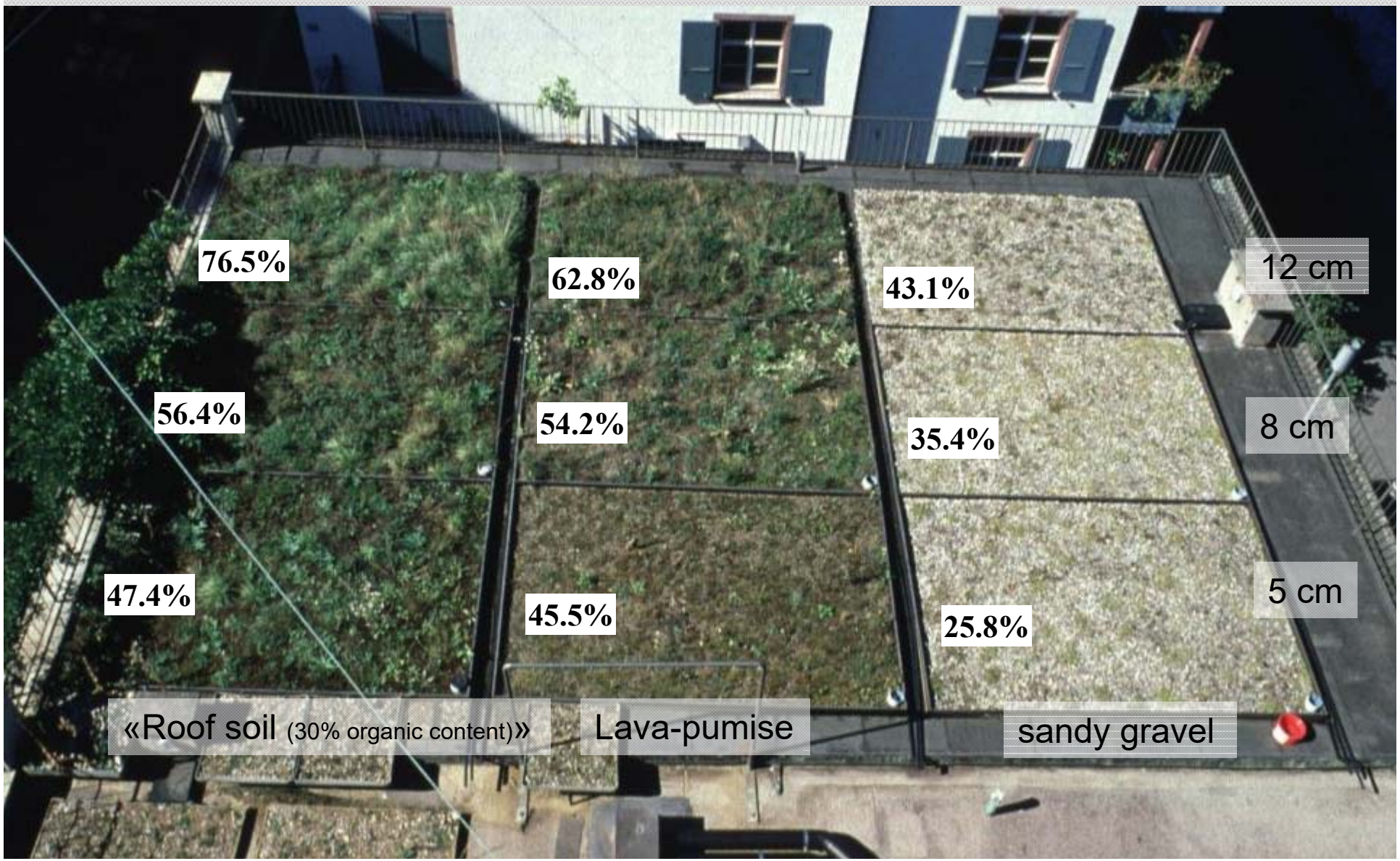
Amphitheater of the roof of the Grande Arche, **Paris**

Friday March 16, 2018

Content of the presentation

- **Research 1 & 2 in Basel and Switzerland**
- **Action 1: Campaigning green roofs**
- **Action 2: Planning green roofs & norms**
  - Urban ecological approach
  - Green roofs for biodiversity

Research 1:
1st Test site 1995-2000: Stormwater management



Research 1:
Lessons learned

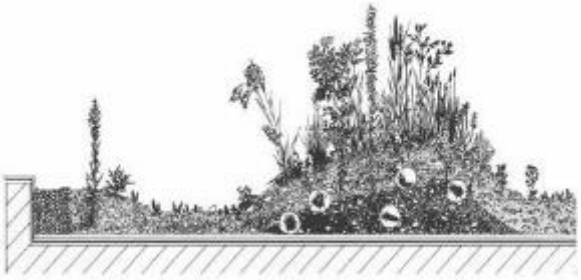
The more water the substrate can store, the more biomass you will get on the roof:

Your habitat will be determined by the substrate type and thickness

Source: ZHAW

Research 1:

