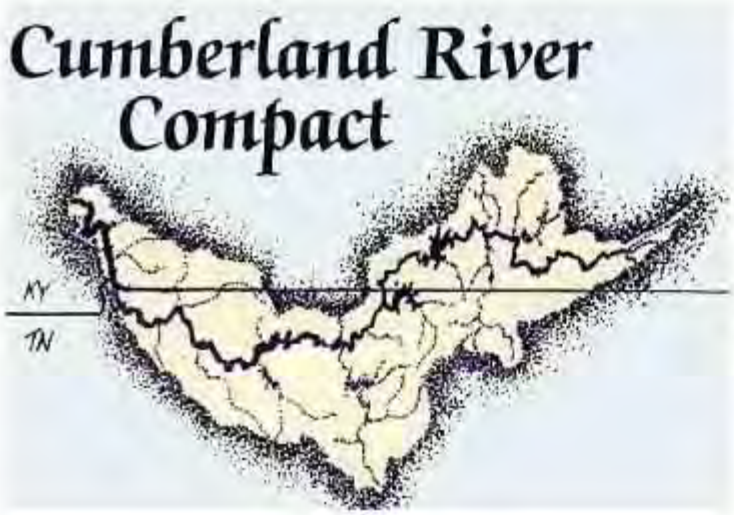
Building Outside the Box

A Cumberland River Compact Program

Sustainable Building Practices for Water Quality and Quantity

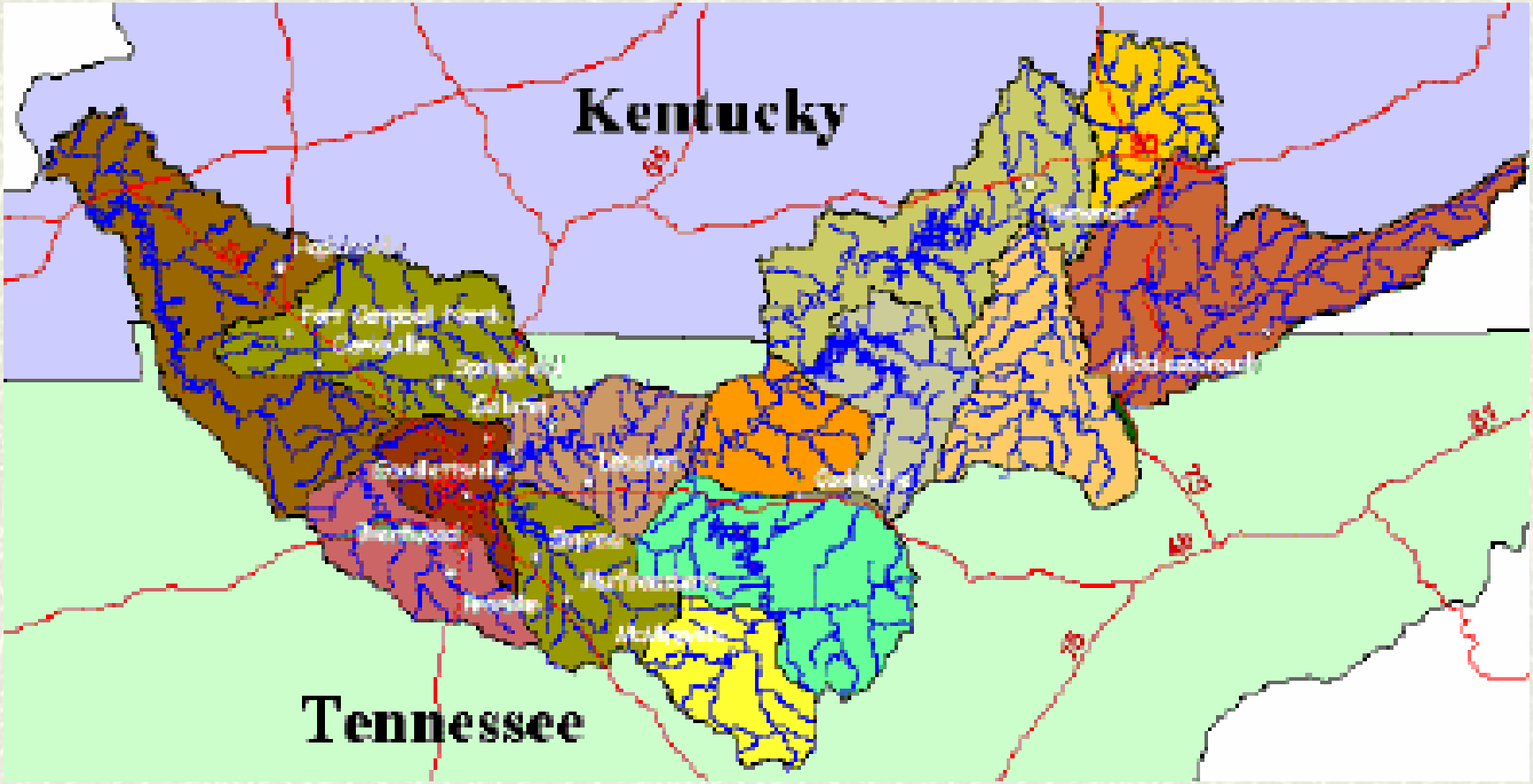
Working Approaches through EPA Targeted Watershed Initiative Grants



