

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

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Agenda



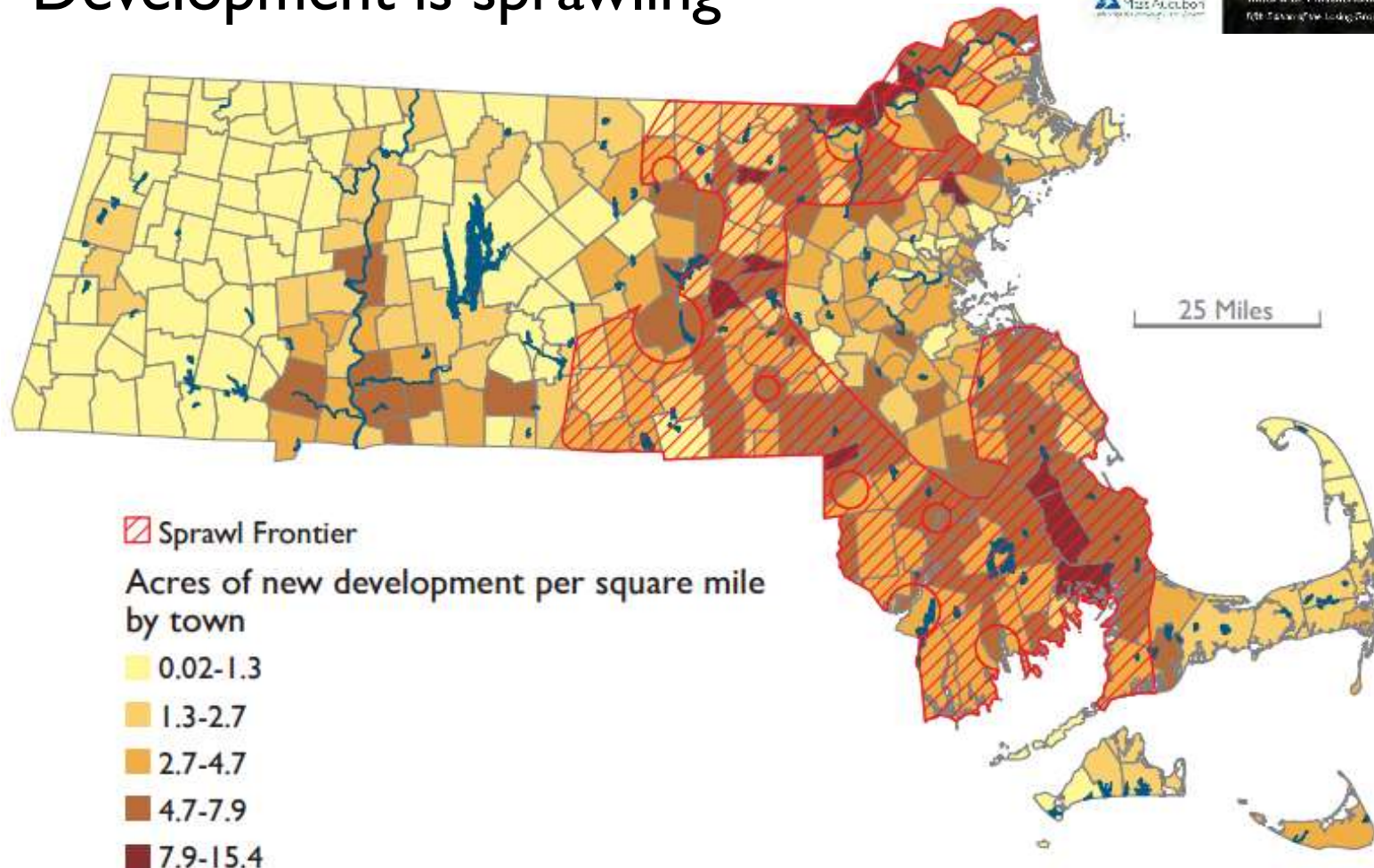
1. **Climate change & land use**
2. **Nature-based solutions**
3. **You get what you zone for**
4. **Conservation Design & OSRD**
 - **How to design**
 - **Examples**
 - **Cost savings**
5. **Summary**
6. **Q&A**

What's the problem?

