OSRD: A Climate (and Budget) Smart Nature-Based Solution

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1. Climate change & land use

2. Nature-based solutions

3. You get what you zone for

4. Conservation Design & OSRD
   • How to design
   • Examples
   • Cost savings

5. Summary

6. Q&A
What’s the problem?

Development is sprawling
Impacts: dry rivers, flooding, algae blooms
We need to change course

- Sprawling development
- Impervious surfaces
- Stormwater runoff
- Water quality impairment
- Infrastructure impacts
- Financial and regulatory burdens

- Large, thirsty lawns
- Groundwater depletion
Our climate is already changing

Temperature: 2.9°F
Since 1895

Growing Season: 11 Days
Since 1950

Sea Level Rise: 11 inches
Since 1922

Strong Storms: 55%
Since 1958

Sources: Fourth National Climate Assessment, NOAA Ocean Service, NOAA nClimDiv dataset, ACIS
Future Expectations

Annual precipitation likely to increase

Extreme precipitation more likely

Outdated assessments do not capture continual change.

Sea level rise will drive greater flood risk.
Why do rising temperatures also bring more precipitation?

...consider your morning coffee.
More fuel for storms
More evaporation
More precipitation
More heat
warmer air holds more moisture aloft
How Much More Precipitation?

Total annual precipitation has increased by:

15%

1.2 trillion more gallons of water or equivalent snow falling on Massachusetts each year.

~9,700 filled Prudential Towers

Changes are calculated from a linear regression of annual totals from 1895-2015, 1901-2000 reference period.

Source: NOAA
Climate change

- Increased precipitation
  - Stormwater & WQ issues
  - Flooding & infrastructure damage

- Increased temperature
  - Heat-related illnesses
  - Tick-borne diseases

Sprawling Development

- Impervious surfaces

Tick-borne diseases
There are real solutions. One of the best adaptation practices is preserving natural areas.
Nature-Based Solutions use natural systems, mimic natural processes, or work in tandem with traditional approaches to address natural hazards like flooding, erosion, drought, and heat islands.

Green Infrastructure

Low Impact Development (LID)
Massachusetts Forests Mitigate Climate Change

- MA forests sequester 14% of the state’s gross annual carbon emissions
- Average acre stores **85 tons** carbon
- Capacity increases over time as forests mature
They also provide free ecosystem services

- Shade
- Windblock
- Reduce erosion
- Soak up/filter water
- Carbon storage

MA forests provide over $3.8 billion annually in free services
1. Protect natural resources and open space
2. Promote efficient, compact development patterns and infill
3. Smart designs that reduce overall imperviousness
4. Adopt GI Stormwater management provisions (LID)
5. Encourage efficient parking
Conserving natural features

Communities often **unintentionally discourage** climate-smart development by...

- Requiring large lots
- Requiring strict dimensional requirements
- Prohibiting curb cuts for drainage
- Requiring wide, curbed roads
- Requiring invasive species
- Not prioritizing LID
- Not prioritizing preservation of natural features
Conserving natural features offers numerous benefits

Every $1 invested in land conservation offers a $4 Return through:

- **Flooding**: Floodplains provide flood protection and reduce infrastructure damage
- **Public Health**: Managing stormwater and reducing retention ponds reduces creation of mosquito habitat
- **Air Quality & Public Health**: Trees reduce the urban heat island effect, reducing smog creation and resulting asthma occurrences as well as reducing nitrogen dioxide and particulate matter
- **Water Quality**: Streamside vegetation filters pollutants and reduces erosion
- **Water Quantity**: Forests and wetlands store water, improve water quality, and recharge groundwater
- **Recreation**: Clean, flowing waters support recreation, including boating, fishing, and swimming while open space provides areas for hiking and biking
- **Quality of Life**: Open space and street trees create a more enjoyable walking environment, benefiting community connection, health, and economic benefit in downtowns and commercial areas
- **Property Value**: Healthy, mature trees add an average of 10-30% to a property’s value
Balancing conservation and development via OSRD

Open Space Residential Design (OSRD)
Sometimes called…
Natural Resource Protection Zoning (NRPZ);
Conservation Design; cluster development
What is Conservation Design?

• Clustered development that considers natural landscape
• Identifies and builds away from critical resources, historic significance, and scenic views
• Permanently conserves at least 50% of the parcel
• Offers classic New England village character
Conventional ‘By-Right’ Plan

- 38 units
- 3+ acre lots
- No open space
- No rural character

Alternative Open Space Plan

- 46 units
- 26 one acre lots
- 16-unit village
- 4 units on three farms
- 68% open space
- preserves rural character and working farmland
How to design OSRD

1. Calculate the traditional amount of allowed lots (removing unsuitable building areas, including wetlands)

2. Identify significant natural, cultural, or historic features

3. Concentrate development away from these features through flexible requirements to achieve a similar amount of lots

4. Preserve permanently at least half of the land, whether for natural, agricultural, or forest use
Identify conservation value areas and remove these from the “developable area”
Site house lots in remaining area to maximize views, access to nature.
Align roads and trails to provide multi-modal access