Mission of the Cumberland River Compact

To enhance the water quality of the Cumberland River and its tributaries through education and by promoting cooperation among citizens, businesses, and agencies in Kentucky and Tennessee.

Cumberland River Basin



What's special about our region?

- Outstanding recreational areas
- Globally significant biodiversity
- Most diverse mussel fauna
- 1/2 freshwater fish in US
- Many threatened & endangered species
- Booming population growth

Major Challenges to Basin Water

- Growth and development
- Urban runoff, roads, & construction
- Industrial discharges
- Farming, clearcutting and loss of habitat
- Acid mine runoff, oil & gas drilling
- Straight piping and failing septic systems
- Invasive exotic species

Urbanization impacts on water:

- Impervious surfaces
- Loss of buffer zones
- Flash floods
- Stream bank erosion
- Lack of Recharge
- Water demands
- Wastewater discharges
- Urban stormwater

How we got started in sustainable, water-friendly building:

1. Held two Conservation & Common Sense Development Workshops
2. Put Low Impact Development on the ground in the Cumberland Basin

Building Outside the Box was born to:

- Demonstrate sustainable building practices
- Implement stream restoration projects
- Improve land use practices to protect water quality
- Educate on benefits & methods of protecting water quality

Sustainable Building: Two Key Factors for Water

- Impervious Surface Cover – mimic natural hydrology
- Streamside Buffers – mimic natural vegetation

Impervious Cover – key factor

- 1-10% IC = Sensitive
- 11-25% IC = Impacted
- 26-100% IC = Non-supporting

- Channel instability
- Loss of habitat
- Poor water quality
- Flash Flood – Drought Cycle

Building Outside the Box (BOB)