16 primary test sites, Basel: large scale



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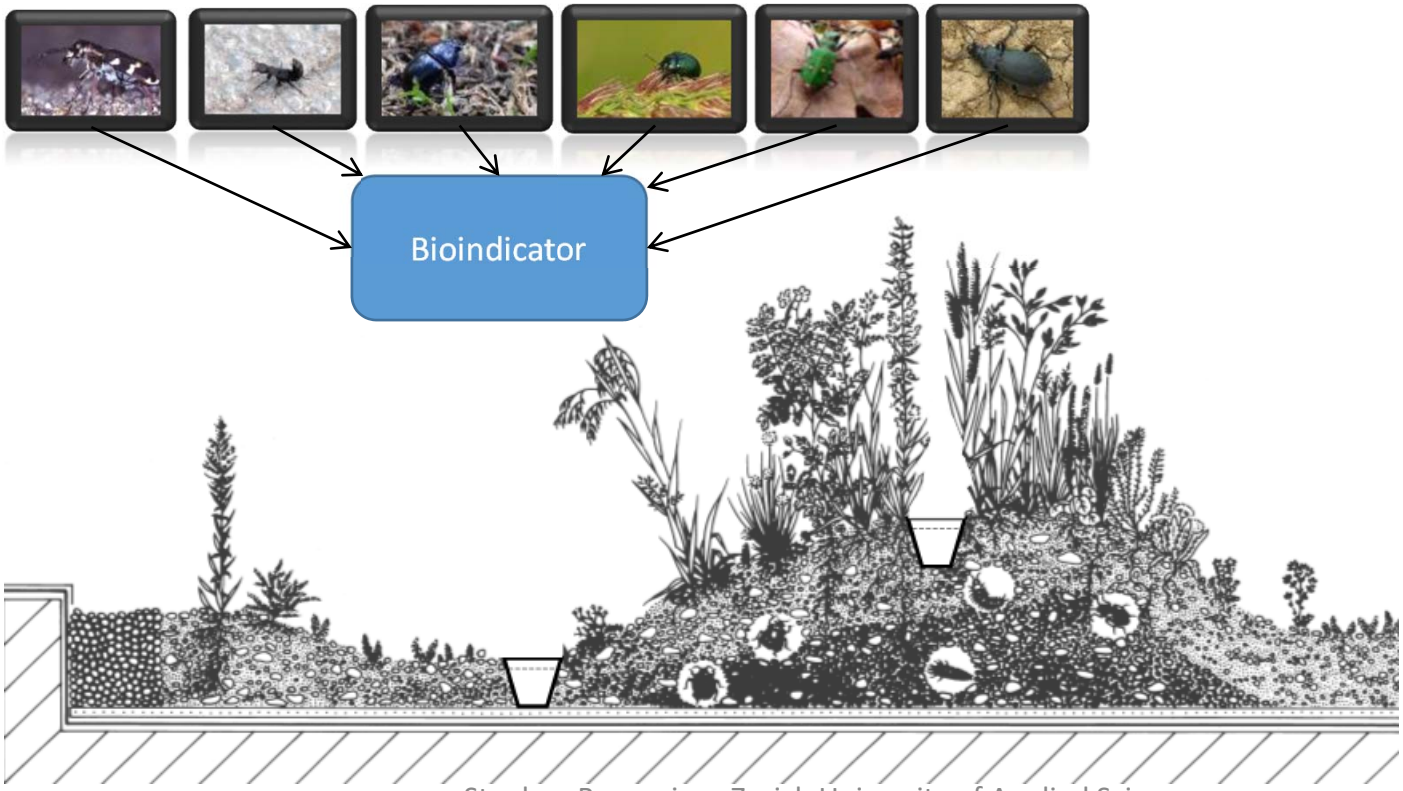
Institute of Natural Resources Sciences

Dr. Stephan Brenneisen
Zurich University of Applied Sciences

Bioindication – pitfall trapping of beetles



Stephan Brenneisen Zurich University of Applied Sciences

Research 1: Technopark

Anthicidae (Blumenkäfer)

Anthicus antherinus

Carabidae (Laufkäfer)

Amara aene

Bembidion femoratu

Bembidion quadrimaculatum

Lionychus quadrillum

Poecilus cupreu

Pseudoophono-nus griseus

Chrysomelidae (Blattkäfer)

Aphthona nonstriata

Chaetocnema hortensis

Longitarsus luridus

Curculionidae (Rüsselkäfer)

Hydrophilidae (Wasserfreunde)

Helophorus nubilus

Lathridiidae (Moderkäfer)

Cortinicara gibbosa

Staphylinidae (Kurzflügel-Käfer)

Aleochara bilineata

Aleochara intricata

Aloconota gregaria

Gabrius breviventer

Paederus fuscipes

Philonthus umbratilis

Scopaeus laevigatus

Scopaeus sulcicollis

Tachyporus chrysomelinus

Tachyporus hypnorum

Tachyporus nitidulus

The beetle fauna of green roofs correlates highly with the soil and vegetation conditions

Research 1: Wollishofen 3

Apionidae (Spitzmausrüssler)


Cyanapion spencii


Ischnopter a-pion virens


Protapion fulvipes


Protapion trifolii


Squamapion atomarium


Squamapion

Carabidae (Laufkäfer)


Amara lunicollis


Clivina fossor


Dyschirius


Panagaeus


Poecilus


Pseudooph o-nus


Pterostichus ovoideus

Chrysomelidae (Blattkäfer)


Chaetocnema hortensis


Chrysolina haemopter


Cryptocep halus

Coccinellidae (Marienkäfer)


Galeruca pomona e


Longitarsu s luridus


Longitarsus pratensis


Longitarsus rubiginosus


Phyllotreta tetrastigma


Coccinella sep-tempunctata


Scymnu s frontalis


Scymnu s suturalis


Tytthaspis sede-cimpunctata

Curculionidae (Rüsselkäfer)


Brachyper a zoilus


Hypera miles


Otiorhynchu s pinastri


Otiorhynchu s porcatus


Rhinocyllu s conicus


Rhinoncu s castor


Sciaphilus asperatus


Trichosirocalu s troglodytes

Dryopidae (Hakenkäfer)


Dryops ernesti

Elateridae (Schnellkäfer)


Agriote s lineatus

Hydrophilidae (Wasserfreunde)


Cercyon convexiusculus

Melyridae (Weichhaarkäfer)


Dolichosoma lineare

Nitidulidae (Glanzkäfer)


Epuraea mel-anocephala


Meligeth es aeneus


Meligeth es carinulatu s

Phalacridae (Glattkäfer)

Olibrus corticalis

Pselaphidae (Palpenkäfer)

Scarabaeidae (Blatthornkäfer)

Aphodius erraticus

Onthophagu s ovatus

Staphylinidae (Kurzflügel-Käfer)

Amisch a analis

Amischa nigrofusc a

Carpelimus corticinus

Carpelimus gracilis

Falagria sulcatul a

Ocypus aen-eocephalus

Ocyp us olens

Philonthus carbonari us

Platydracu s stercorari us

Research 1: Migros

Anthicidae (Blumenkäfer)

Anthicus antherinus

Carabidae (Laufkäfer)

Amara aene

Bembidion femoratu

Bembidion quadrimaculatum

Lathridiidae (Moderkäfer)

Cortinicara gibbosa

Staphylinidae (Kurzflügel-Käfer)

