Community Trees and Carbon Sequestration

Partners in Community Forestry National Conference

November 19, 2008
Atlanta, Georgia

Dudley R. Hartel, Centre Manager
Urban Forestry South
Athens, Georgia

A very brief introduction to the potential for carbon sequestration projects in urban areas.

References

- **A Model of Urban Forest Sustainability**
  - James R. Clark, Nelda P. Matheny, et.al.
  - Journal of Arboriculture 23(1), January, 1997
- **Harnessing Farms & Forest in the Low-Carbon Economy**, "How to Create, Measure, and Verify Greenhouse Gas Offsets"
  - Zach Willey and Bill Chameides, Editors
  - Nicholas Institute of Environmental Policy Solutions, Duke University Press, 2007
- **California Climate Action Registry**
  - Project Protocols (& Verification)
    - Urban Forestry
    - Forestry
- **Urban Tree Risk Management**
  - J.D. Pokorny, USDA FS, 2003

Entrance into the urban forestry carbon market will require a fairly intense management program.
The carbon goal is to produce trees (carbon sinks) that are healthy and have long life cycles with minimum costs.
And, the carbon market itself will impose a new set of costs not previously encountered in most communities.

References for this discussion include:

- **UF Sustainability** which emphasizes a comprehensive approach to UF management
- **Harnessing Farms & Forests** which gives specific farm & industrial forest examples, but is important for details on inventory
- CCAR (CA Climate Action Registry) **Urban Forest Project Protocol** is currently the most comprehensive UF protocol published
- **Urban Tree Risk Management** is an essential component of a comprehensive UF management program.

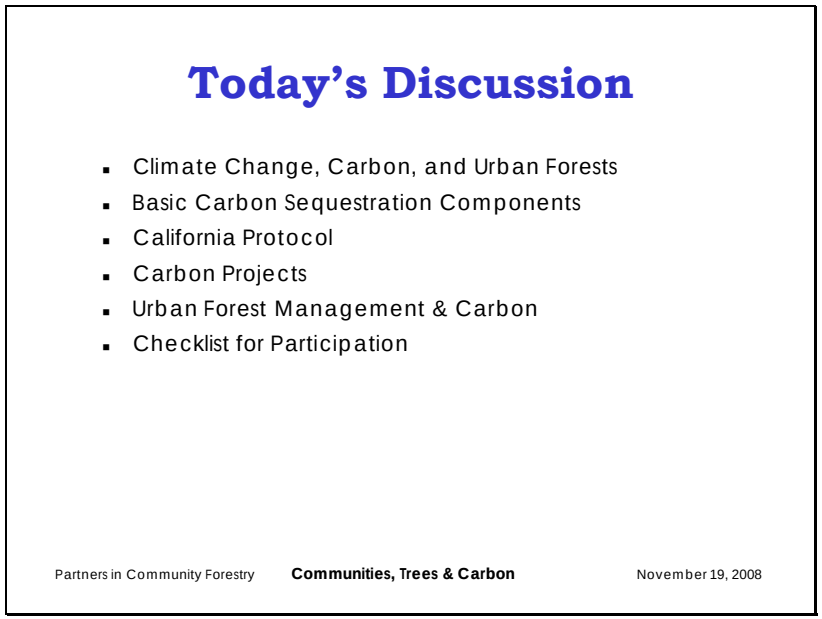
In addition, regional or national best management practice guides should be adopted and incorporated into your community's management program.
Examples include:

- Sample nursery stock specification for shade trees, E.F. Gilman,

University of Florida
- Planting specification for trees, E.F. Gilman, University of Florida
- Writing Good Pruning Specifications, E.F. Gilman, University of Florida
  - Sample pruning Specs for Young Trees
  - Sample Pruning Specs for Medium and Mature Trees

James Urban's 2008 book, **Up by Roots**, is an excellent field guide for developing appropriate planting sites for long-term urban forest sustainability.

