

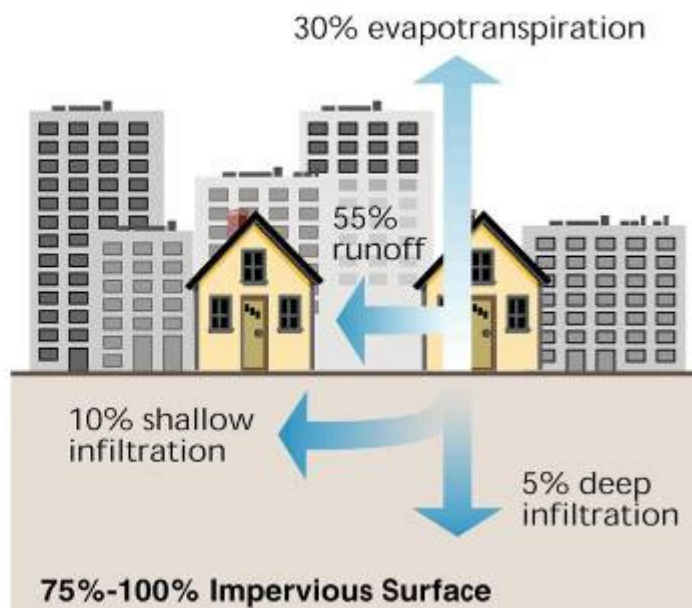
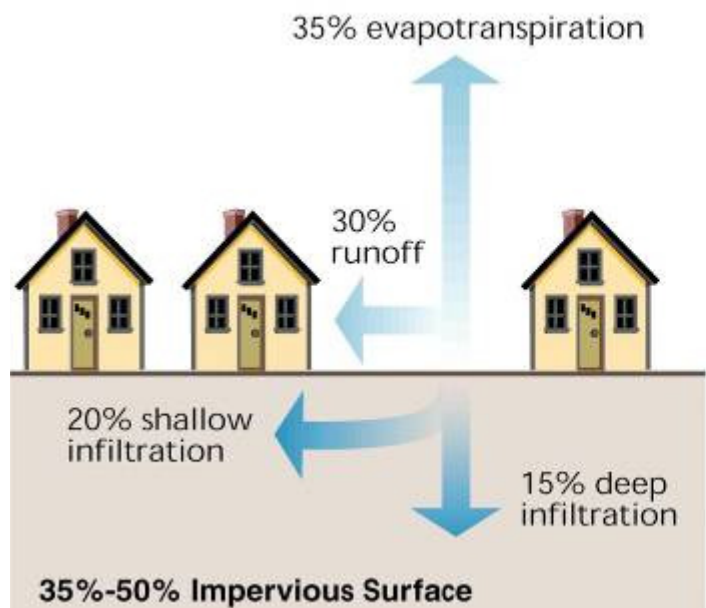
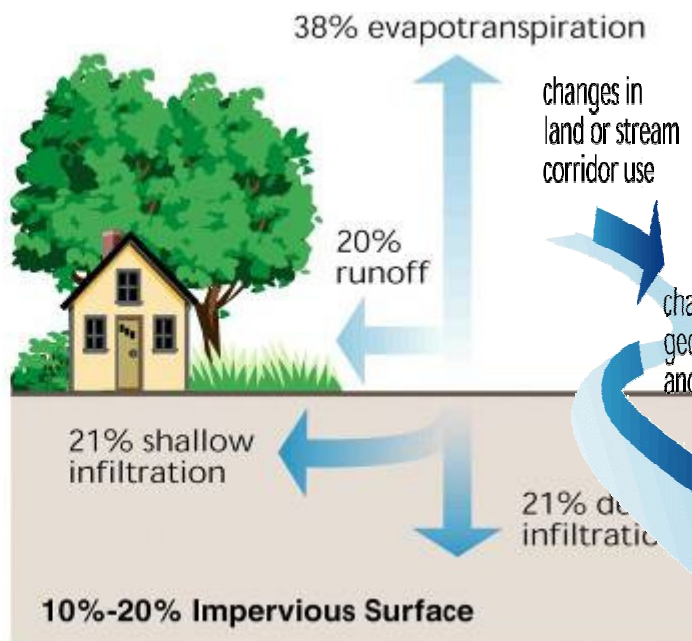
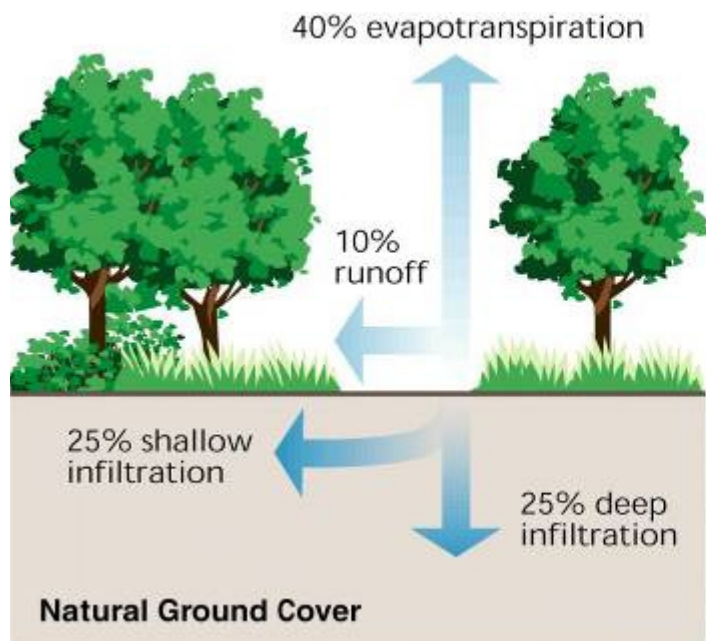
Office of Water