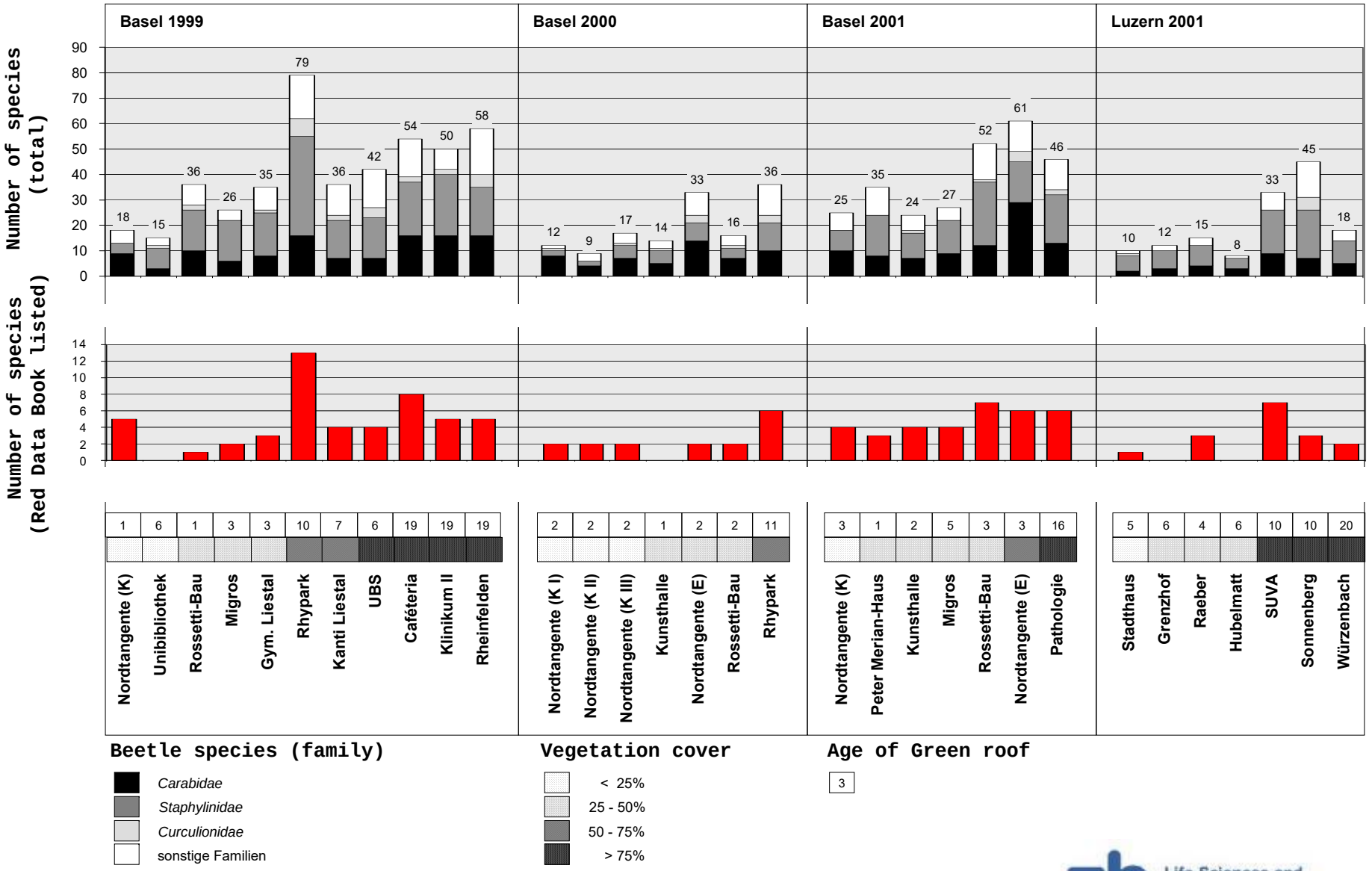
Aleochara bilineata

Scopaeus sulcicollis

Tachyporus chrysomelinus

The beetle fauna of green roofs correlates highly with the soil and vegetation conditions

Number of Beetle species on the investigated Green roos in Basel and Lucerne (Source: BRENNEISEN 2003)



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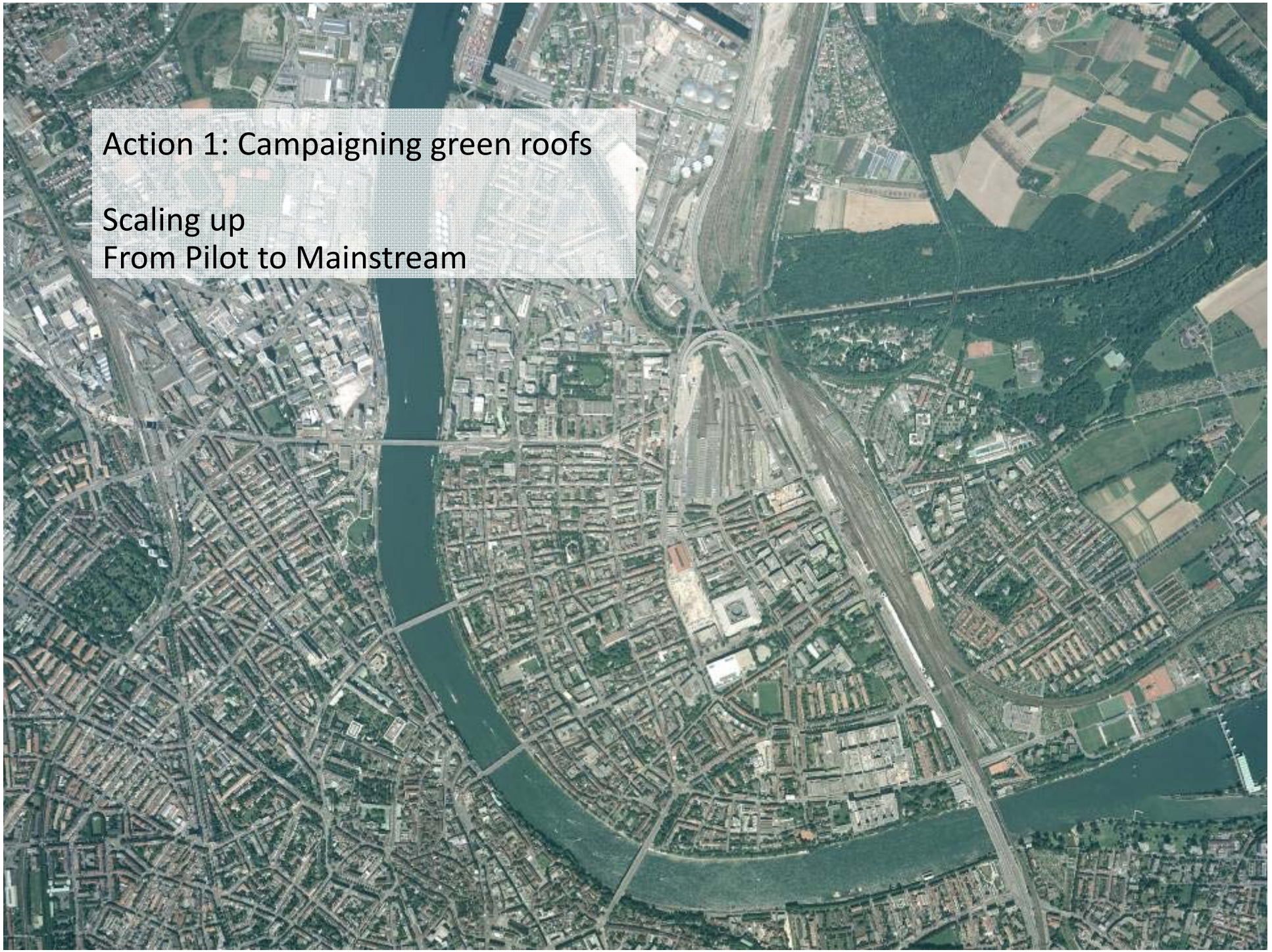
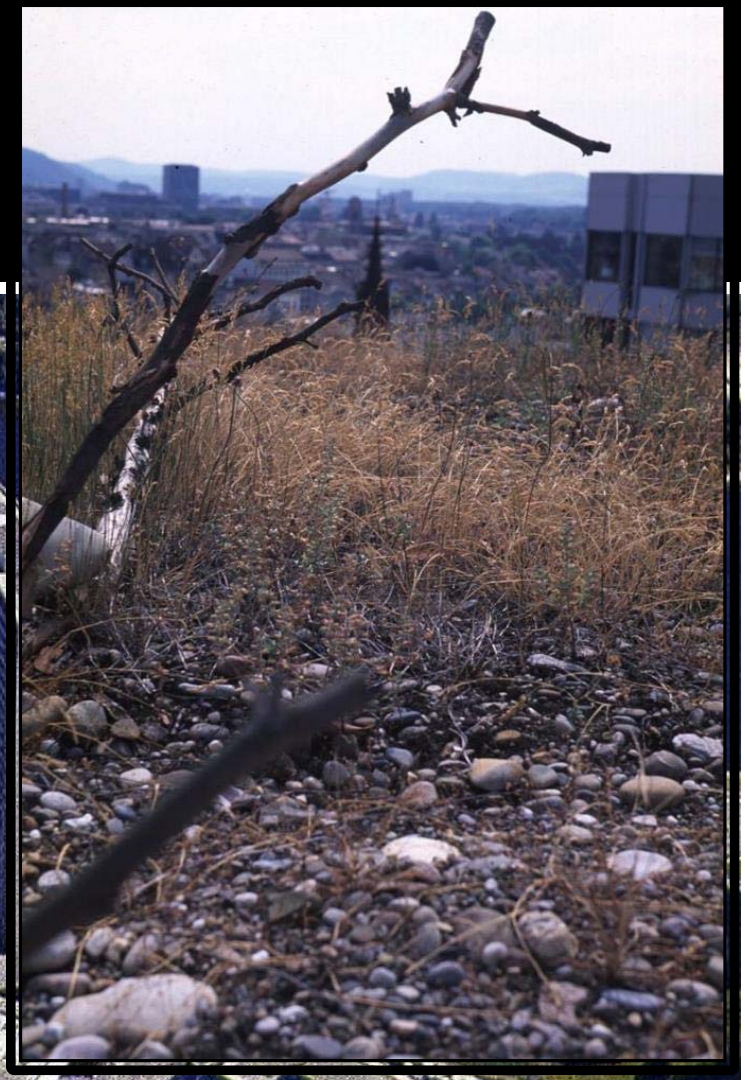