Demonstration sites in three impaired watersheds of Cumberland Basin

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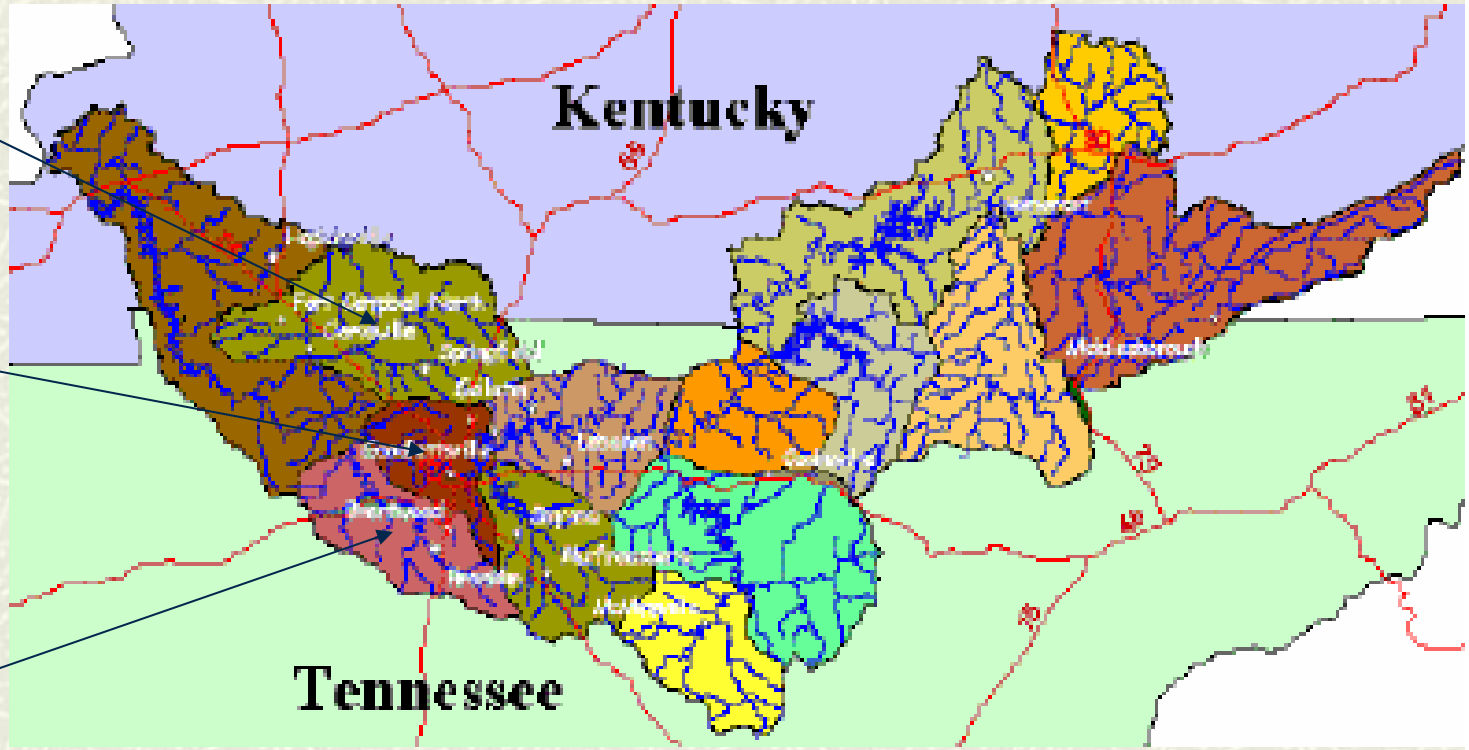
- **Suburban – Harpeth River**
- **Urban – Mill Creek**
- **Rural – Red River**

Cumberland River Basin

- Red River
- Mill Creek
- Harpeth River



Red River – BOB rural site

- **200 acre farm**
- **Logan County, KY**
- **Pleasant Grove Creek**
- **Farm renovations**
- **Agricultural BMPs**
- **Farm house practices**

Improve manure management…

Hard armor cattle crossings
Re-establish Streambank stability

Barn Roof Runoff Capture

Quiet Creek – BOB urban site

- **17 acres – Nashville**
- **Franklin Branch**
- **Mill Creek Watershed**
- **Mid-development changes**
- **Site Redesign process**
- **Affordable Housing Resources - partner**
- **1-2 demonstration homes**
- **Stream & Site runoff monitoring**

Original site plans: Mill Creek site

Quiet Creek Redesign

Partners:

Developer

Metro Nashville Design Engineers

Landscape Company

Site Redesign Goals:

Mimic natural hydrology

Minimize impervious Cover

Demo Infiltration Options

Achieve 80% TSS Removal

Bio-Retention Option

Micro Pool Option

Morgan Park Place – Nashville

- Two blocks in Germantown historic district
- 63 units – mixed use
- Model Urban Stormwater treatment
- EarthCraft Multi-family Certified
- Lawrence Brothers and New Urban Construction

Harpeth River – BOB suburban site

- 620 acre farm site in Franklin, TN
- On Harpeth mainstem
- 1000 homes planned
- Aggressive LID practices
- All high performance homes
- Over 40% open space

