



Water and Green Roofs in Dry Climates

A Speculation

Christian Werthmann

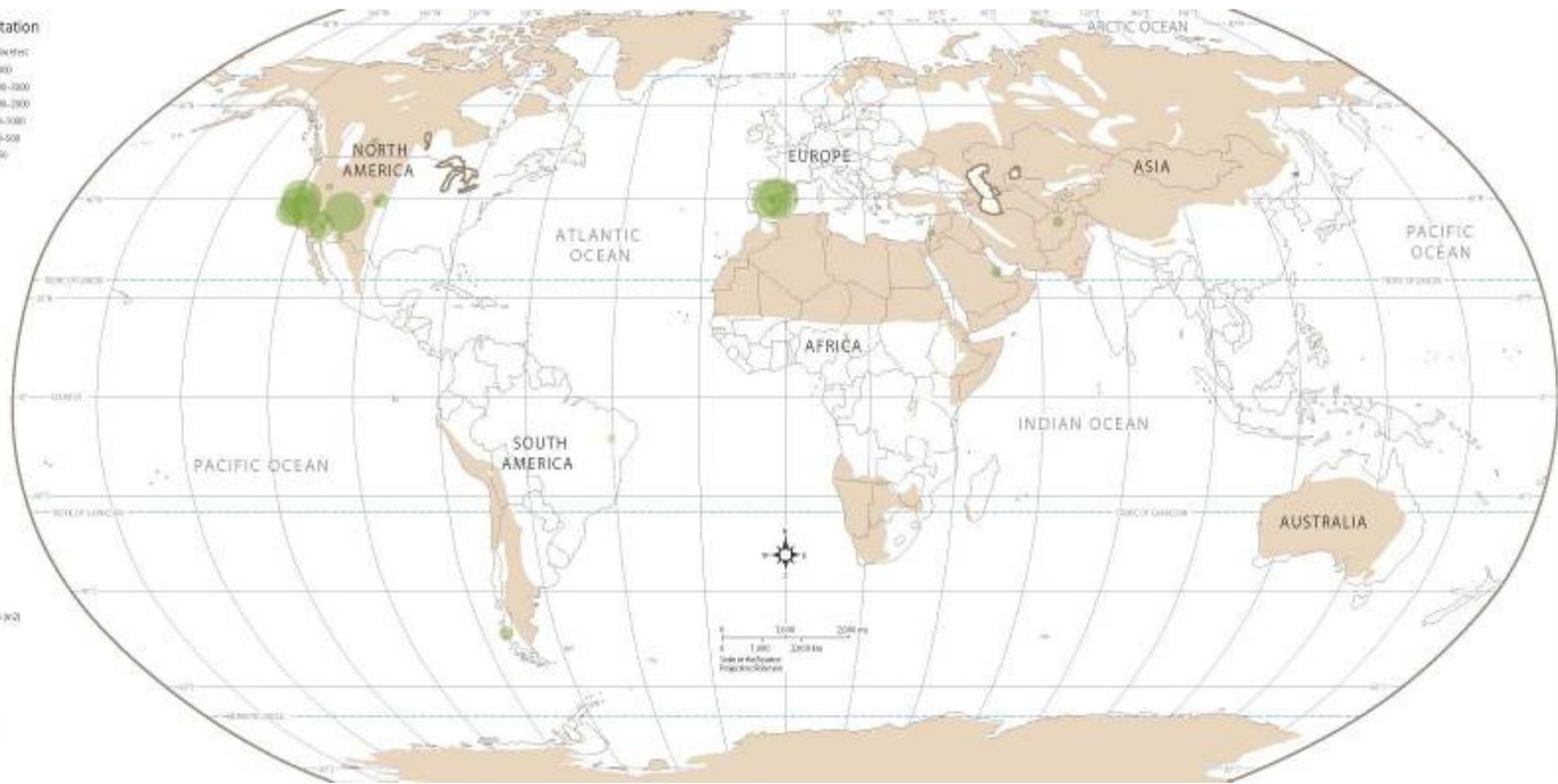
Associate Professor, Program Director
in Landscape Architecture
Graduate School of Design
Harvard University