Development is sprawling



Mass Audubon
The State's Wildlife & Natural Heritage Program



Impacts: dry rivers, flooding, algae blooms



We need to change course

Sprawling development

Impervious surfaces

Large, thirsty lawns

Stormwater runoff

Groundwater depletion

Water quality impairment

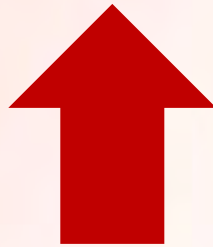
Infrastructure impacts

Financial and regulatory burdens



Our climate is already changing

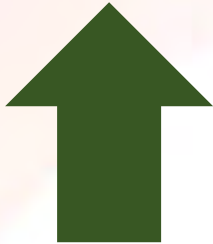
Temperature:



2.9°F

Since 1895

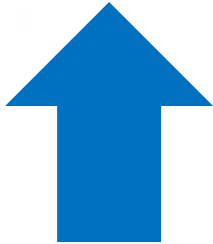
Growing Season:



11 Days

Since 1950

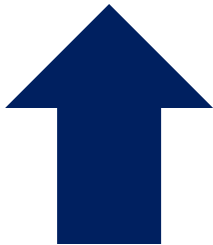
Sea Level Rise:



11 inches

Since 1922

Strong Storms:



55%

Since 1958

Future Expectations



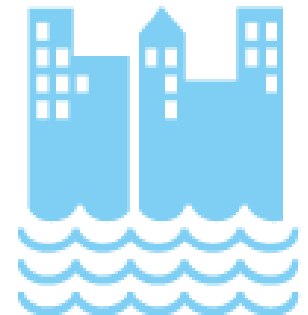
Annual precipitation likely to increase

Extreme precipitation more likely



Outdated assessments do not capture continual change.

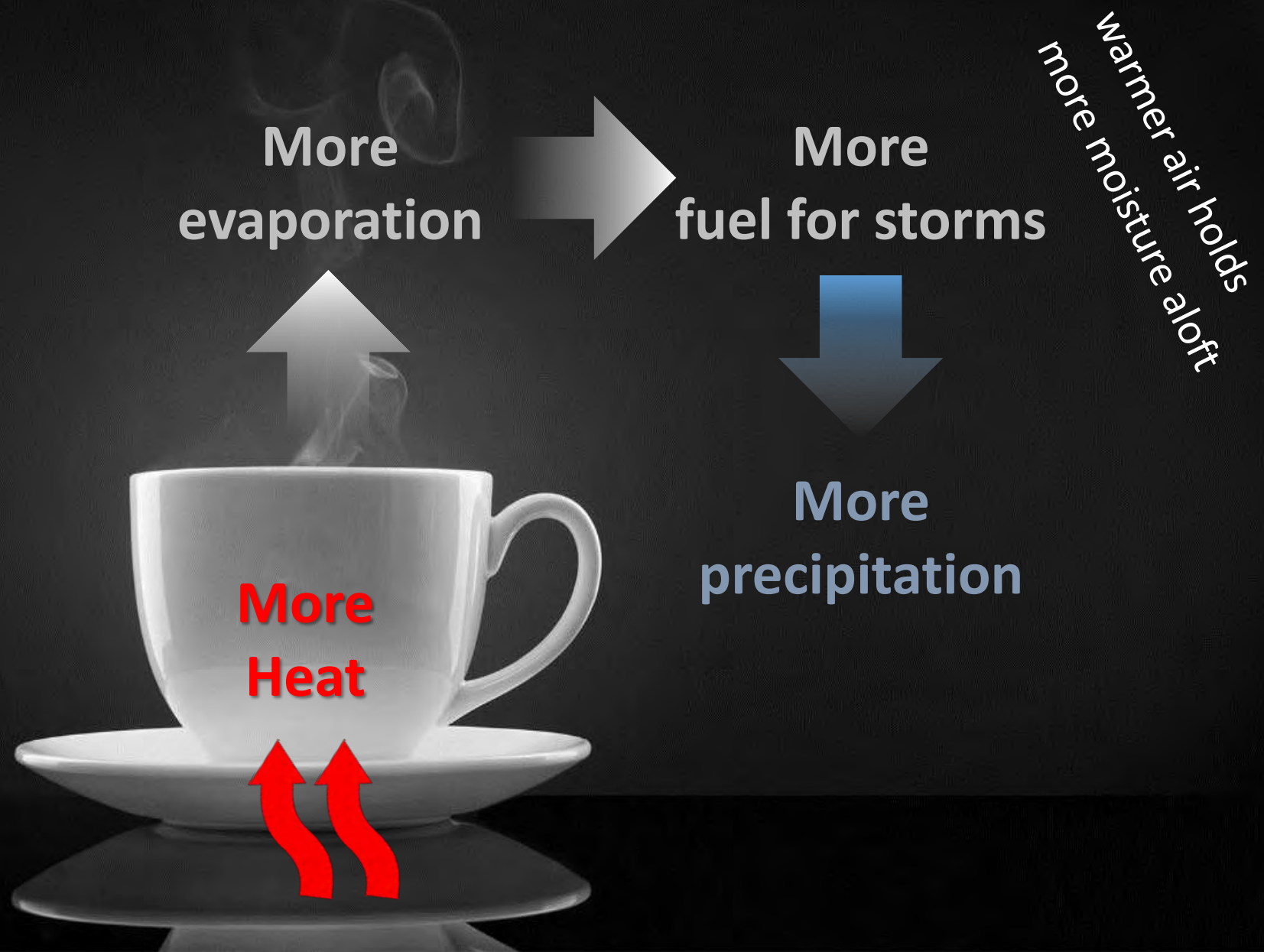
Sea level rise will drive greater flood risk.