Highlands at Ladd Park
Harpeth River BOB Site

Stream Restoration – all 3 sites

- Focus on tributaries and headwaters
- Establish and protect buffer zones
- Vegetative plantings
- Stream bank stabilization
- Disconnect stormwater runoff

Project Monitoring

- In-Stream baseflow water quality
- In-stream storm event sampling
- Site runoff on Quiet Creek site
- Economic costs and savings
  - Developers and builders
  - Home owners
  - Communities

BOB Site Goals

- **Less impervious surface**
- **Maximum green space**
- **Maximum stream buffers**
- **Runoff infiltration**
- **Native vegetation**
- **Water conservation**
- **Energy efficiency**

Better Site Design Features

- **Cluster housing**
- **Narrow roads/sidewalks**
- **Rain Gardens/Barrels**
- **Pervious concrete**
- **Dual track or shared driveways**
- **Infiltration landscaping**
- **Water saving appliances**

Infiltration landscaping

- Open Section Roads
- Grass Channels and Swales
- Infiltration Trenches

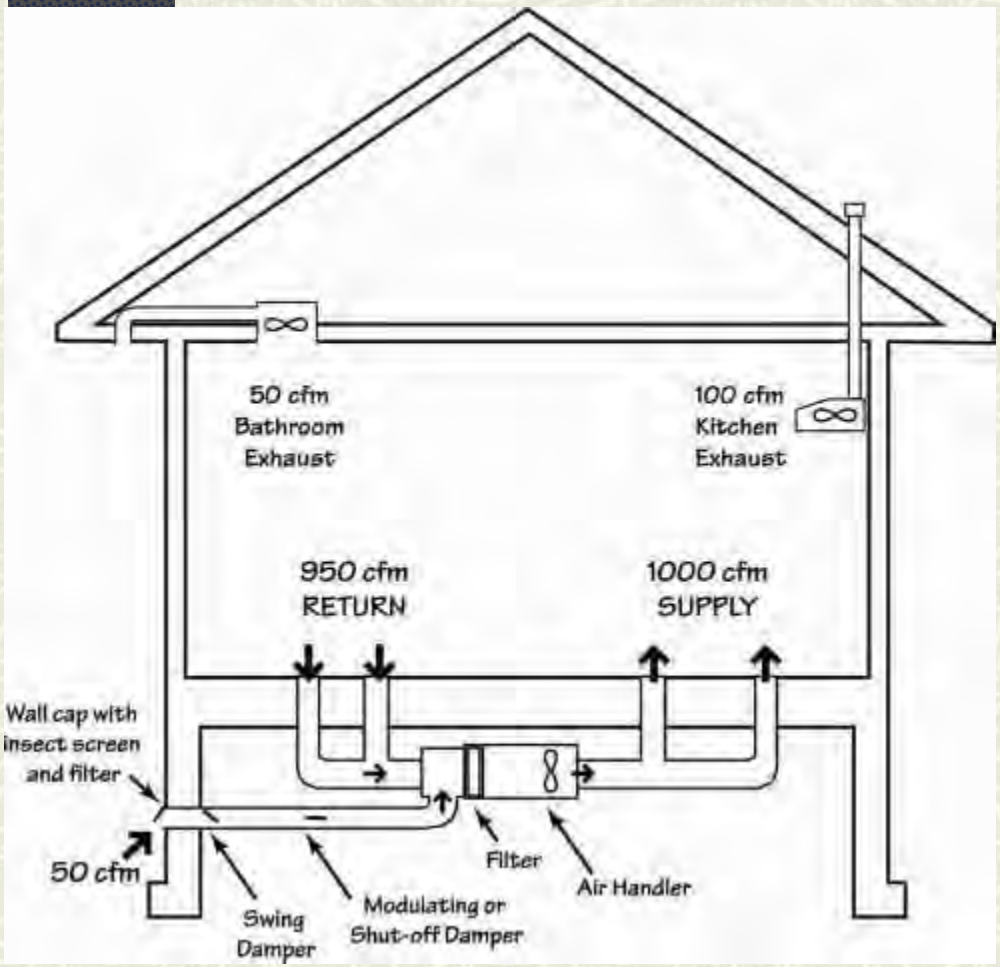
Roof runoff infiltration

Rain Garden

BOB Home Construction

- Earth Craft certified home construction
- Systems approach to sustainable building
- Energy efficiency
- Water efficiency
- Green materials
- Indoor air quality