Photo: Michele A. Shelor

World Precipitation

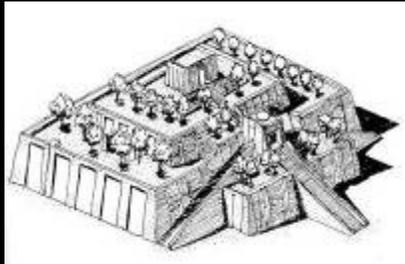


Green Roof Projects by Size (sq)



Roof Gardens

2100 B.C.



79 A.D.



1934



2005



Green Roofs

undated



undated



1922



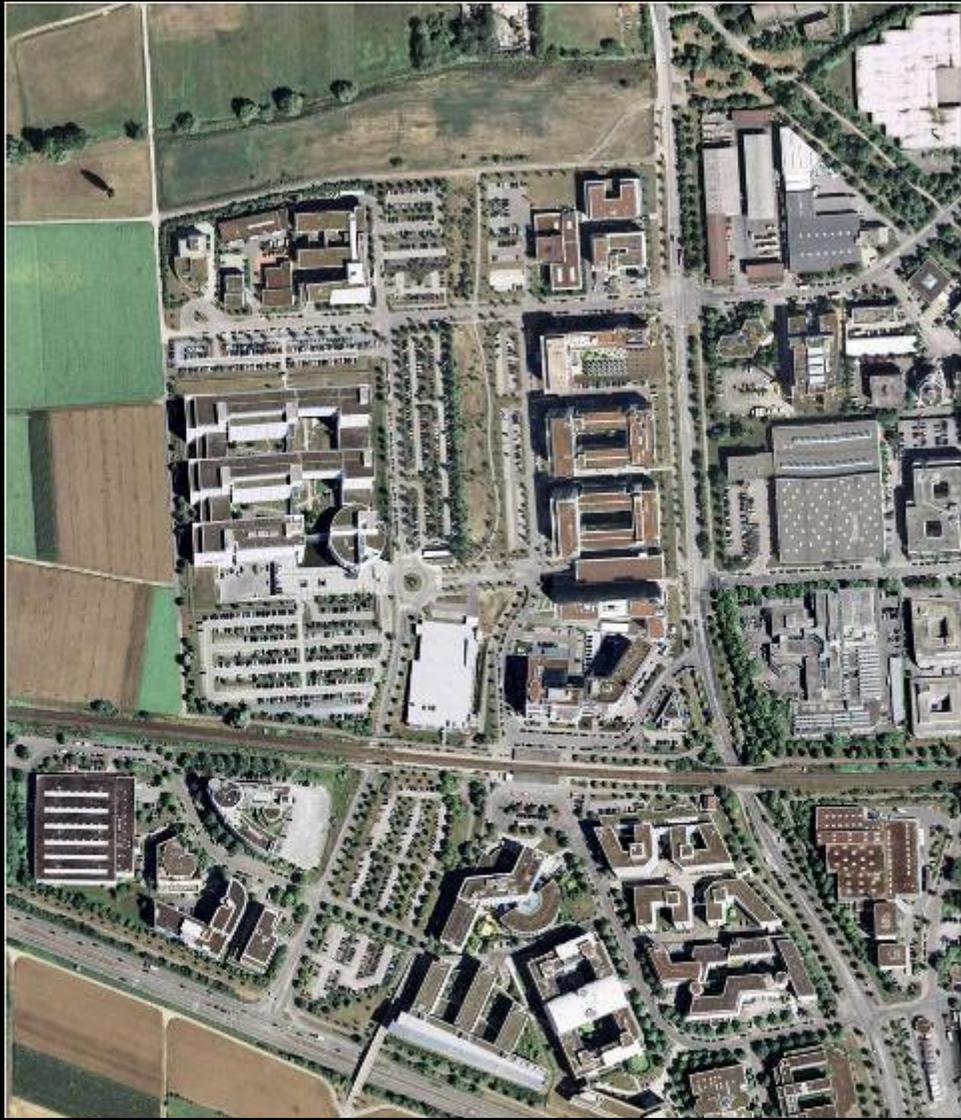
2005





15 cm

Moos Water Treatment Plant, Zuerich, 1914



7% of all new roofs in Germany are green.