Action 1: Campaigning green roofs
Scaling up
From Pilot to Mainstream

Research 1:
Planning wildlife refuges on roofs



Source: Theodore H. Osmundson

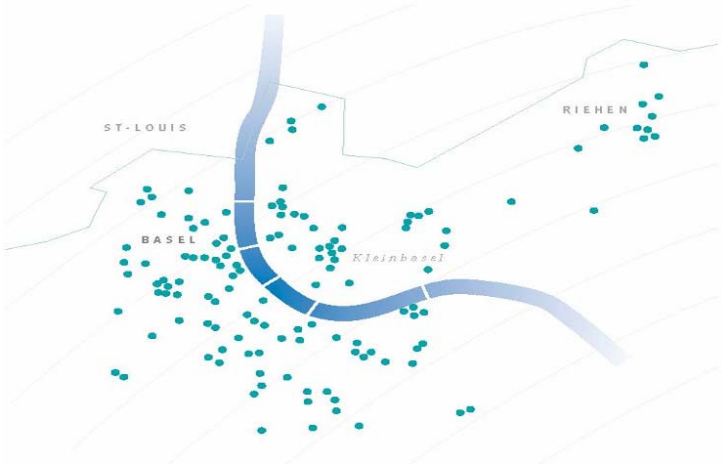
Action 1: Campaigning green roofs

How to make it happen?

Campaigns

Legistlations

Processes



Basel: 1st Green roof campaign 1996-98

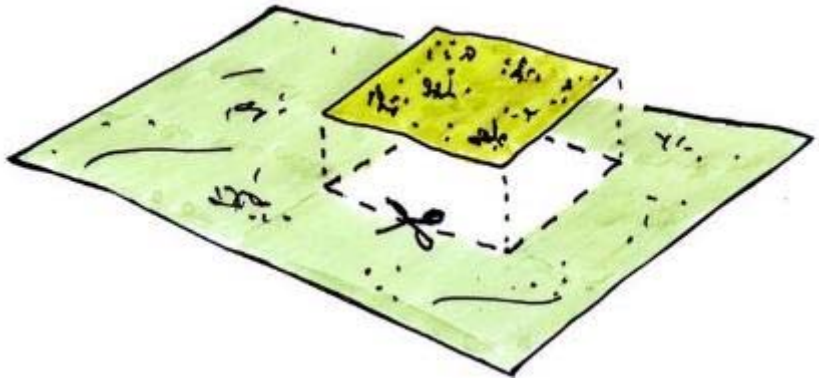
Action 1: Campaigning green roofs

Action 1: Campaigning green roofs – From Pilot to Mainstream

MOST CITIES IN SWITZERLAND IMPLEMENT GREEN ROOFS AS MANDATORY IN THE BUILDING CODE

- Basel
- Zurich
- St. Gallen
- Lucerne
- Winterthur
- Berne
- etc

NEW APPROACH OF LANDSCAPE TRANSFORMATION – HABITAT TRANSFER



Research 2: Seewasserwerk Moos, Wollishofen

Wollishofen, Zurich

A «World Wonder» of ecological construction, built 1914

An Orchid meadow with a high nature conservation value:

10 orchid species (> 30'000 individuals)

- and many other rare plants from the former meadows of the region could survive the last century on the roofs, while most of them got extinct in the surrounding areas