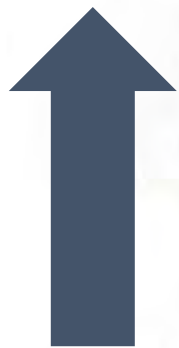
Why do rising temperatures also bring more precipitation?



...consider your
morning coffee.



How Much More Precipitation?



**Total annual precipitation
has increased by:**

15%

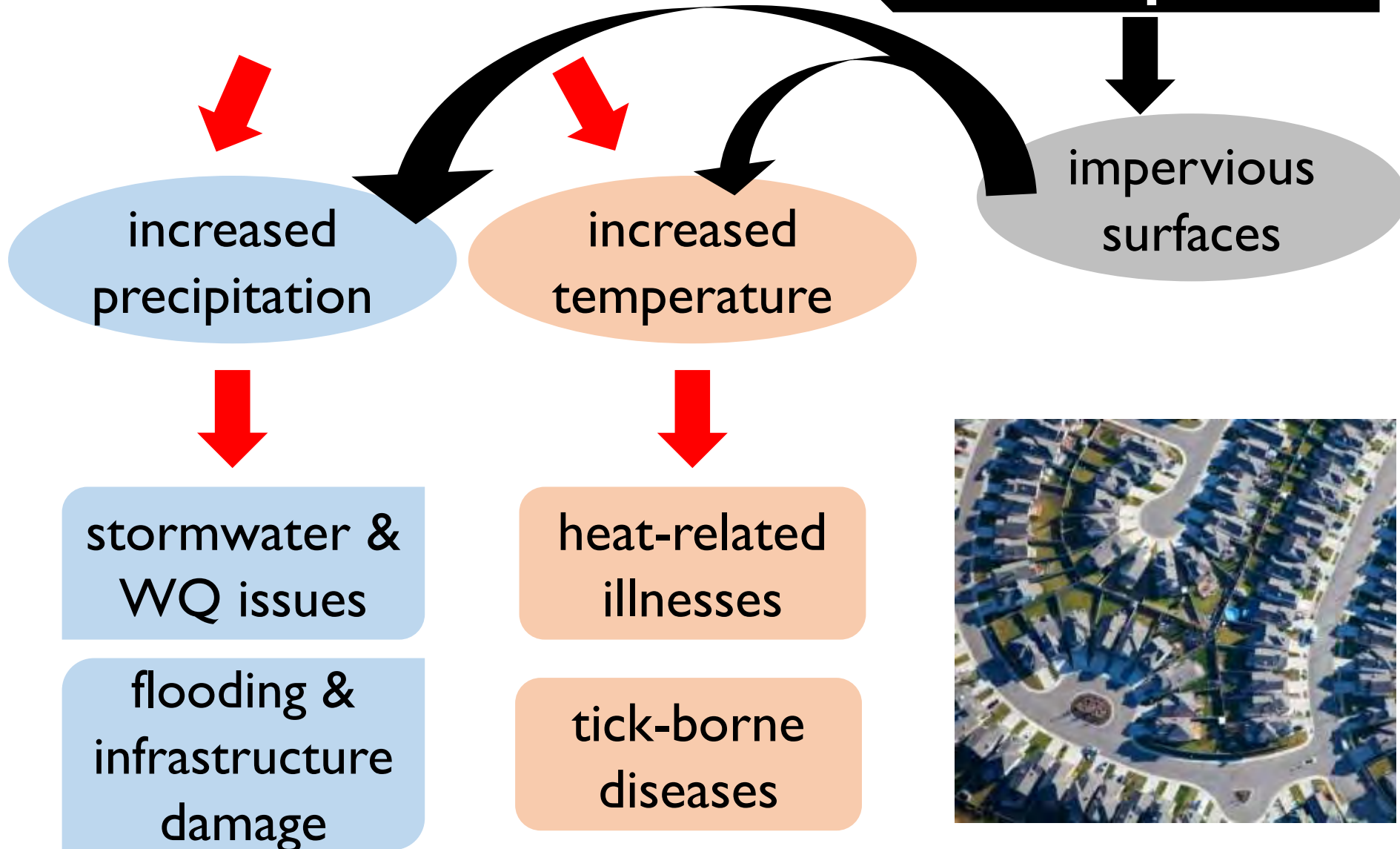
***1.2 trillion more gallons of
water or equivalent snow falling
on Massachusetts each year.***

~9,700 filled Prudential Towers



Climate change

**Sprawling
Development**



There are real solutions.