U.S. Environmental Protection Agency

Sustainable Water Infrastructure and Urban Development

Ensuring safe and clean water for all Americans
Healthy Watersheds Sustainable Communities





changes in
land or stream
corridor use

changes in
geomorphology
and hydrology

changes in
stream
hydraulics

changes in function
such as habitat,
sediment transport,
and storage

changes in
population,
composition, and
distribution,
eutrophication,
and lower water
table elevations

Source: FISRWG 2001

Challenges of Sprawl



Spread-out housing → spread-out roads and services → increased pollution and vehicle miles

Paradigm Shift:

Rain is a resource, not a burden

- Shift from the concept of moving stormwater as far away as quickly as possible in large, buried collection and conveyance systems.



- Shift towards the concept of managing stormwater the way mother nature would do it: where it falls, with plants and soils.

Maximize Retention to Minimize Runoff



Water-Quality Benefits



- Reduces sewer overflows
- Filters polluted stormwater
- Recharges groundwater
- Protects stream banks
- Conserves water
- Prevents flooding

Non-Water Quality Environmental Benefits

- Climate change mitigation
- Improved air quality
- Energy savings
- Increased water supply
- Wildlife habitat



Sydney Conservatorium of Music

Community Benefits

- Increased recreation opportunities
- Job creation
- Increased property values
- Cost savings
- Market creation
- Reduced crime
- Improved mental functioning



2009 Philadelphia Triple Bottom Line Analysis

Citywide Present Value Benefits: Cumulative through 2049

Benefit Categories	50% LID option (2009 million USD)	30' tunnel option (2009 million USD)
Increased recreational opportunities	\$ 524.5	
Improved aesthetics/property value (50%)	\$ 574.7	
Reduction in heat stress mortality	\$ 847.1	
Water quality / aquatic habitat enhancement	\$ 336.4	\$ 189.0
Wetland services	\$ 1.6	
Social costs avoided by green collar jobs	\$ 124.9	
Air quality improvements from trees	\$ 131.0	
Energy savings / usage	\$ 26.6	\$ (7,324.1)
Reduced (increased) damage from SO ₂ and NO _x emissions	\$ 43.8	\$ (2,838.9)
Reduced (Increased) damage from CO ₂ emissions	\$ 11.1	\$ (745.8)
Disruption costs from construction and maintenance	\$ (5.6)	\$ (10,524.5)
TOTAL	\$ 2,616.0	\$ (21,244.3)

Approaches



- Community involvement
- Green infrastructure
- Smart growth
- Voluntary programs
- Regulation

Community Involvement

- **Urban Waters Initiative:** Federal Partnership to reconnect communities to their urban waters
 - Help communities access, improve and benefit from their water environments
 - Emphasis on underserved communities
- **America's Great Outdoors:** White House initiative to reacquaint Americans with the outdoors, both in developed and natural areas