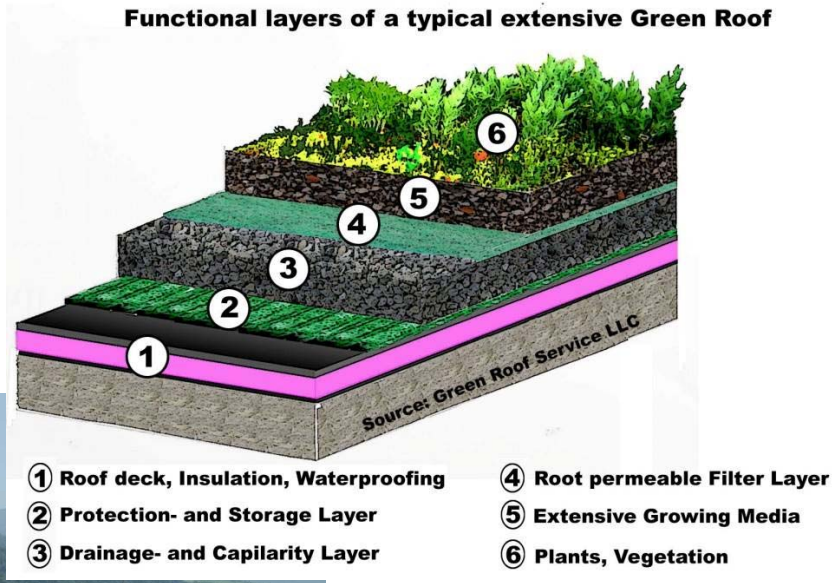
Kantonsspital
St. Gallen

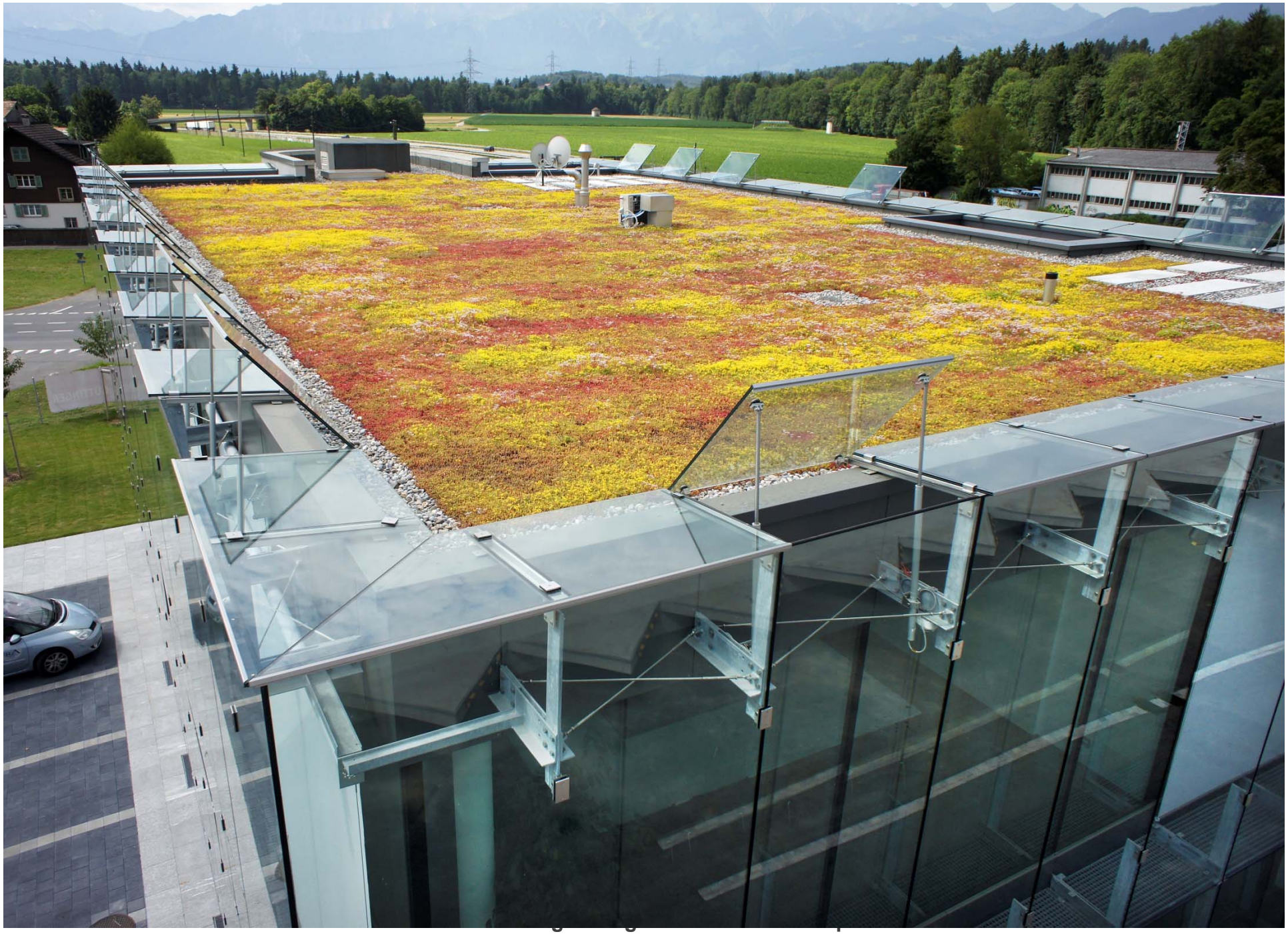
Research 2:
Gardening?

Ecosystem services?

Research unit Urban Ecology

Green roofs high and low tec





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Planung von Dachbegrünungen: Projekte