**One of the best adaptation practices
is preserving natural areas.**



Nature-Based Solutions

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**

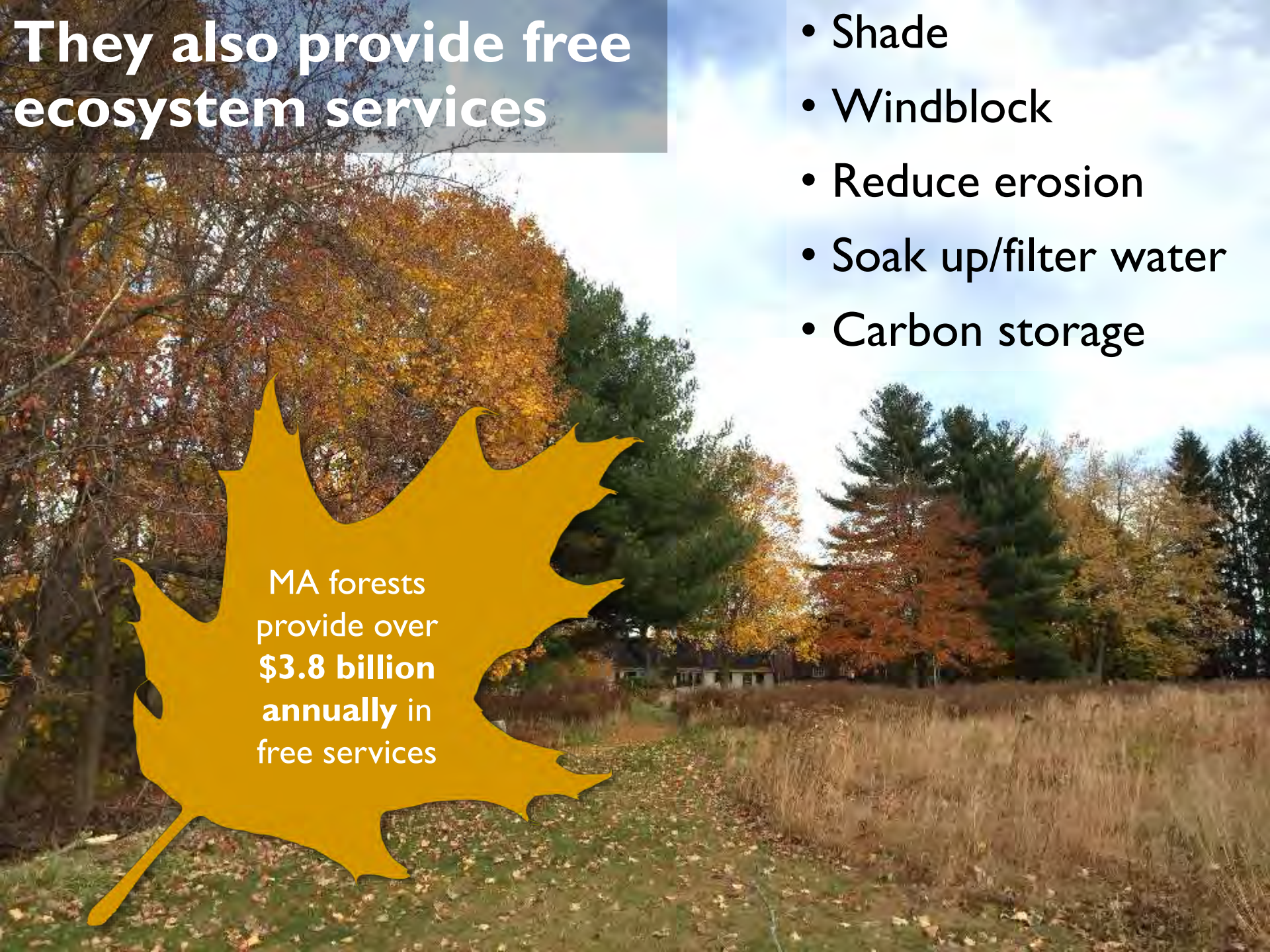


**Low Impact
Development (LID)**

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

Preserve benefits: climate-smart zoning and regulations

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

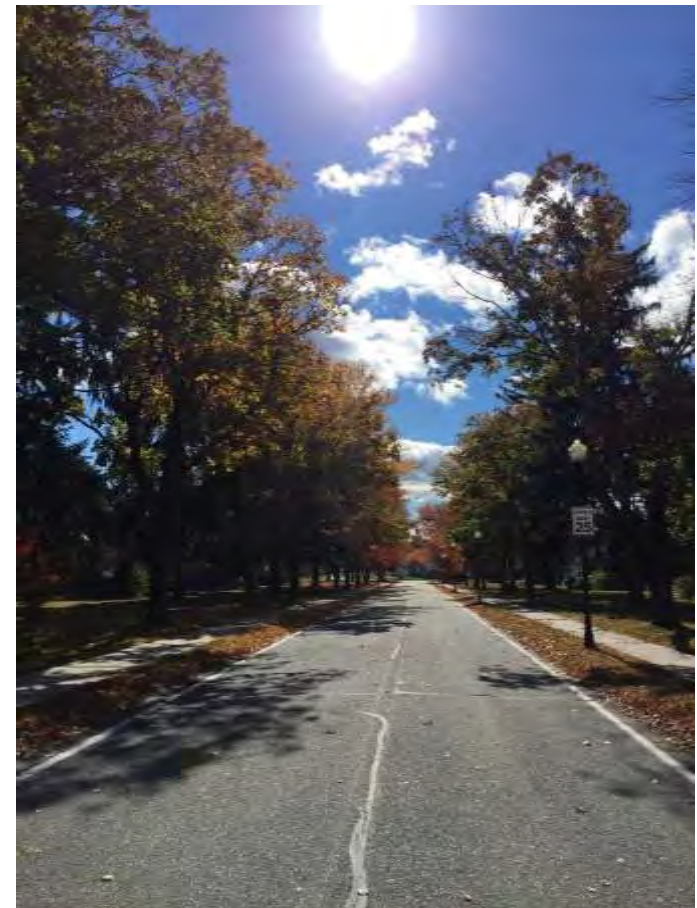
Factors	Conventional	Better	Best
Curbing	Curbing required full height both sides of road	Allow curb limits to curb built with pavement to enable water to flow to integrated LID features	Open drainage with roadside drains and to curbs preferred
Roadside/Shoulder	Allowed as an option	Preferred over paved drainage	Preferred, with criteria for proper design
Grading	Off road required contributing to road ROWs	Not specified, flexible	Allow under road, adjacent to road to enable placement of roadside drains
Drainage	Concrete or bituminous	Leave flexibility to material and design	Prefer permeable pavement
Subsurface	Required both sides of road	Allow on only 1 side of road typically in new density neighborhoods	Prefer along with land contours and for best protection ability (e.g. connect with drainage areas and shared open space) – not necessarily necessarily parallel to road
Drainage	Drains to road closed drainage system	Not addressed	Disinfect drainage from road system – e.g. adjacent green strips or other vegetated areas that can absorb slow flow



