

# Ensuring Ecosystem Benefits from Stormwater Capture

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# Little discussed benefits of stormwater capture systems

- Ecosystem services
- Ecological values



# Ecosystem services

Functions or attributes of ecosystems that people value

- Planned ecosystem services include:
  - Water quality improvement
  - Flood regulation
  - Groundwater recharge
  - Water supply
- Additional ecosystem services include:
  - Support of biodiversity
  - Wildlife habitat
  - Pollination
  - Climate and temperature regulation
  - Carbon sequestration
  - Cultural ecosystem services
    - Aesthetics (incl. property values)
    - Recreation
    - Education

Ecological  
value





# Ecological values

- Biodiversity
- Species habitat
  - Plants
  - Vertebrates
  - Invertebrates
- Connectivity
  - Especially important in urban environments



Dwight Sipler



© Gary Nafis



# Vegetation

- Role of plants in biofilters has been established
- But ecological value or services not studied
  - Currently not a factor in plant selection
- Importance of native vegetation
  - Adapted to local climate
  - Support native biodiversity



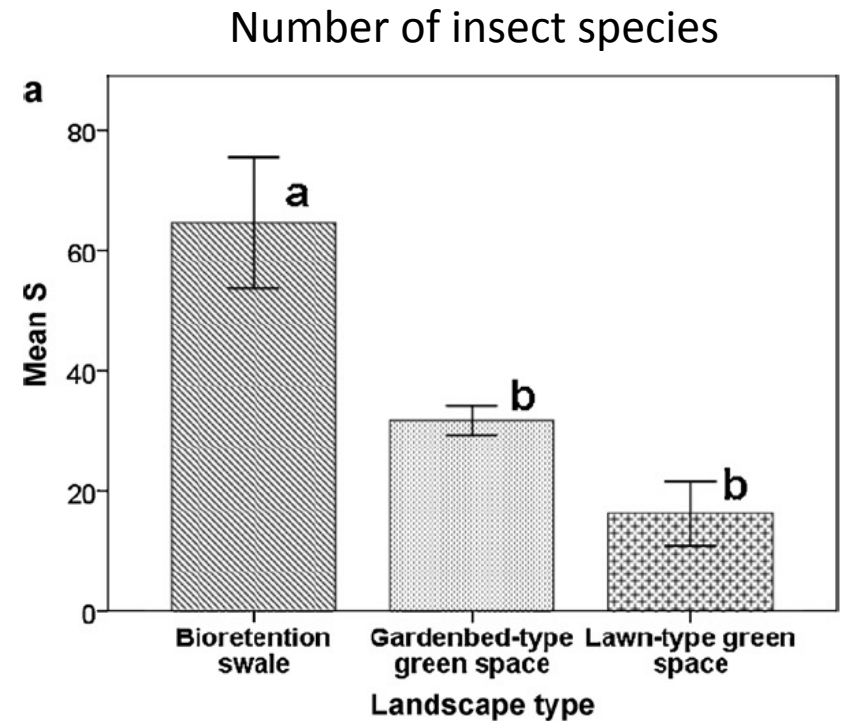
# Biodiversity (Insects)