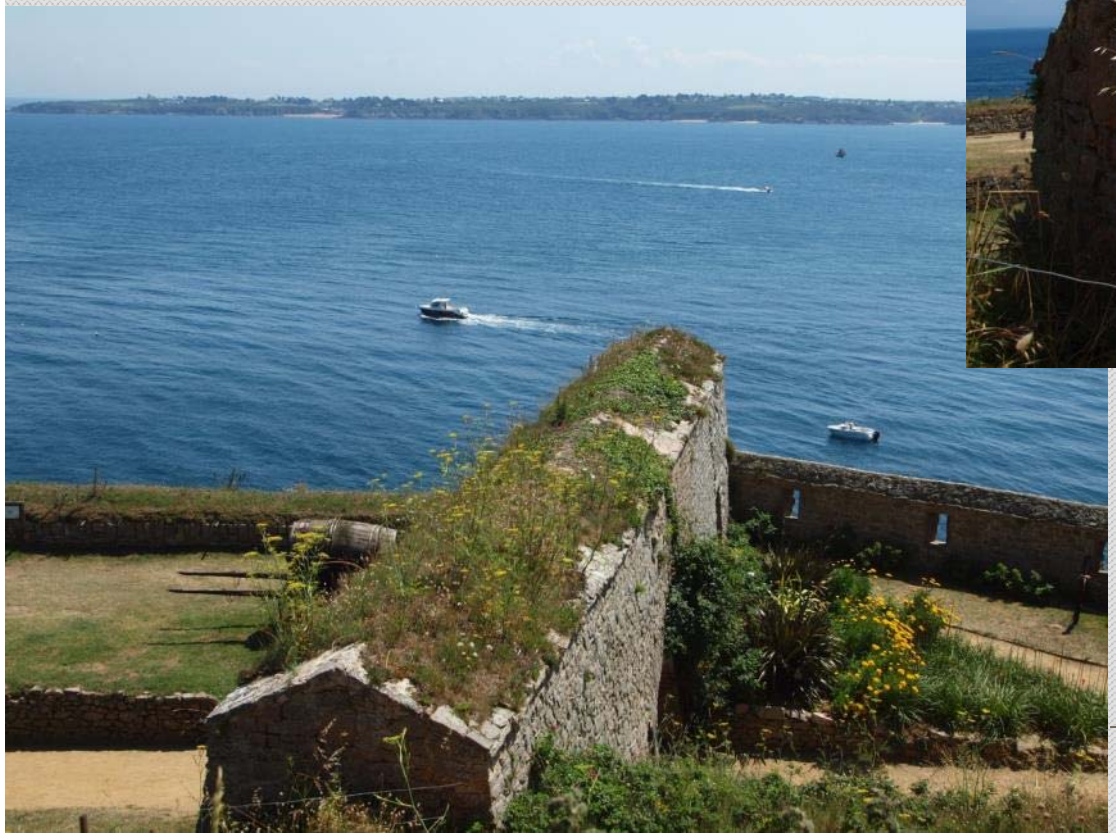
Forschungsgruppe Stadtökologie

Planung von Dachbegrünungen: Projekte


Dachbegrünung Stücki-Einkauf
Sandiger
(ohne grosse St
den (Erde)

In nature many varying factors are under ground – on green roofs you have to creat the variation differently…

Bretagne

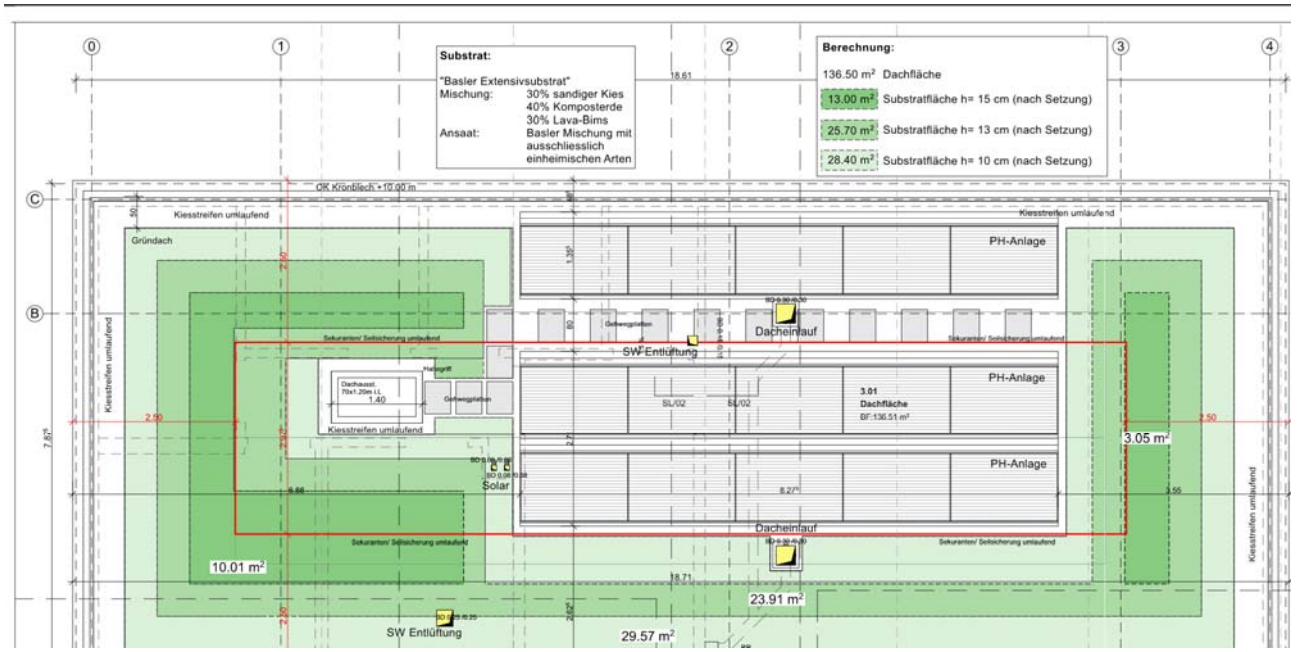


Action 2: Implementation, second step

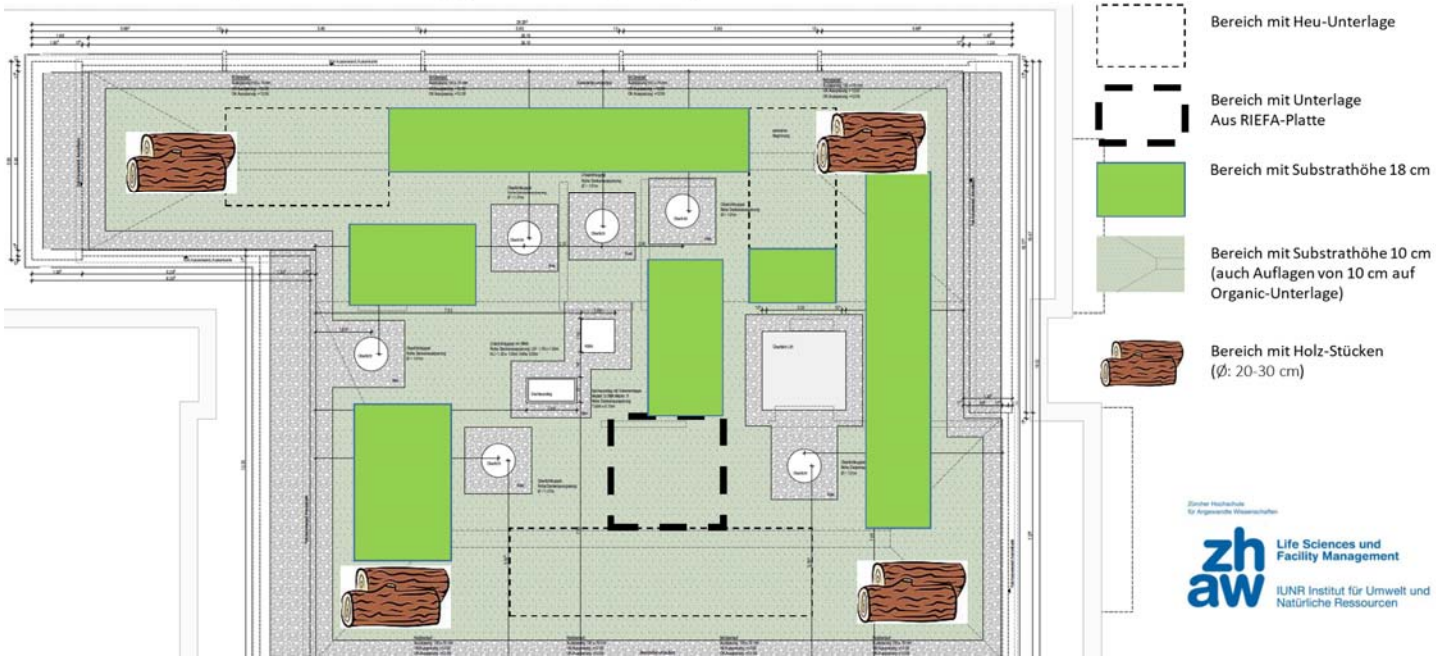
Habitat guideline for green roofs of Basel, Switzerland