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);

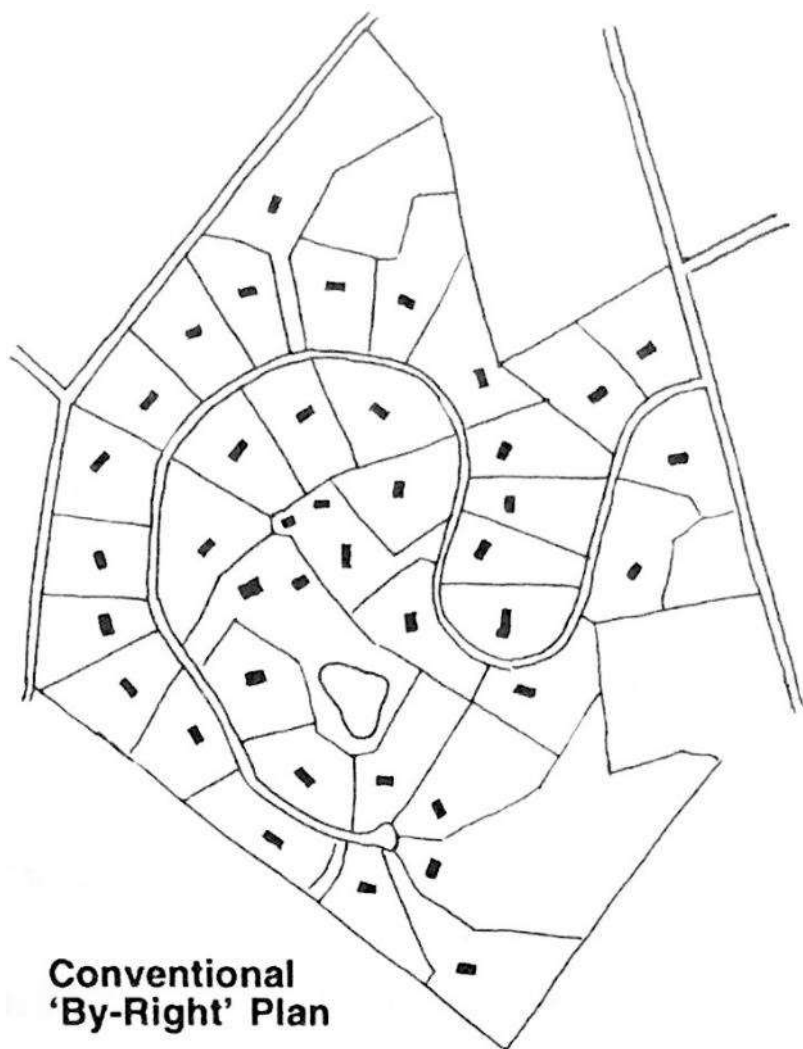
Conservation Design; cluster development