Lawn-type green space



Gardenbed-type green space

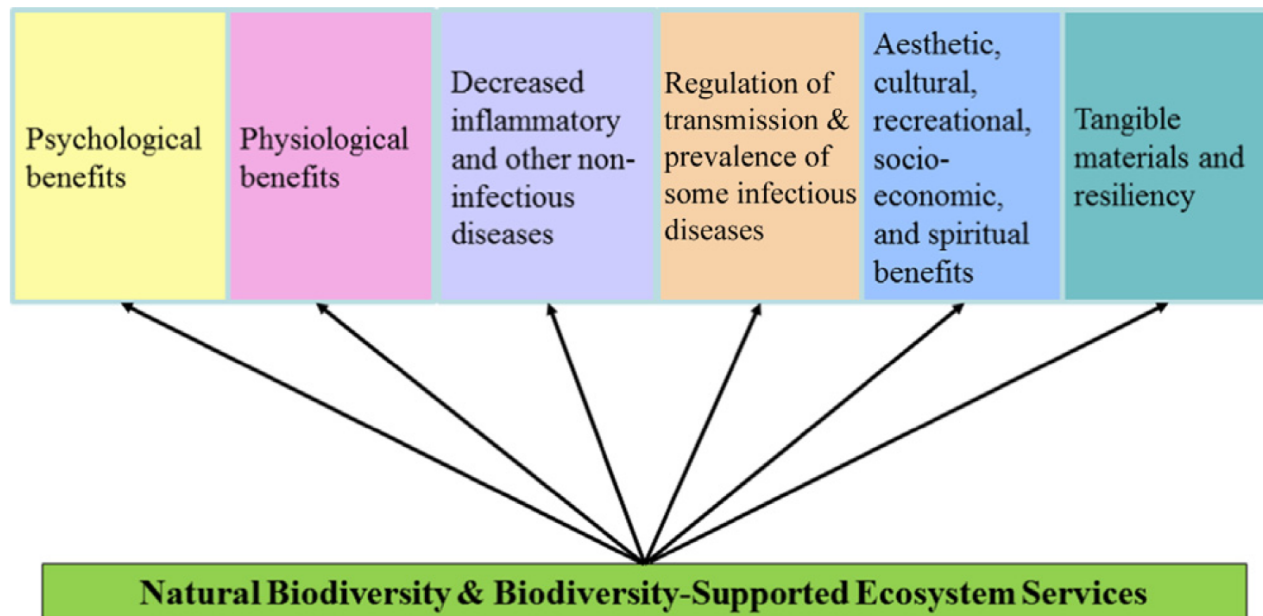


Kazemi et al. 2011



# Health effects of green spaces

- Living in greener environments is associated with better mental health and lower mortality
- More research is needed on the type of green space and scale that is most effective



Stormwater capture

System considerations



# Centralized capture vs. distributed capture

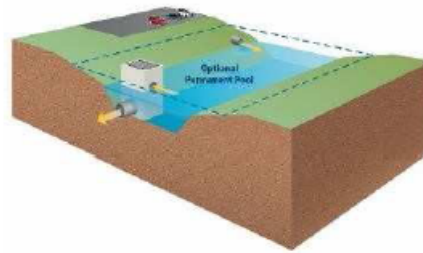
## Infiltration Facilities

Infiltration facilities are designed to decrease runoff volume through groundwater recharge and improve water quality through filtration and sorption. Infiltration facilities can be open-surface basins or subsurface galleries.



## Retention Facilities

Retention facilities are designed to retain runoff and improve water quality primarily through pollutant settling. Stored water can also be used to augment local water supply (e.g. via irrigation of parks and open spaces). Retention facilities can be open-surface practices or subsurface galleries and can be dry during non-rainy seasons or wet year-round.



## Constructed Wetlands

Constructed wetlands are engineered, shallow-marsh systems designed to control and treat stormwater runoff. Particle-bound pollutants are removed through settling, and other pollutants are removed through biogeochemical activity.

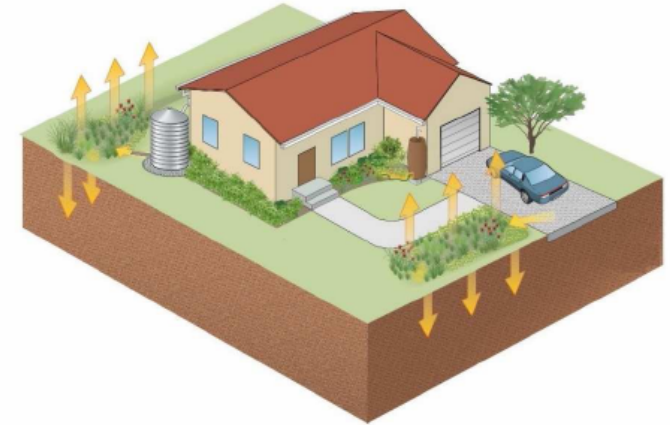
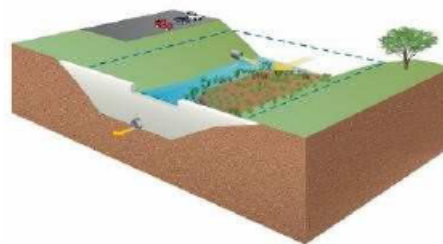


Figure 5-1 Conceptual Schematic of LID Implemented at the Site Scale  
(arrows indicate water pathways)



Figure 5-2 Conceptual Schematic of Green Street  
(arrows indicate water pathways)