In preparation for your community's participation in carbon markets, read them all and adopt these or similar practices!



The Climate Change setting.

Important terminology.

The California Protocol (first comprehensive urban specific protocol) is discussed because of its importance in defining methods and opportunities. It was developed by a committee under leadership of Dr. Greg McPherson (USDA FS in Davis, CA). And used Reference City data for the "business as usual" calculation.

Basic carbon sequestration definitions and concepts.

What will qualify and be appropriate for carbon sequestration.

The bigger picture of urban forest management (sustainability) and carbon.

Climate Change, Carbon & Urban Forests

- **Climate Change, Compliant & Voluntary Markets**
  - Drives the market for carbon
- **US Mayors' Climate Agreement**
  - Targets for GHG reductions set by cities
  - Uses multiple components to meet the target
- **Other Agreements, Targets, & Incentives**
  - Kyoto & European Union
  - Marketing
- **What trees can/can't do**
  - Store carbon; but, **reversible** (losses)
  - Other benefits; the "package" has added value
  - Comprehensive management approach is essential

Partners in Community Forestry **Communities, Trees & Carbon** November 19, 2008

The current climate change "discussion" is the only/primary reason that carbon sequestration is of interest.

In the US, 902 cities (November 2008) have joined the agreement. Opportunities exist for urban foresters and arborists to get involved.

The EU and Kyoto Agreement drive market in Europe. Corporate marketing (i.e. public relations) is part of the US voluntary carbon market incentive.

But,

- Carbon stored in living systems (trees, soil) can be lost to the atmosphere from biological processes (decay) and management (harvest, fire, cultivation)
- Trees (and soil) provide a bundle of benefits that engineered solutions for CO_2 reduction/sequestration cannot
- Comprehensive (intensive and extensive) UF management is the key to maximum storage at lowest cost for the longest time (i.e. healthy trees)

The Carbon Market Basics

- **Additionality**
  - "Business as usual"
    - Baseline inventories
    - Performance standards (CA)
- **Leakage**
  - Reassigning resources (budgets)
- **Permanence (Reversibility)**
  - Unplanned
    - Tree biology
    - Disaster
  - Planned
    - Management
- **Metric Ton of CO_2** (1,000 kg = 2,200 lbs)

Partners in Community Forestry **Communities, Trees & Carbon** November 19, 2008

The primary issues for carbon market sellers (and buyers):

- Carbon being marketed must be "new" carbon that would not have otherwise been stored (from actions/management that you normally do)
- Communities cannot not take funding from existing carbon budgets (i.e. current UF management program) to pay for new carbon projects
- Protocols and communities must account for the non-permanence of biological carbon
  - discounted carbon storage (i.e. only get credit for a portion of the carbon in the project; remainder held against risk of loss)
  - or, insurance against carbon losses that are part of the contract

Dudley R. Hartel, Center Manager
Urban Forestry South dhartel@fs.fed.us

California UF Protocol

- **Direct carbon benefit only**
  - Energy reductions from shading
- **Eligibility & ownership**
  - Urban setting
  - Entity must own or control
- **Performance standards (Additionality)**
  - Net Tree Gain (NTG) – Above statutes
  - 1.00 trees planted/tree removed
- **Permanence**
  - 100 year standard – risk of losses

Partners in Community Forestry **Communities, Trees & Carbon** November 19, 2008

CCAR Tree Perspective

- **California: By 2020 reduce to 1990 levels**
  - -173 MMT of CO_2
  - 5,000,000 trees = 0.26 MMT
  - 50,000,000 trees (2025) = 4.5 MMT (2.6%!)
- **Large Scale Projects!**
- **Costs**
  - $140 - $553/Metric Ton
  - Sacramento Tree Foundation
    - $150/Metric Ton
  - Management (Planting, inventory, care, replacement)
  - Verification

Partners in Community Forestry **Communities, Trees & Carbon** November 19, 2008

The CCAR UF Protocol will NOT include the indirect CO_2 reduction because of shading (reduced electric demand) and reduction in electric generation.