Systems approach – ventilation



- **Controlled ventilation**
- **Sealed systems**
- **Pressure equalization**
- **Equipment Size Adjusted**
- **Blower Door Test**

Systems Approach to Efficiency

Cost		Savings	
High-Perf. Windows	$500	Right-Sized AC:	($500-$800)
Air Sealing	$250	Reduced # of AC:	($500-$1,000)
Tight Ducts	$250	Compact Ducts	($200-$400)
Effective Insulation	$500	Reduced Framing	($200-$400)
High-Eff. Equip.	$500	Eliminate Furnace	($0-$500)
	$2,000	vs.	($1,500-$2,500)

Benefits of High Performance House

Builders

- Higher demand & market share
- Higher profits
- Higher quality product with lower costs
- Lower liability risks
- Lower call backs

Homeowners

- Higher home value
- Utility Savings
- Better Indoor Air Quality
- Health Benefits
- Greater durability & value appreciation

Improving the way we build:

<u>Start with good planning</u>:

- **TN Growth Readiness**
- **Center for Watershed Protection**
- **Better Site Design Roundtable**
- **Codes & Ordinance Worksheet**
- **Training building professionals**
- **Training Realtors and Home Owners**

Improving the way we build:

<u>Follow through with Good Implementation</u>:

- Training
- Incentives
- Vigilance
- Inspections
- Enforcement

Focus on Erosion and Sediment Control

Multiple Levels of Awareness Required:

Bankers to Brick-layers

- Growth & Zoning Rules
- Urban Planner
- Developer
- Design Engineer
- Architects
- Builder
- Contractors
- Subcontractors
- Municipal officials
- Home buyer
- Real Estate agents
- Landscapers
- Erosion Control

<u>BOB Educational Outreach:</u>

- EarthCraft House trainings
- LID Trainings
- Home Tours
- Design Charrettes
- Presentations
- LOC Programs
- SWAN website

BOB Outcomes

- Demonstrate sustainable building is cost effective and protects water quality
- Motivate building community to adopt it
- Raise awareness of public to ask for it
- Improve water quality in basin

Applications to Watershed Protection

- Cumulative effects make big difference
- Smart sites to go with smart growth planning
- Conservation design and erosion control are key components
- Can intervene at any point in process

Tangible Outcomes On the Ground

- First Earth Craft house in Tennessee
- First Water-Friendly mixed use development in Nashville
- Pledges for over 1,000 water-friendly homes
- A fourth BOB site added with a fifth coming
- SOLD! *Developers saw them sell and started building more!*

Tangible Outcomes in Education

- Southeast Watershed Assistance Network launched and
- Over 1,000 people taught in person:

-Builders learning on construction sites

-Developers & Designers on site & in charettes and trainings

-Professionals & the public attending workshops

BOB Partnerships

- 3 Watershed associations – Harpeth, Red, Mid-Cumberland
- 3 Universities – Vanderbilt, Austin Peay, Western Kentucky
- Home Builders Association of Middle Tennessee
- Southeast Watershed Forum
- Affordable Housing Resources, Inc.
- Southface Energy Institute / Earth Craft House
- Center for Watershed Protection
- Federal agencies – EPA, USGS, TVA & NACD
- State agencies – TDEC and TDA
- Municipal agencies – Stormwater and Codes, Planning
- Professional groups – ASLA, AIA and USGBC
- Electric utilities - NES and MTEMC
- Local business leaders – architects, builders, planners, engineers
- Local officials – District conservationists, planners, mayors

For full list go to www.cumberlandrivercompact.org

Resources

- Cumberland River Compact
  www.cumberlandrivercompact.org
  www.buildingoutsidethebox.org
- Southeast Watershed Assistance Network
  www.watershed-assistance.net
- Center for Watershed Protection
  www.cwp.org
- U.S Green Building Council
  www.usgbc.org
- Earth Craft House Program
  www.earthcrafthouse.com

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