Figure 4-1 Examples of Types of Regional Projects to be used for EWMP Implementation  
(more details provided in Appendix 4.A)

# Centralized capture Pacoima Spreading Grounds

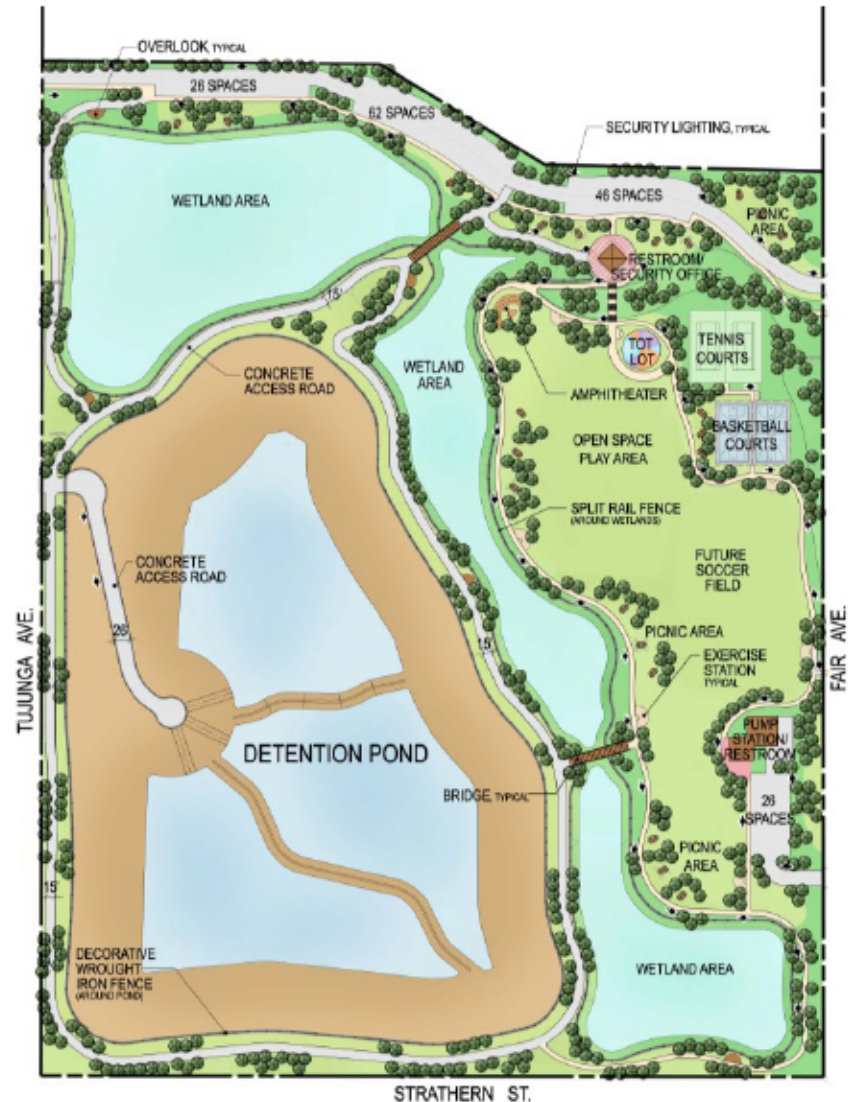


Little ecological value and few ecosystem services



# Centralized capture

- Great potential for wildlife habitat
- Strategic locations could enhance connectivity