Projects must be in urban areas, and the entity claiming the offset or selling it must have direct ownership or a long-term contract with the owner that controls the carbon over the length of the offset agreement.

CCAR opted for performance standards based on the reference city studies instead of a baseline or record-based assessment of historic management. Standards have been set for cities and campuses. Utility standards will also be developed. Originally CCAR was proposing 1.16 planted trees for each tree removed; but, opted for an easier standard that only requires 1 tree planted for each tree removed before getting any carbon project credit. Net tree gain (NTG) is actually No net loss in this protocol.

The reporting period is 100 years and a risk evaluation procedure has been developed to account for losses (human and natural). Basically, depending on the risk assessment, carbon sequestration credit is only given for a percentage of number of trees planted. e.g. If 1,000 trees are planted for a project at minor risk, maybe credit will be given for 850 trees to adjust upfront for the expected losses.

Trees in perspective!

Only one small part of the GHG reduction puzzle for California (and others).

Project scale is immense.

Life cycle costs for CO_2 sequestration are known (exclude specific protocol monitoring costs); but, other benefits are also realized.

Dudley R. Hartel, Center Manager
Urban Forestry South dhartel@fs.fed.us November 2008

Carbon Sequestration

- **Street trees (?)**
  - Monitoring costs higher (individual trees)
  - Maintenance cost vs growth (site quality)
  - Risk high (human losses)
- **Park trees**
  - Scale should reduce costs
  - Risk of loss may be high
- **Tree Projects**
  - Greenways
  - Mitigation areas (FEMA)
  - Corporate partnerships
  - Others (Landfills, brownfields, land application areas, Ind. Dev.)

Partners in Community Forestry **Communities, Trees & Carbon** November 19, 2008

What are the most suitable public resources for carbon markets?

Street trees:
- Higher maintenance costs
- Shorter life cycle (higher risk of loss before the carbon contract ends)
- Higher carbon market inventory, verification costs

Large projects on previously un-treed land that has only passive use:

- Lower maintenance costs
- Longer life cycle (unless harvested)
- Lower inventory & verification costs

UF Management & Carbon

- **Healthy trees increase all ecosystem benefits**
  - Carbon sequestration rate higher
  - Trees live longer
  - Lower risk of loss
  - Increased return on investment
- **Regular assessments & records**
  - Supports intensive management
  - Supports carbon reporting
- **If an UF carbon project**
  - Pays more than the additional "carbon related" costs
  - And, pays some (or all) of management costs
  - Then, the carbon market is subsidizing other benefits
    - e.g. Improved water or air quality as lower cost

Partners in Community Forestry **Communities, Trees & Carbon** November 19, 2008

Long-term and sustainable UF management programs should improve a community's carbon opportunities.

Carbon is a component of the ecosystems market approach to management; one resource (trees) and many benefits (& potential markets).

A carbon market that supports some or all of your management costs means that the additional ecosystem services (that are currently not directly compensated; $$) are even less costly.

Dudley R. Hartel, Center Manager
Urban Forestry South dhartel@fs.fed.us November 2008

Carbon Participation Checklist

- US Mayor's Climate Protection Agreement
- FEMA Permanent Relocations
- Brownfield Remediation programs
  - EPA
  - State
- Other land (all types)
- Active NGO and/or citizen participation
- Current & periodic public tree inventory
- High level of UF management

Partners in Community Forestry **Communities, Trees & Carbon** November 19, 2008

Communities that have some or all of these programs currently implemented will find entry into (urban) forestry carbon markets easier.

Dudley R. Hartel
Center Manager, Urban Forestry South
Athens, Georgia

(706) 559-4236 office
dhartel@fs.fed.us

www.UrbanForestrySouth.org

For a copy of this presentation and additional information on urban forestry and carbon markets, visit www.UrbanForestrySouth.org.