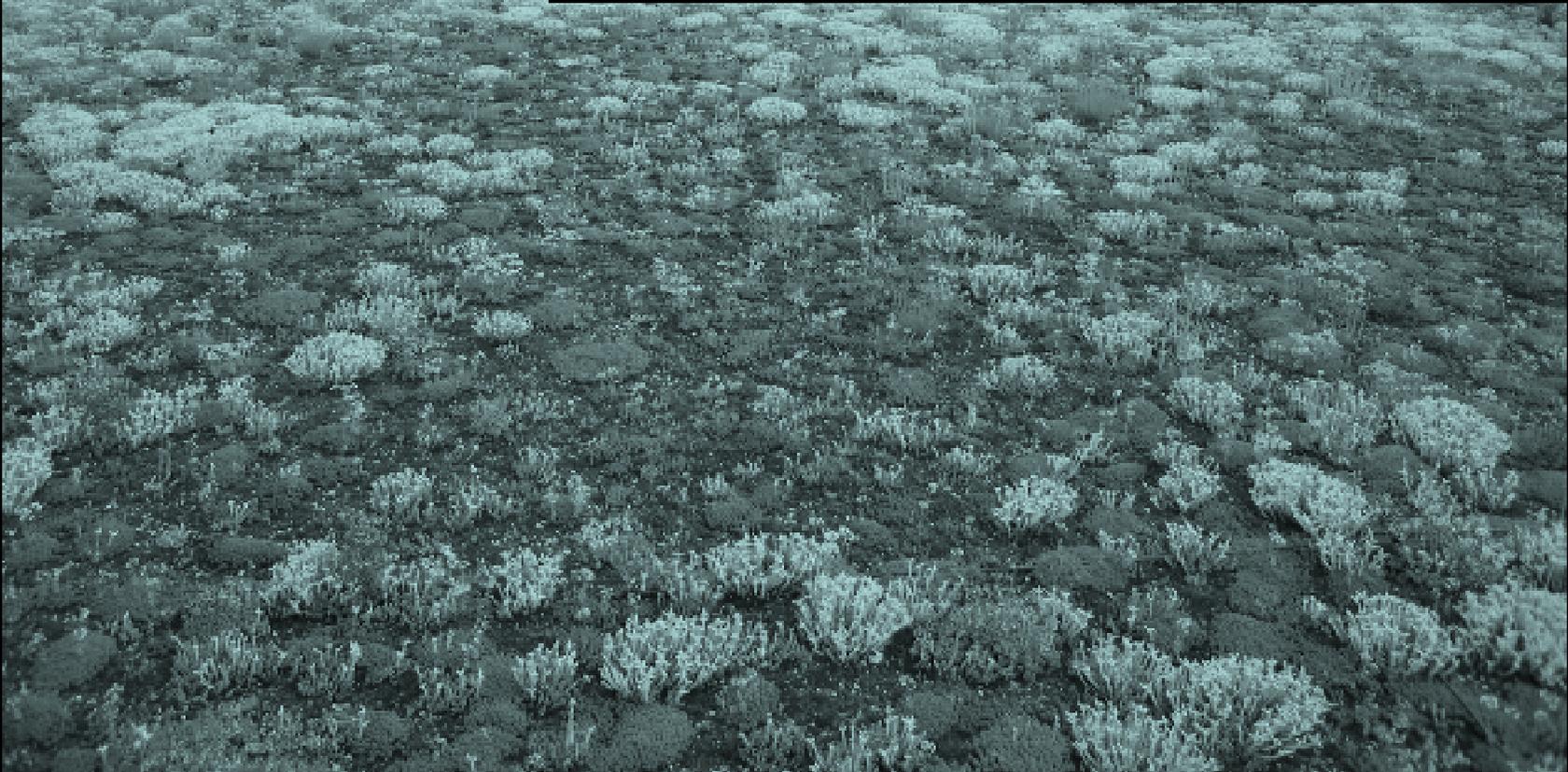
13 km²/year of green roofs are built in Germany = **4x Central Park**