**Rory M. Shaw Wetlands Park  
Sun Valley District, Los Angeles**

# What is the best arrangement?

## Stormwater capture considerations



Figure 4-3 Regional Project Opportunities in the Ballona Creek Watershed



# What is the best arrangement?

## Ecological considerations

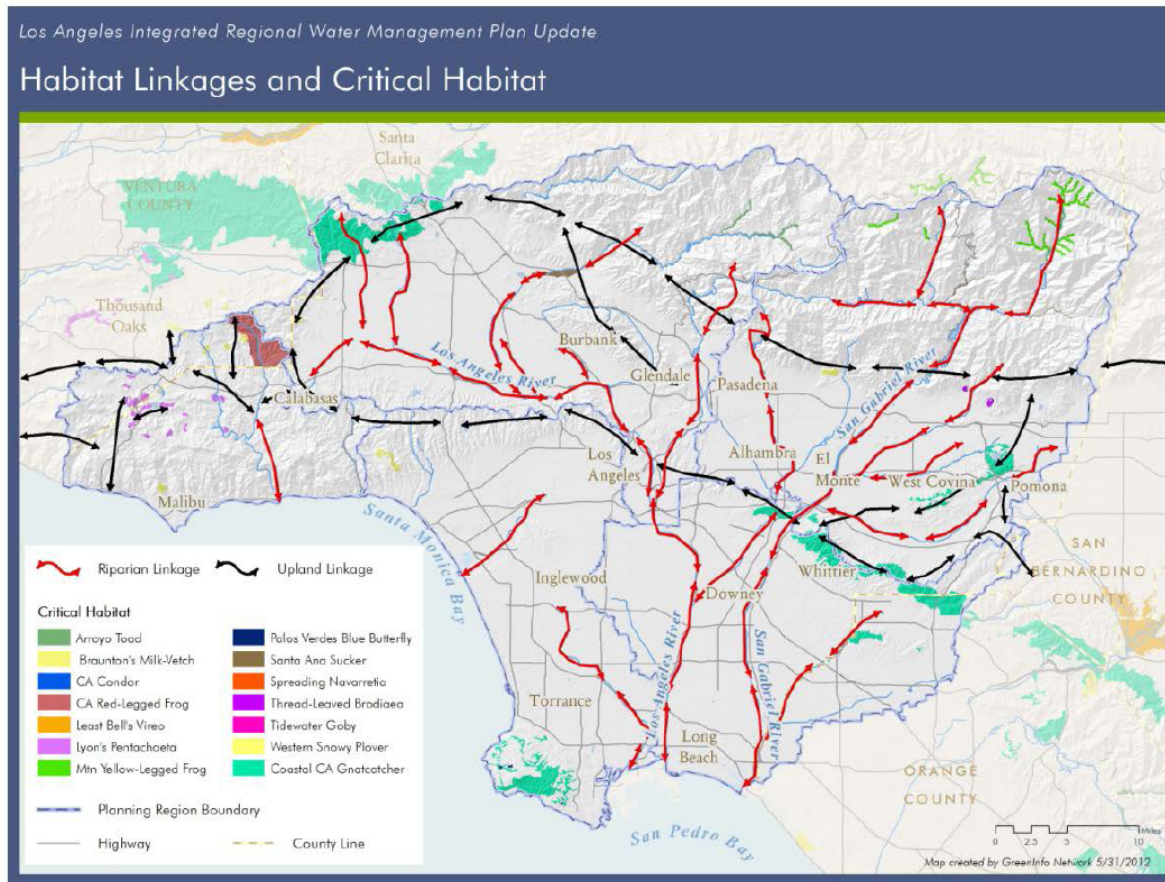


Figure 9. Habitat Linkages with USFWS Designated Critical Habitat Areas (May 2012)

# Distributed capture

- Smaller, more isolation reduces suitability of habitat for larger wildlife
- However, a large network could provide substantial benefits





# Elmer Avenue

Elmer Ave, Los Angeles, CA 91352, USA

Google earth



# Distributed stormwater capture systems will be extensive

- Potential for significant ecosystem benefits despite small size of individual projects

