Forests and Water Quality in the Potomac

Sally Claggett
US Forest Service
Chesapeake Bay Liaison
Gifford Pinchot believed that we ought to value forests for their “effects on the climate and floods, rainfall and runoff, springs and erosion.”

1905
TPL and AWWA Study on Water Treatment Costs

![Graph showing the relationship between Percent of Watershed Forested and Costs per Million Gallons. The equation $y = 0.0174x^2 - 2.7531x + 140.77$ is provided with $R^2 = 0.5518$. Data used in regression analysis and outlying data points not used are indicated.]
Importance of Forests to Drinking Water

Forests, infiltration, & adaptation

- Canopy intercepts water and atmospheric pollutants
- Evapotranspiration uses water and creates more soil storage capacity
- Forest floor/ litter layer acts as sponge and supports insects/microbial community
- Deep rooting develops macropores for rapid infiltration
The moderating influence of forests

Forests protect

- Air quality
- Flooding
- Summer low flows
- Water quality
- Groundwater recharge
- Habitat (water and land)
- Quality of life
Watershed health and water quality depends on:

- Percent of forest land in a watershed
- Extent of forests remaining on critical landscapes – riparian areas, wetlands, steep slopes and erodible soils, & recharge areas
- Distribution and location of forests – degree of fragmentation
- Forest age, health and condition
- Stewardship and management knowledge
Influence of forests and imperviousness on Stream health (IBI)

For 245 watersheds

Good
<15% impervious
>60% Buffered
>50% Forested

Impervious cover
Watershed tree cover
Riparian buffer tree cover

Excellent     good      fair     poor

Geotz et al. 2003
Forest loss by 1900—Dramatic effects

Massive clearing of forest land in the East for agriculture and fuel.

Settlers cleared forests at the rate of 13.3 sq. miles per day.

Our rivers were the highways to get timber to the mills ... and rivers were damaged.

Wildfire commonly consumed 20 million acres annually.
The Distribution of Forest Cover

Low   →   High
35%  →  82%
Forces of Change

- Land use and management
  - Afforestation
  - Conservation
  - Development patterns
  - Forest ownership
  - Forest Management
  - Deer
- Invasive Plants
- Air pollution
- Climate Change
- Fire
- Insects and diseases
Forest Management

Current

- Only 8% of forests in Potomac have written management plans
- Active harvesting practices take place on about 1% of all forests at any given time
- High grading is common
- Rate of BMP implementation is largely unknown

Future

- More owners, less knowledge
- Decrease in long-term timber value when high-graded
- Shifts in forest composition, more uncertainty
Tree Size Class in Potomac: Current vs Ideal

Number of Trees in Millions

- Large
- Medium
- Small
Fire - Fire season is coming earlier and lasting longer. Fires are hotter and bigger and more damaging.

Insects - Both the natives and the invaders—are spreading more rapidly than ever, killing more trees.

Water - Warmer winters are affecting our water supplies. Snowpacks are thinner and melt earlier; water runs off from the forest earlier in summer. Droughty forest soils makes trees more vulnerable to fire and insects.

**Big Losers:**
- Red maple
- American beech
- Black cherry
- Sugar maple
- White ash
- Sweet birch
- Eastern hemlock
- Striped maple
- Aspen
Insects

- >100K acres impacted by gypsy moth just between 2000-2003
- Most of Potomac impacted by hemlock wooly adelgid for >10 years – no infected tree known to survive
- Emerging threats – emerald ash borer, sudden oak death, Asian longhorned beetle, others?
Thank-you!