Practical Implications of Urban Forest Management Programs to Improve Air Quality

Jerry Bond

Davey Resource Group

Geneva NY

315-585-9145, jbond@davey.com

Many Agencies and People

David J. Nowak[1], Kevin Civerolo[2], Michael Ku[2], Kesu Zhang[3], Huiting Mao[3], Gopal Sistla[2], Eric Zalewsky[2], S. Trivikrama Rao[7], Daniel E. Crane[1], Jeffrey T. Walton[5], Christopher J. Luley[6], Jerry Bond[6], Chris Hogrefe[2,] Jack Edwardson[4], John Bachman[4], Gary Allen[7], Mike Galvin[8], Tad Ahern[8] and others[8]

---

[1] USDA Forest Service, Northeastern Research Station, Syracuse, NY
[2] New York State Department of Environmental Conservation, Albany, NY
[3] State University of New York (SUNY) at Albany, Albany, NY
[4] U.S. Environmental Protection Agency, Research Triangle Park, NC
[5] SUNY College of Environmental Science and Forestry, Syracuse, NY
[6] Davey Resource Group, Naples, NY
[7] Center for Chesapeake Communities, Annapolis, MD
[8] MD Dept of Natural Resources, MD Dept of Environment, University of MD

Foundation belief

- Urban Forest (canopy) can have substantial impacts on ozone
  - Atlanta Study **(Cardelino and Chameides, 1990)**
  - DC to MA Study **(Nowak et al, 2000)**
  - CA Study **(Taha, 1996)**
  - NYC Study **(Luley and Bond, 2002)**

Conceptual Analysis: Increasing Tree Cover

$$C_T = C_B + C_G - C_M + C_N$$

where

C_T = Target canopy cover

C_B = Existing canopy

C_G = Canopy growth

C_M = Canopy cover loss

C_N = Canopy from planting

C$_B$

- Strategy: **<u>measure accurately</u>**
  - What do we actually have?
    - Canopy (remote analysis available)
  - What is its structure?
    - Species, count, DBH, condition
  - How does it function?
    - Carbon
    - NOx and SOx
    - PM

C$_B$

- Need to <u>promote</u> local knowledge
  - Local structural analysis
    - Inventories of any kind
  - Local functional analysis
    - UFORE, STRATUM (others?)
- Need to <u>pool</u> local knowledge
  - How can we speak at state level?
  - Need sampling protocol (TIGER/line files)

C_G

- Strategy: **<u>promote functionality</u>**
- Various means
  - Preservation
  - Protection
  - Ordinance
  - Maintenance
  - Education

C_G

- Preservation and protection
  - New public emphasis, not just for huggers
  - Critical to keep with pace of development—power, money issues
- Ordinance
  - Local code must reflect importance
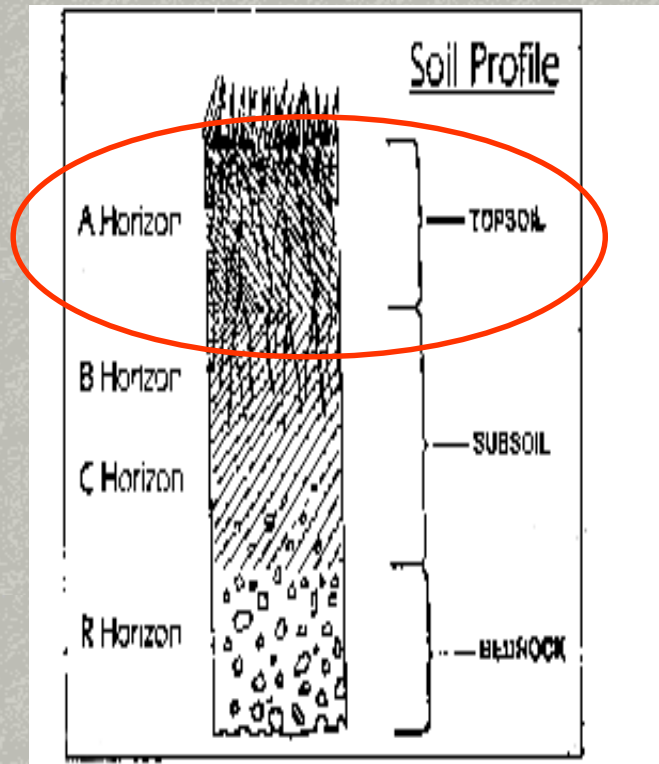 - NJ has experiment going

C$_G$

- Maintenance
  - Health is critical
  - Soil issues at center
  - Removals
  - Local manager support
- Education
  - Technical knowledge
  - Significance of effort
  - Good existing structures

Soil Profile

A Horizon — TOPSOIL

B Horizon

C Horizon — SUBSOIL

R Horizon — BEDROCK

C$_M$

- Strategy: **reduce mortality**
- New forest
  - Selection, stock, installation
  - Water, mulch, fertilizer, training
  - Target: 5% annual (2 years)
- Established forest
  - Mulch, training
  - Target: 2% annual
- Ref. for percents: Miller, *Urban Forestry*

C_M

- Gap between research and practice
  - Public practice
  - Private practice
- Big dollars involved
  - At beginning (replanting costs)
  - At end (ozone and all that)
- Sticks and carrots both necessary

C$_N$

- Strategy: **<u>maximize return on effort</u>**
- NYC study: 1+ million trees per year for 10 years
  - Enough plantable space exists
    - 30 years to reach cover goals
- Trade off between planting rate and time to achieve modelled change

C_N

- Serious concerns
  - Sources
    - **How to find that many trees**
  - **Specs**
    - **What size? What form? What species?**
  - **Sites**
    - **How will sites be identified and distributed?**
  - **Logistics**
    - **Storage, transportation, staging**
  - **Personnel**
    - **Who is going to plant? Oversight?**

C$_N$

- Tactics: identify likely locations
  - Public
    - Transport corridors
    - Institutions
  - Private
    - Corporate campuses
      - **"Acres for Ozone" ?**
    - Institutions

Conclusions

- Serious but not insurmountable practical implications of trees-for-ozone policy
- These concerns affect policy-level decisions through cost/benefit analysis
- As policy work proceeds, practical planning should keep step
- **Action step**: create draft of practical planning document