



# EREN: PERMANENT FOREST PLOT PROJECT (PFPP) ESA WORKSHOP 2011

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# Permanent Forest Plot Project (PFPP)

## Snapshot

- ❑ Establish 20 x 20 meter permanent plots
- ❑ Protocol for faculty and students in a lab setting (1-3 labs)
- ❑ Educational materials available for student learning outcomes and assessment
- ❑ Online database to download and upload to share data from multiple sites
- ❑ List of suggested ecological questions to be answered by students in a class setting, or by faculty and students in a collaborative research effort which focuses on:
  - ❑ Carbon sequestration
  - ❑ Urbanization effects on forest community
  - ❑ Invasive plant species

# Example Research Questions:

<http://erenweb.org/project/carbon-storage-project/permanent-plot-protocol/potential-pfpp-research-questions/>

- Stem biomass: urban versus rural forest plots
- Carbon accumulation relative to annual rainfall, temperature, etc.
- Edge type (road, electric line, pasture, buildings, etc.): impacts on forest composition
- Invasive species (garlic mustard, bush honeysuckle, privet, multiflora rose, etc.): impacts on native species biomass

# PFPP Student Learning Outcomes/Skills

- Hypothesis Formulation and Testing
- Field Work and Data Collection:
  - plot establishment
  - tree measurements
  - site variables including topography, soil, disturbance
- Data Management:
  - entry and proofreading
  - analysis
- Oral or written reports
- Group projects: teamwork

# Time commitment options: One lab (2-3 hrs)

## Choose one option

- Set up one 20 x 20 m plot
- Identify and measure all trees in previously set 20 x 20 m plot
- Measure small stems (less than 2.5 cm dbh) in previously set 20 x 20 plot
- Re-measure previous year's 20 x 20 m plot
- Download and analyze data from other sites and answer a specified question

# Time commitment options: 2 labs

## Set up plot and choose second option

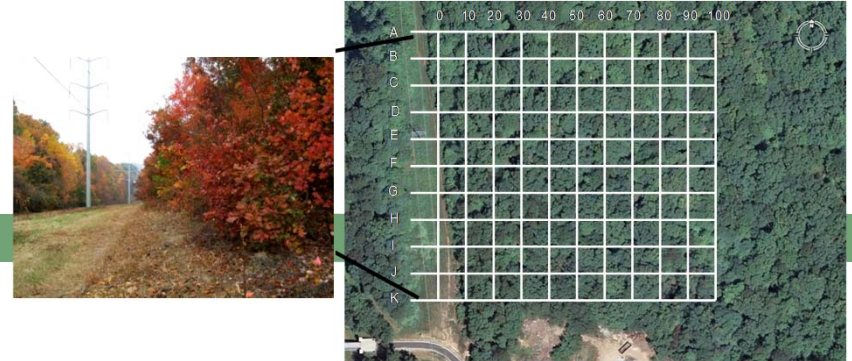
- Set up one 20 x 20 m plot AND
  - Identify all trees in previously set 20 x 20 m plot
  - Measure small stems (less than 2.5 cm dbh) in previously set 20 x 20 plot
  - Re-measure previous year's 20 x 20 m plot
  - Set up an additional 20 x 20 m plot
  - Analyze data of one 20 x 20 m plot

# Time commitment options: 3 labs

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- Lab 1: Set up one 20 x 20 m plot
- Lab 2: Analyze data of one 20 x 20 m plot OR  
Collect more data
- Lab 3: Analyze data OR
  - Students present findings in an oral presentation OR
  - Submit written scientific papers, exchange papers for peer review, and revise papers
  - Rubrics provided to help grade oral presentations, papers, and peer reviews

# Permanent Forest Plots



- ❑ 20 x 20 m plots
- ❑ Can be in any type of forest: old growth, naturally regenerated, recently disturbed, managed, small fragment or forest edge
- ❑ Site variables will describe all the above and more
- ❑ One plot sufficient for classroom purposes
- ❑ Three or more replicate plots per site recommended for research participation



# Lab Protocol Downloads

- Lab Protocol (abbreviated and expanded)
  - ▣ List of Materials
  - ▣ Step by step directions for plot formation and tree measurements
- Appendices 1 & 2: Soil methods
- Appendix 3: Forest area using USDA Soil Survey
- Appendix 4: Percent cover pictorial guide
- Appendix 5: Plant species abbreviation list
- Appendices 6 & 7: DBH and stem soundness guides
- Data Forms: Plot, Trees, and Small stems (<2.5 cm)

# Measurements and Equipment Needed

- Downloadable handouts, data sheets, etc.
- 3 50-m transect tapes
- DBH tape
- Compasses
- Pin flags
- Clinometer
- Optional: metal calipers for small stems, aluminum tags and nails for trees, GPS for plot location and soil survey



# Data Entry and Analysis

- Data entry forms for plot and tree field data
  - Some site data (soil and climate) is obtained from websites
- Standard Excel database provided for data entry and uploading (CSV file) to EREN website
- Data Assurance and Quality Control protocol provided for data proofreading before uploading
- Protocol includes information needed for students to calculate basal area, biomass, and carbon

# Instructor Resources Available for Downloading

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- ❑ PFPP Instructor Overview of Educational Resources
- ❑ Data Quality Assurance Directions (Word) and database example (Excel)
- ❑ Suggested Student Assignments and Instructor Rubrics
- ❑ Group Work Ground Rules and Contract
- ❑ Group Work Evaluations

# Lab Assignment Example: % Total Campus Carbon Emissions Sequestered by Campus Forest

- DBH change → Biomass estimate (Jenkins et al. 2003)
- Estimated  $\sim 85.5 \text{ kg C ha}^{-1} \text{ yr}^{-1}$
- Meredith College Forest = 22.26 ha
- Meredith carbon emissions = 16,003,000 kg C yr<sup>-1</sup>  
(Environmental Resources class estimate)
- Meredith Forest sequesters 0.026% of our annual carbon emissions



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- EREN Colleagues:
  - ▣ <http://erenweb.org/about/leadership-committee/>