Based on the eco-faunistical studies (and according to the federal law: NHG, natural and cultural heritage requirements) the habitat guideline for green roofs could be established:

- Three different substrate thickness (9, 12, 15 cm). Average of 12 cm
- Locale based substrate compositions
- only native plants



Missionsstrasse 36, Basel: Einrichtungsplan Dachbegrünung



Bereich mit Heu-Unterlage

Bereich mit Unterlage
Aus RIEFA-Platte

Bereich mit Substrathöhe 18 cm

Bereich mit Substrathöhe 10 cm
(auch Auflagen von 10 cm auf
Organic-Unterlage)

Bereich mit Holz-Stücken
(Ø: 20-30 cm)

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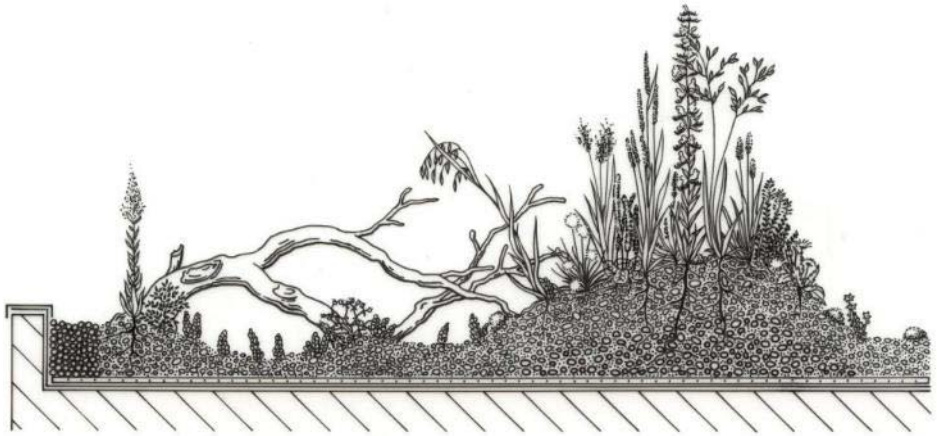


Konzept: Stephan Brenneisen, Gestaltung Sybille Erni

+ use of different materials

Action 2:
Planning green roofs & norms

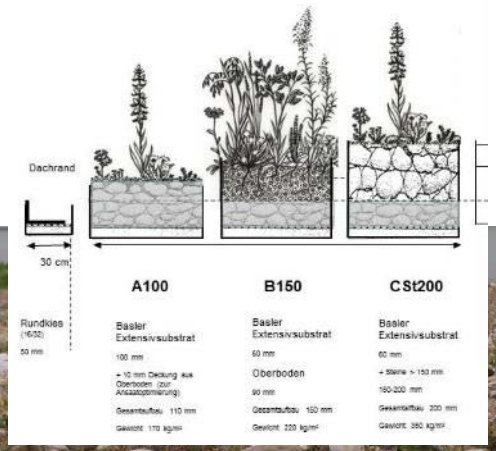
Barcelona (competition)

Quelle: Daniel Tigges Architekten

Action 2: Planning green roofs & norms
Rheinresidenz Basel




Projekt RIVA Basel



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Planung von Dachbegrünungen: Projekte

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Planung von Dachbegrünungen: Projekte

Norm SIA 312 Begrünung von Dächern

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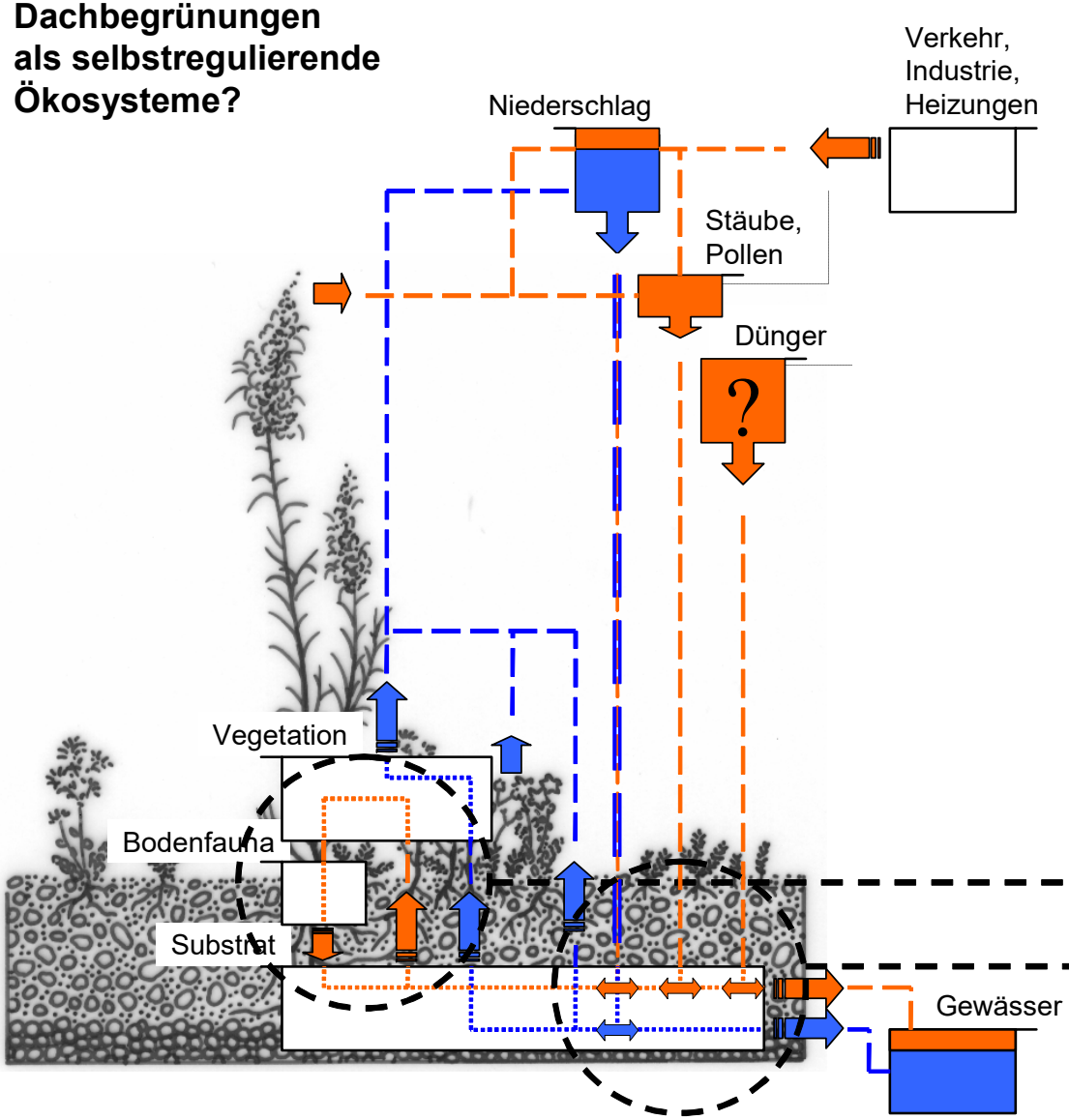
Substratprinzip: Eigenschaften