Green infrastructure techniques

Bioinfiltration



Pocket wetlands



Green roofs/walls



Open swales



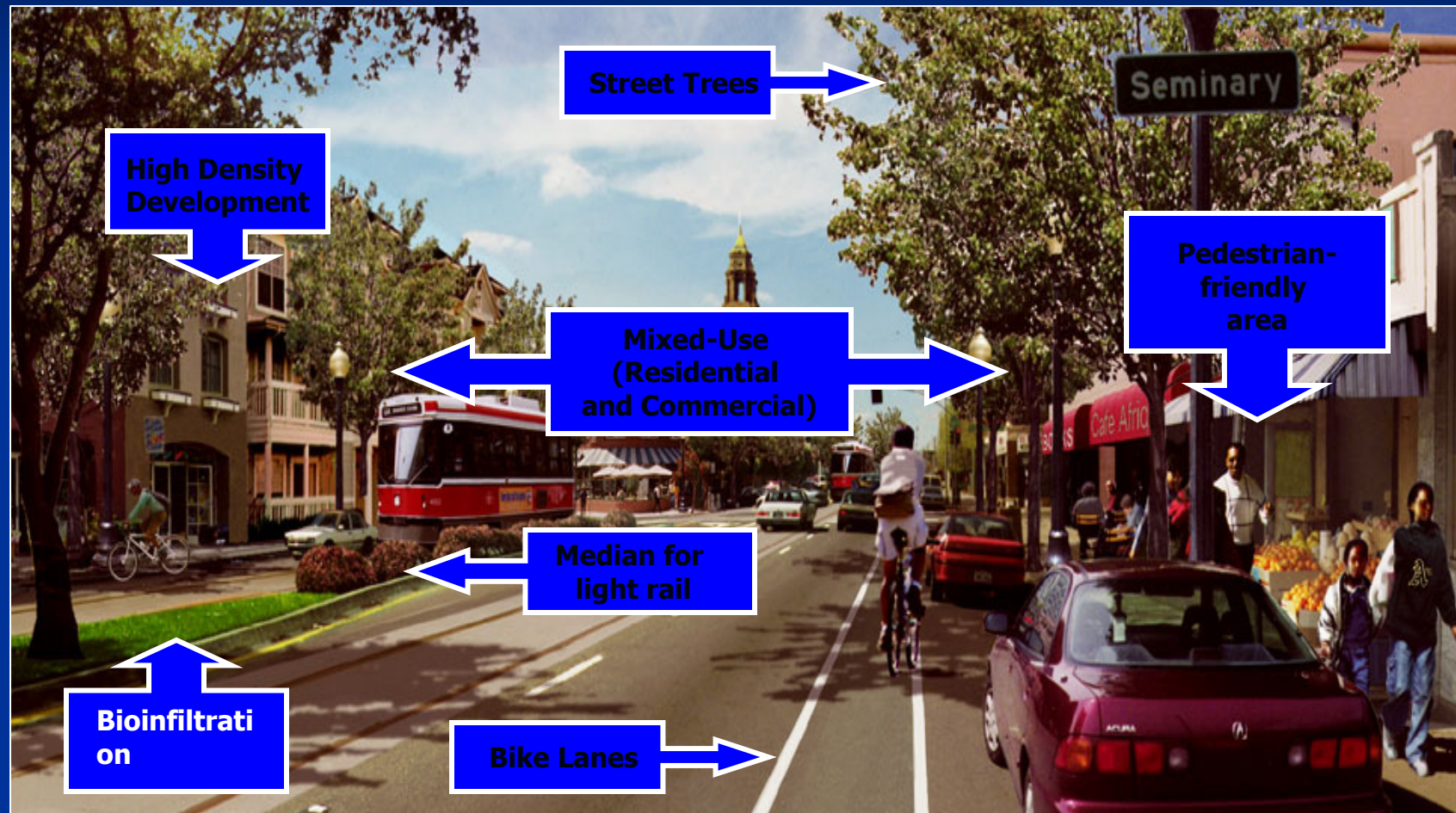
Smart Growth:

Development as Part of the Solution

- Preserve
Natural features
- Recycle
Land and
infrastructure
- Reduce
Land consumption
- Reuse
Stormwater



Street Design Using Smart Growth



Philadelphia in 2025

An aerial photograph of a city block in Philadelphia, showing a mix of residential and commercial buildings. Many of the buildings have green roofs, which are covered in grass and small plants. The roofs vary in size and shape, following the layout of the city streets. Some buildings have solar panels installed on their roofs. The streets are paved and have some parked cars. There are trees and greenery around the buildings, and a few people can be seen walking on the sidewalks. The overall scene depicts a city that is integrating green infrastructure into its urban landscape.

*photo courtesy of Howard Neukrug,
City of Philadelphia*

Smart Growth – Redevelopment Case Study

- Atlantic Station in Atlanta, Georgia
- Former steel mill site redeveloped with EPA's help
- 138 acres of LEED-certified office space, retail and residential buildings
- Residents drive half of what average Atlantans do
- Reduced Atlanta's stormwater discharge by almost 20 million cubic feet/year



Atlantic Station

EPA Voluntary Programs

- HUD-DOT-EPA Partnership for Sustainable Communities
 - Promoting “Fix It First” strategy
 - Echoed in SRF policy
- CWSRF pilot projects
- Green Infrastructure Partnership
 - Over 90 that support and promote using green infrastructure to reduce stormwater pollution

EPA's Regulatory Tools for Stormwater Management

- Stormwater rulemaking
- Construction and Development Effluent Limitation Guidelines
- Municipal Separate Storm Sewer System (MS4) Permit
- Enforcement Settlements