Sedum



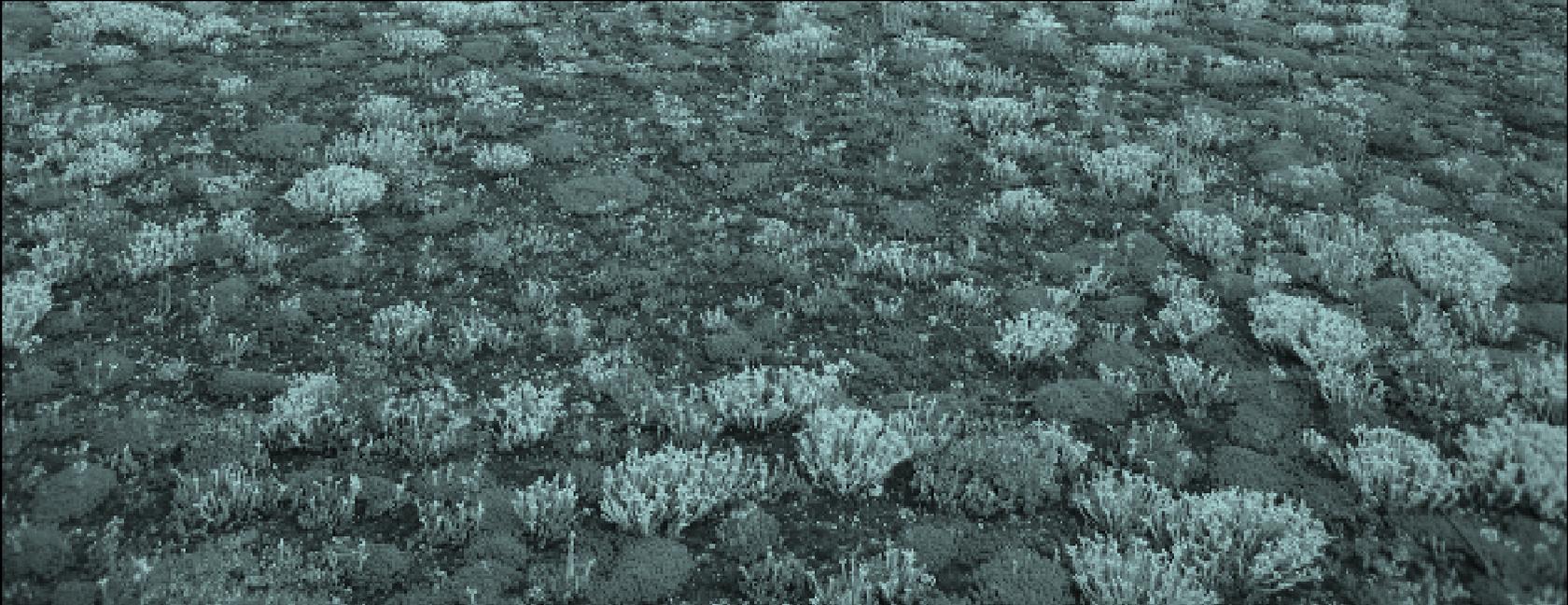
Fixation of Dust and Smog





Fixation of Dust and Smog

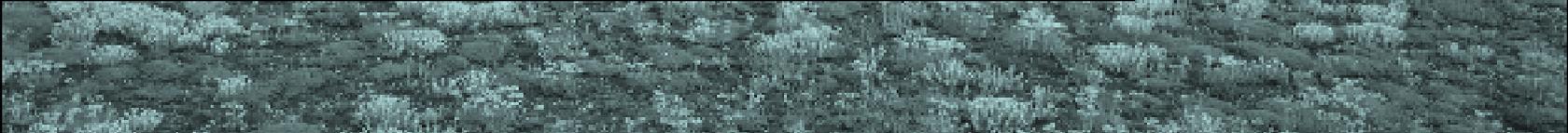
City Cooling



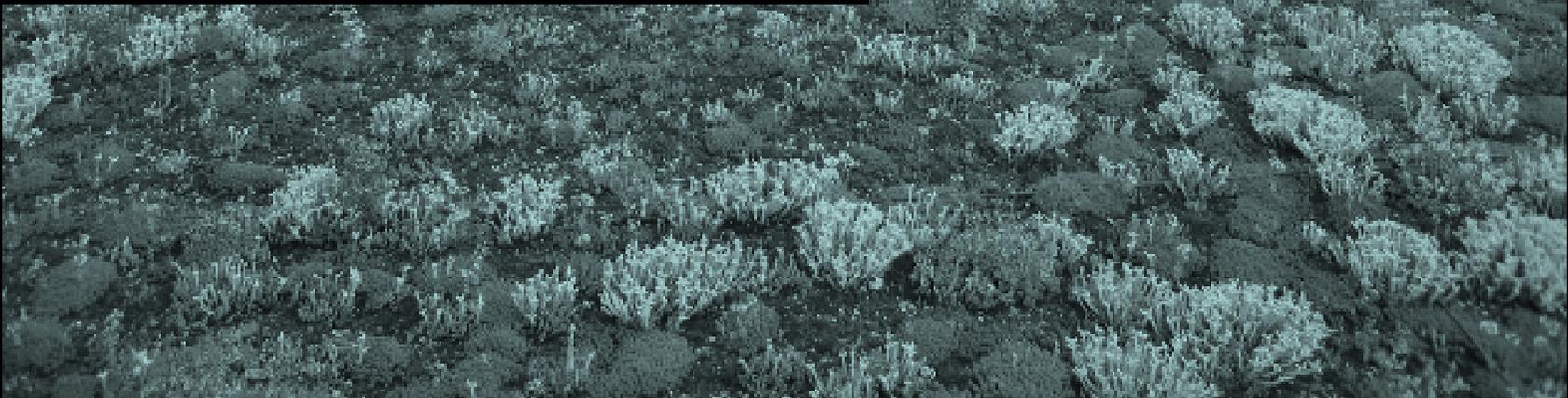


Fixation of Dust and Smog

City Cooling



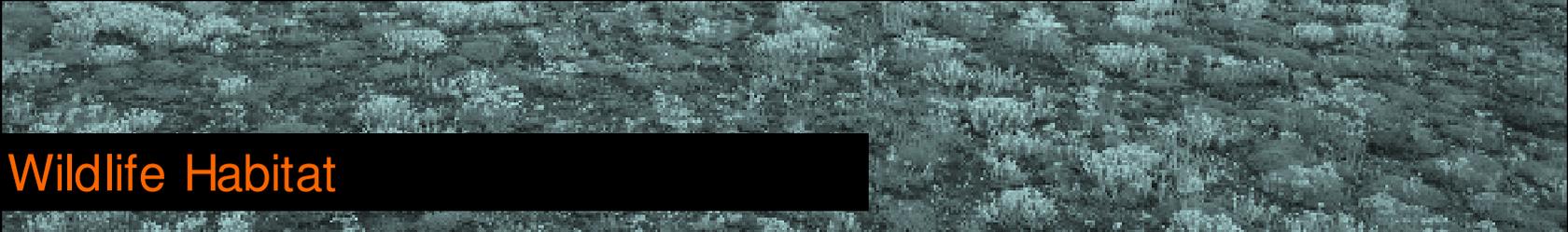
Wildlife Habitat





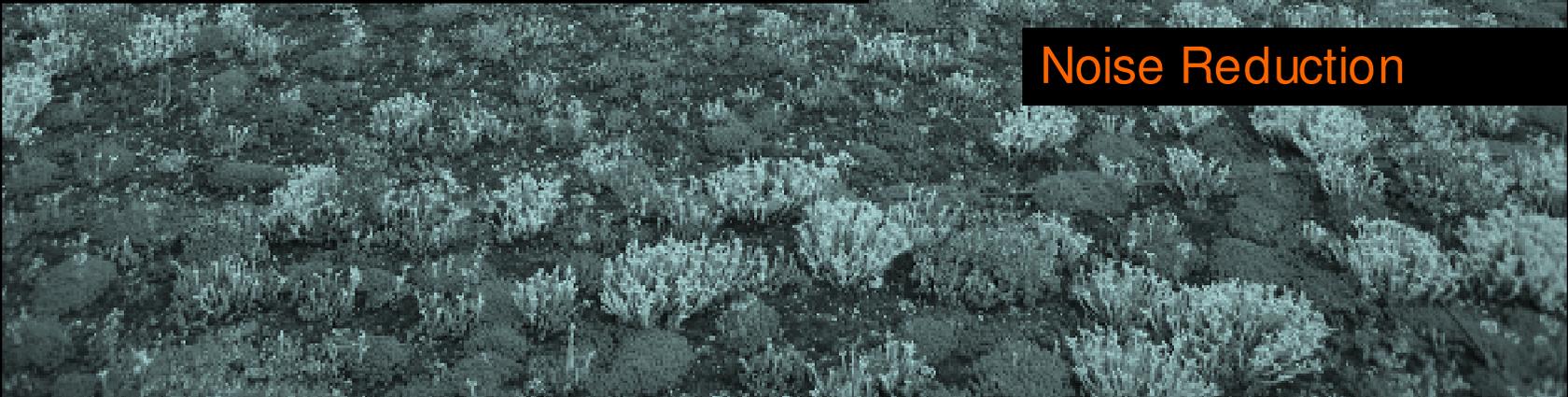
