What if stormwater runoff was considered a resource rather than a problem to be solved by costly infrastructure networks? What if reclaiming stormwater at the locations where it occurs resulted in higher quality of life in more verdant, locally active and socially vibrant neighborhoods?

Most Southwestern cities have scarce water resources. Harvesting stormwater could have multiple benefits: reducing flood peaks, reduced loss to evapotranspiration, increased recharging into the natural aquifer, reduction of demand of potable water resources for irrigation, mitigation of urban heat islands, provision of habitat, energy savings, reduction of dependence on imported water sources, improving stormwater quality, and a contribution to the creation of locally grounded communities and economies...

This can be achieved by decentralizing the flood control infrastructures and locating them in the neighborhoods.

Tucson, Arizona

What if...?

The further the point of generation of stormwater, the greater are the losses to evapotranspiration. While 80% of the rainfall on a lot and 15-40% of stormwater in a neighborhood are harvestable, only 3% can be recharged downstream in regional watercourses.

Current approach: mostly relying on large infrastructure projects.
stormwater: local solutions

Maximize the **use of stormwater** at the neighborhood scale:

- passive (earthworks) and active (tanks) **water harvesting** structures: slow flood stream, more time for water infiltration into ground, increase soil moisture to support plants and recharge groundwater, attenuate the floodpeak in and downstream of the neighborhood, increase water quality, increased **vegetation** reduces heat island effect and loss to evapotranspiration, restore ecosystems and wildlife habitats.

- creation of **mix-use facilities** with shade, cooling and diverse activities will foster public, urban life even in hot summer times.

- over time implementation: flexible and **adaptable toolkit** valid for new development and for densification of existing neighborhoods. Allows for specific localized approaches.

- there are **physical and legal challenges** that impact the ability to use stormwater as a supplemental source including the variability of annual and seasonal rains, surface water rights, and water quality regulations. Some of the proposed measures require changes in public policies and to existing water rights.

- **financing**: save on new large, centralized infrastructures, save on potable water, save on chemicals, mix-uses generate payback for private-public investments. Strong, green branding will attract private investments.

Tucson has an assumed average rainfall of 12 inches per year. Over 50% of the annual rainfall occurs in intense summer storms during the monsoon season. Sometimes, 24% of the total for the year is received in one single summer storm event. Mostly, the washes are dried out after 24h of the flood event. Flood control infrastructure is therefore not filled with stormwater for 90% of the year, allowing other uses instead.
toolkit strategy 1: irrigation and recharge

Stormwater detention facilities can co-locate with passive and active recreation:
- Irrigation provides lush vegetation.
- Drywells collect surface water and route it to the aquifer.

water percolates and is filtered through the ground, moisturizes the soil and recharges the aquifer. Locations have to be chosen carefully due to differing ground qualities. The area south of the Rillito Creek has great potential for recharge as it was once a floodplain.

riverpark: hydroperiod characterized by cyclic patterns of inundations (10%) and subsequent drawdowns (90%) allowing mixed uses over the course of a year.
toolkit strategy 2: refreshing by evaporation

Stormwater can replace potable water uses such as evaporative coolers and cool towers, reducing the Southwest’s high temperatures.

The cool tower works with a very simple principle: air is captured high and cooled down by evaporation. A natural downdraft due to a temperature differential transports the cool air into adjacent spaces.

vertical gardens, moisturised from above (example by Patrick Blanc)

vertical gardens: cooling, shade, recreation
toolkit strategy 3: reclaiming by refinement

Stormwater is harvested, filtered and utilized as quality water. The synergetic effects are: clean water, locally grown produce, energy savings, chemical free pool water, sustained revenue, reduced infrastructure downstream, opportunities for empty lots and for retrofitting existing pools.

natural pool: cleaning of stormwater by marsh plants in substrate of gravel, lime, and sand. The plants use nutrients from the water as food, which helps prevent algae. Microorganisms and microbes break down pollutants into basic elements.

urban farm: reclaiming stormwater. Filtering the water while growing produce closest to inflow plants where produce is not in direct contact with water.

vertical farm / pool carved into ground where site dimensions are constrained.

natural pool with covered area for shade.

urban farm with local market.

natural pool, vertical.

urban farm, vertical.

filtering and irrigation systems

natural pool: the wetland ponds are used for filtering.

urban farm: the ponds are used for filtering and growing crops.

urban farm with local market.