

Introduction

- Flooding negatively impacts infrastructure and poses safety hazards for residents
- Water cannot penetrate the soil
- Erosion and degradation of water quality
- Improve existing water drainage systems and create green infrastructure

Problem Statement

- Costa Mesa is not currently able to redirect excess water
- If flooding is not addressed, it will cause a humanitarian crisis
 - increased death rates, the spread of infectious diseases, and overpopulated medical centers (CDC, 2024)
- **Our goal:** build new storm drainage systems with larger water capacity and implement green infrastructure (Q3 Consulting, n.d.)

Proposed Solution

- Redistribute excess water to dryer regions within California
 - State supervises sustainable management of groundwater from floods
- Incorporating green infrastructure to minimize carbon emissions, linked to reducing the likeliness of floods
- Administer underground water tanks
 - Suggested by our interviewee, constructing water tanks underneath existing parking structures preserves infrastructure from being broken down
- Urban neighborhoods would benefit, since they face highest risk against floods
- Improving current water drainage system
- Water absorption through water retention ponds
 - To alleviate reliance on drainage systems

Reducing Flooding in Costa Mesa

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Figure 1: Car stuck in flood water (2018) | Daily Pilot <https://www.latimes.com/socal/daily-pilot/news/tn-dpt-mc-flooding-20181206-story.html>

Feasibility

- Cost of fixing all the storm drainage systems is over \$42 million dollars
- This is out of our budget, so will combine fixing storm drainage systems and implementing green infrastructure
- The cost for wet retention ponds is cheaper than installing a drainage system line that averages around one million dollars (Q3 Consulting, n.d.)

| Watershed | Cost |
|---------------|---------------------|
| West | \$12,855,720 |
| North | \$11,251,283 |
| East (N) | \$3,421,657 |
| East (S) | \$14,523,786 |
| Total: | \$42,052,446 |

(Q3 Consulting, n.d.)

Approach

- Applying Costa Mesa’s website, and using their accessible annual sustainability report to acquire data on water waste management
- City of Costa Mesa aims to implement advanced technology to improve usage of natural resources
 - Effective for constructing pond retentions
- Access to Costa Mesa’s master plan through their government website allows insight for drainage system planning and updates
- Gaining EPA’s insight of constructing green infrastructure
- Exerting water conservation sources to solve cities dealing with water surpluses, and lending it to drier cities

Cost-Benefit Analysis

- \$40 million budget over 25 years: Leveraging federal/local grants. Partnerships with environmental organizations. FEMA/FMA/CA Proposition 1/ OCTA/City tax
- Cost: Engineering intricacies, construction expenses, and the ongoing maintenance requirements for the enhanced drainage systems.
- Unintended consequences: Disrupting certain infrastructure and transportation.
- Benefits: Reduced flood damage, improved community resilience, quality of life, an increase in aesthetic value, and the potential for increased water availability.
- Potential additional benefits: Decreased demand on traditional water sources and mitigation of the urban heat island effect.
- California spent 4.7 billion dollars on flood damage recoveries in 2013, which averages out to 120\$ per person in California.
- Costa Mesa’s population in 2023 was 108,400 thousand, if we multiply that by the average 120\$ spent per resident in California, we get 13,008,000\$ spent in Costa Mesa for flood damages = an annual 13 million benefit/saving.
- Green infrastructure could save up to 4.5 trillion gallons of water over the lifetime of our green infrastructure.

Conclusion

- Green infrastructure and system improvements are not only beneficial for the city but also cost-effective
- Benefits:
 - Mitigate flood risks and enhance community resilience.
 - Repurpose water for drier areas.
 - Long-term benefits outweigh initial costs within a few years.
 - Influential to other communities

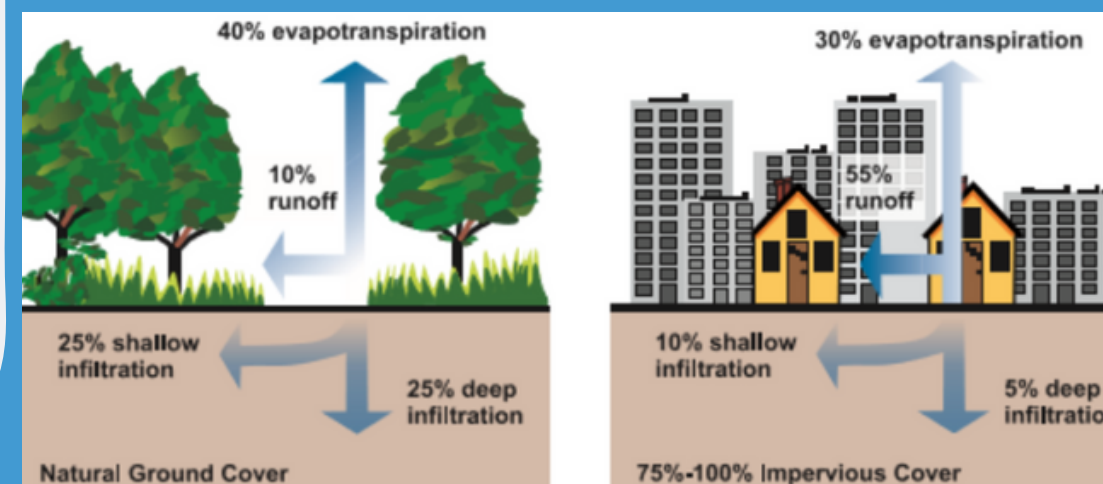


Figure 2: City of Corpus Christi. Learn About Storm Water | City of Corpus Christi. (n.d.). <https://www.ectexas.com/services/utilities/learn-about-stormwater>

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