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





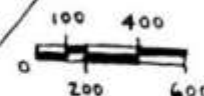
Conventional 'By-Right' Plan

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



Alternative Open Space Plan

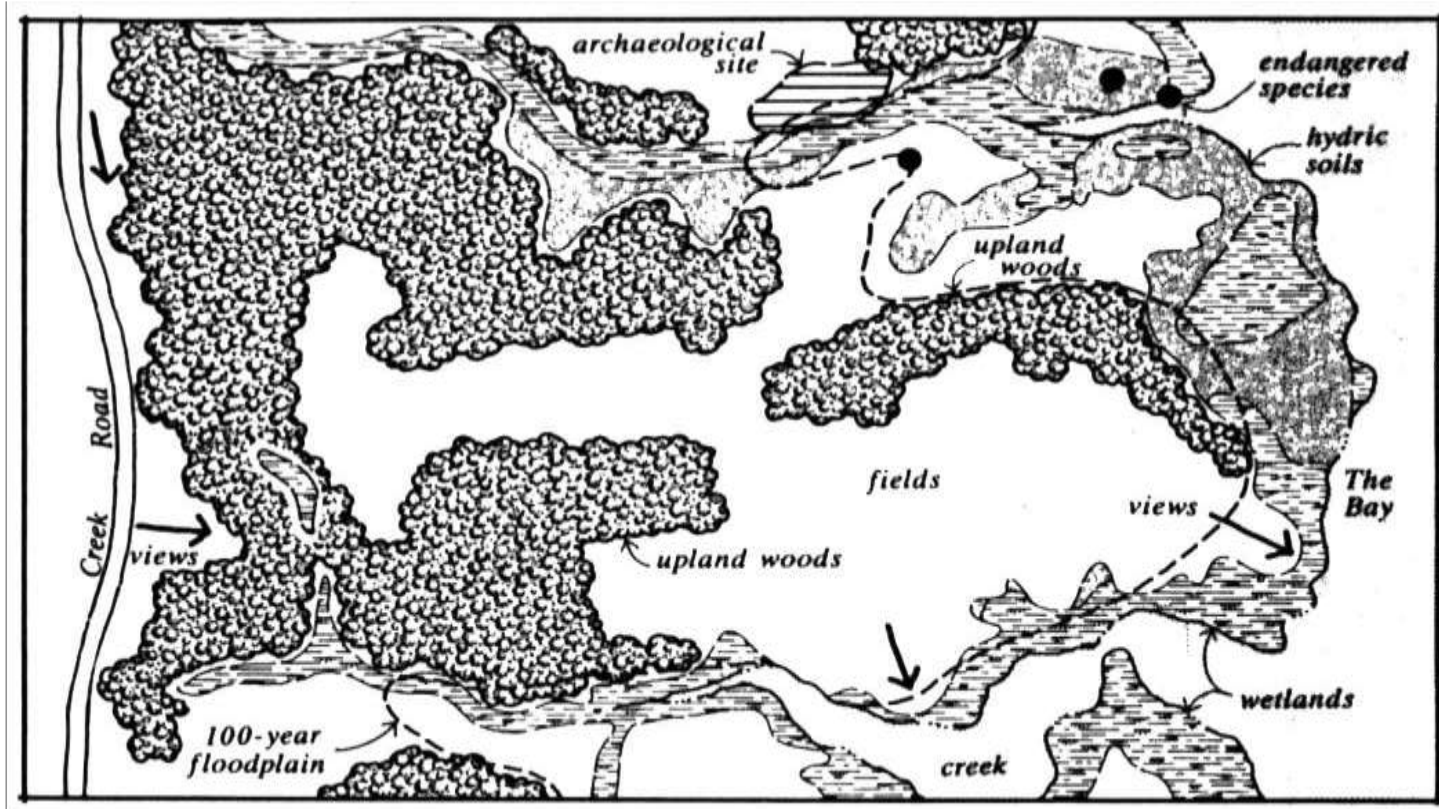
- 46 units
- 26 one acre lots
- 16-unit village
- 4 units on three farms
- 68% open space
- preserves rural character and working farmland



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