Fixation of Dust and Smog

City Cooling



Wildlife Habitat

Noise Reduction





Fixation of Dust and Smog

City Cooling

Wildlife Habitat

Noise Reduction

Extended Roof Life



Versuchsanlage Veitshoechheim

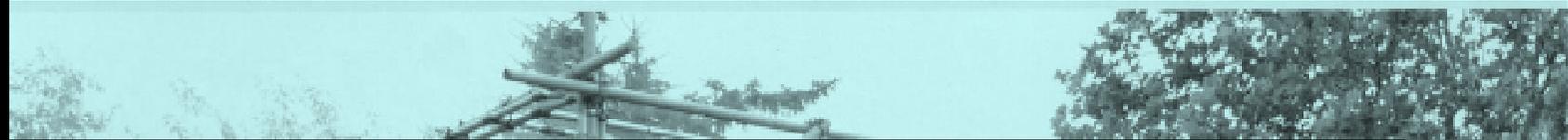
Stormwater Retention



A photograph of a wooden building with a green roof, surrounded by scaffolding, illustrating stormwater retention. The building has a gabled roof and is situated in a wooded area. The scaffolding is made of metal poles and is set up around the building, likely for construction or maintenance work. The green roof is covered with various plants and vegetation. The overall scene is in black and white.