Dachbegrünungen als selbstregulierende Ökosysteme?



Externe Einflussgrössen

- Aus externen, anthropogenen Quellen (Verkehr etc.) werden Nähr-und Schadstoffe auf die Dachbegrünung eingetragen.
- Düngerzugaben können ein zu schnelles Wachstum auslösen und dadurch kontraproduktiv sein

Substrat als wichtigster Faktor

- Geeignete Substrate ermöglichen Dachbegrünungen, die selbstregulierende Ökosysteme darstellen, wesentlich sind dabei:
  - **Korngrössenzusammensetzung**
  - **pH-Wert**
  - **Einrichtungsart**

Anzustrebende Ziele

- Geschlossener Kreislauf Vegetation-Bodenfauna-Substrat
- Minimierung des Stoffaustrages/ Nähr- und Schadstoffbindung

conclusion

- **We need research to get data and information needed**
- **We need actions, campaignes to get green roofs from Pilot to Mainstream**
- **We need mandatory building codes, norms (and controls!) to support green roofs, urban ecosystems, biodiversity – with a critical eye on the definition "how a green roof must look like and/or serve for the ecosystem"**

Research 3:
long term study

Apionidae (Spitzmausrüssler)

Cyanapion spencii | Ischnopter a-pion virens | Protapion fulvipes | Protapion trifolii | Squamapion atomarium | Squamapion

Carabidae (Laufkäfer)

Amara lunicollis | Clivina fossor | Dyschirius | Panagaeus | Poecilus

Coccinellidae (Marienkäfer)

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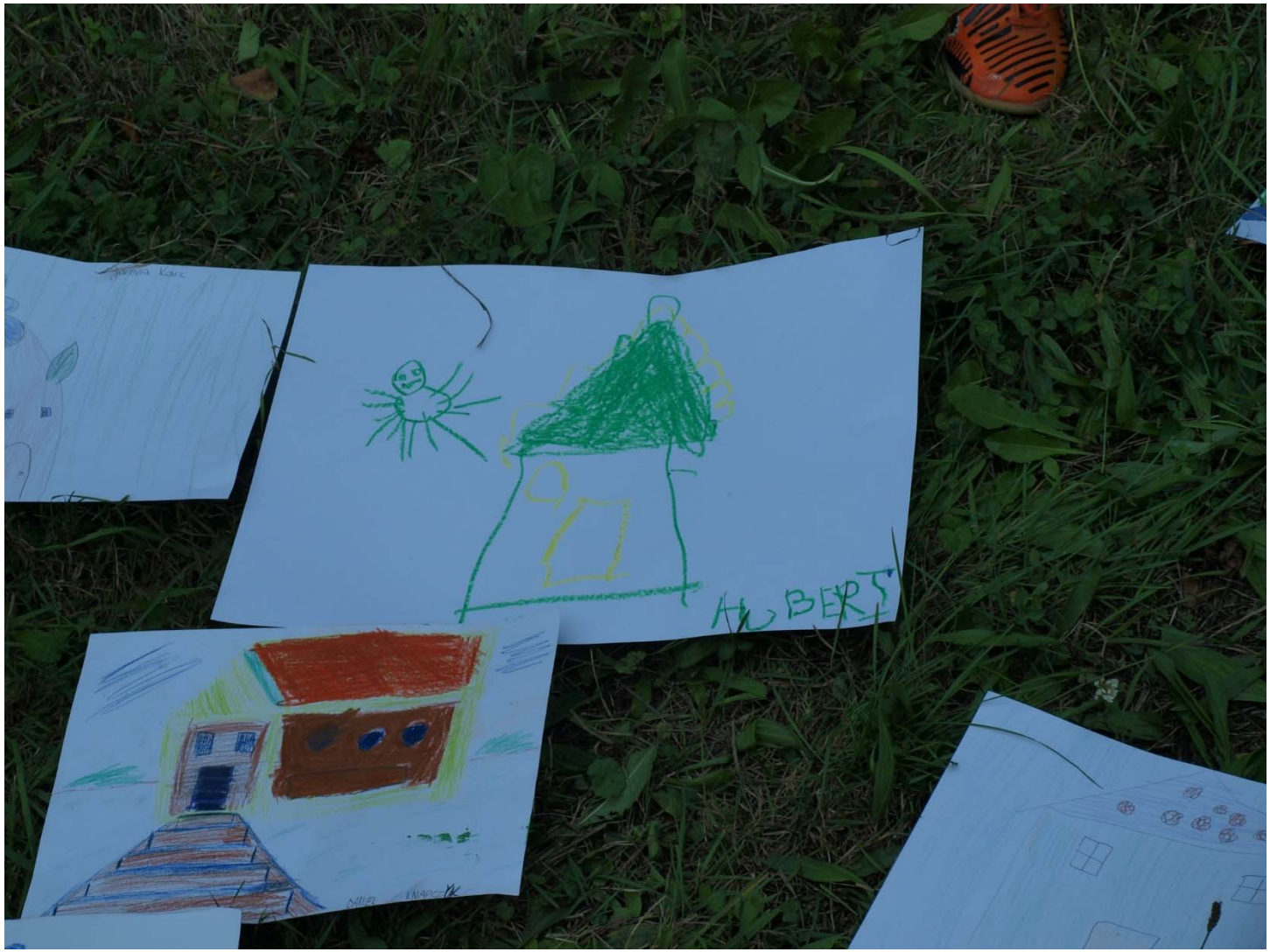
Staphylinidae (Kurzflügel-Käfer)

Amisch a analis | Amischa nigrofusc a | Carpelimus corticinus | Carpelimus gracilis | Falagria sulcatul a | Ocypus aen-eocephalus | Ocyp us olens | Philonthus carbonari us | Platydracu s stercorari us

«ongoing communication, education….»


Z AZBESTOCEM


ALBERT


ZIELONY
DACH ”