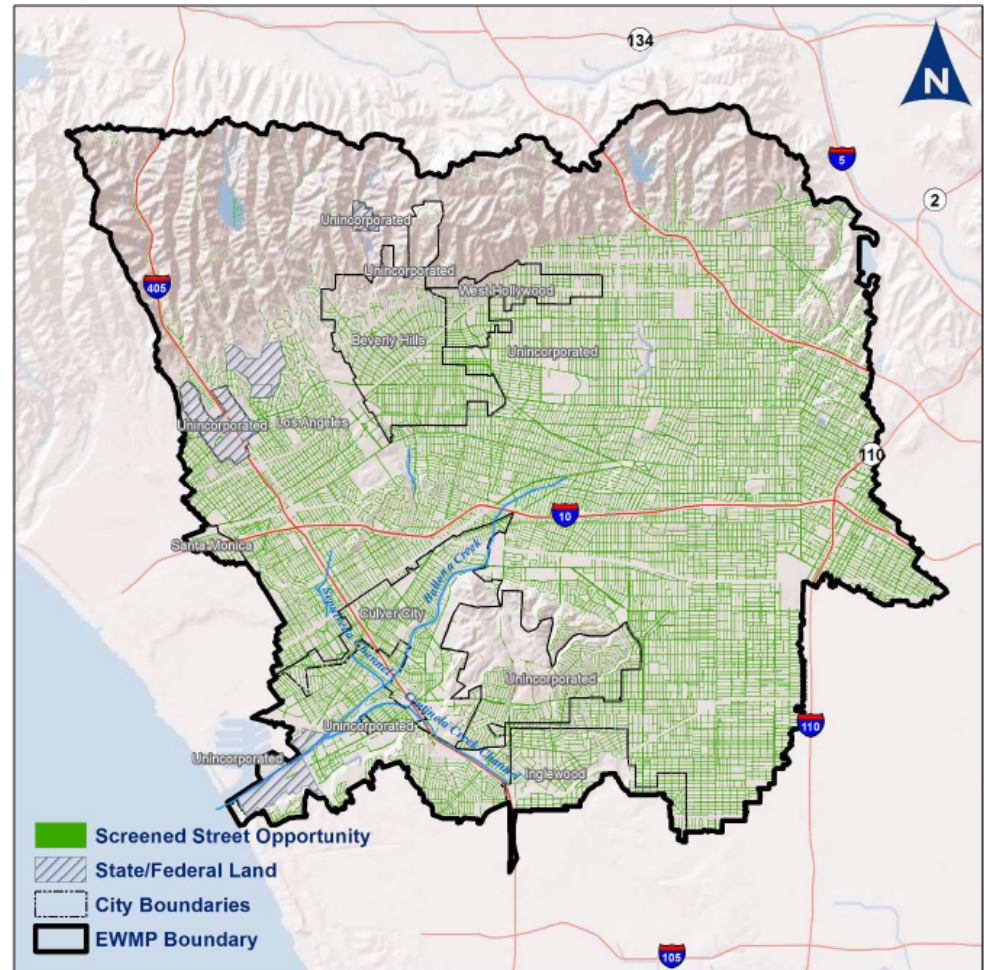
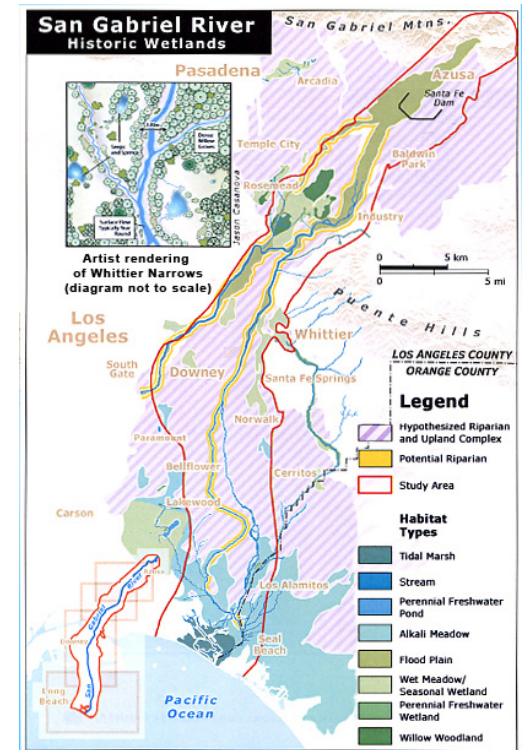


Figure 5-5 Green Street Screened Opportunities in the Ballona Creek EWMP Area



# What about downstream?

- What happens when water currently draining into streams and rivers is captured?
- Need to maintain sufficient water to protect and enhance stream ecosystem values
- What should the target be?
  - Historical ecology
  - Current conservation objectives (e.g., endangered species)



# Research needs

- What ecosystem services are associated with stormwater capture systems?
- How can we design stormwater capture systems to optimize ecosystem services and ecological values?
- What is the appropriate scale for individual (distributed) and regional (centralized) stormwater capture systems?
- How should stormwater capture systems be distributed in the landscape?
- How much water do we need (and when) to maintain or restore ecosystem benefits in streams and rivers?



# Conclusions

- Stormwater capture systems could provide important ecosystem services and ecological values
- Need to include ecosystem benefits as a design consideration
  - Individual projects
  - Regional scale
- Need to consider ecosystem benefits for the entire system, including downstream habitats
- There are big research gaps!