Stormwater Retention

Reduction of Combined Sewer Overflows



Stormwater Retention

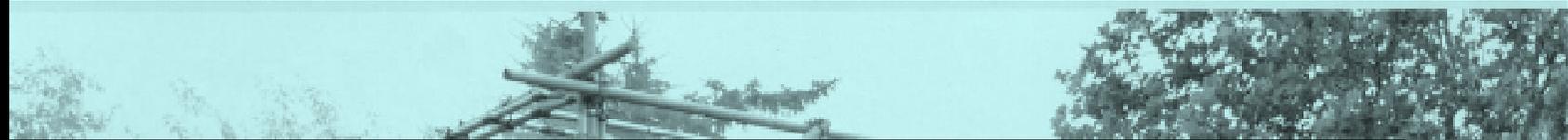


Reduction of Combined Sewer Overflows



Reduction of Flood Risks





Stormwater Retention



Reduction of Combined Sewer Overflows

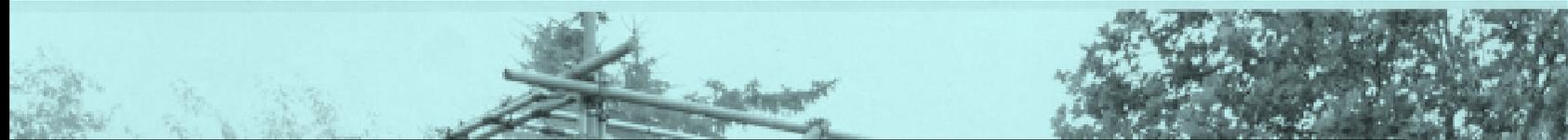


Reduction of Flood Risks



Facilitation of Groundwater Recharge





Stormwater Retention



Reduction of Combined Sewer Overflows



Reduction of Flood Risks



Facilitation of Groundwater Recharge



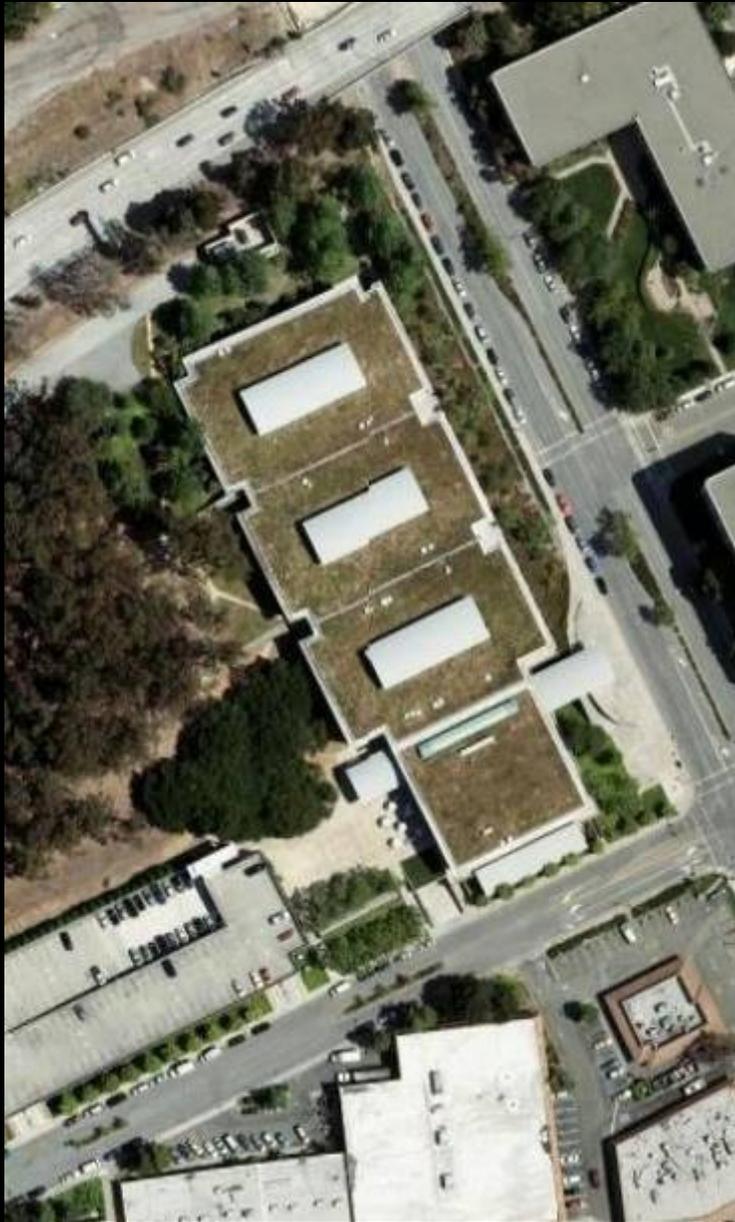
Improving Water Quality of Roof Run-off







Irrigation



Gap Headquarters, San Bruno, California . 6,000m². 500mm rainfall

Photo: Melissa Guerrero



Photo: Melissa Guerrero



Photo: Melissa Guerrero



California Academy of Sciences, San Francisco, CA. 15,000m². 530mm Rainfall



Santander, Madrid. 100,000 m². 420 mm rainfall



Tempe Transportation Center, Arizona. 200mm Rainfall

Photo: Michele A. Shelor

HABITAT CREATION



Hospital, Basel, Switzerland

ENERGY PRODUCTION



School, Stuttgart, Germany

FOOD PRODUCTION



RECREATION



ASLA Green Roof, Washington DC