**CRUM WOODS VISION**

“*Here the careworn teacher could retire in summer and rest his weary mind. Here the student could withdraw from the busy hum of voices and uninterruptedly drink deep of learning’s fount. The scenery below and around…. Must be a fit place for deep thought and sweet communion of mind”* -- Isaac Hicks on first visiting the Crum Woods in 1865.

The idyllic, modest ends described 150 years ago are harder to achieve on a planet now in crisis.[[1]](#footnote-1) The College’s commitment to sustainability should explicitly include stewardship in the Crum Woods, both as effective management of a natural endowment, and as an opportunity for the College and surrounding community to develop local ecological knowledge and natural history literacy--all in the context of enormous social and environmental challenges.

The Crum Woods will be a place where learning happens, people come to relax and rejuvenate, and community members connect to each other and the land they live on. We will maximize and balance the pedagogical, recreational, and recuperative purposes of the Woods by restoring and maintaining ecological communities appropriate to the meeting of two bioregions (Piedmont and Coastal Plain) in Southeastern Pennsylvania. Swarthmore’s Crum Woods will provide a replicable model for suburban woodland management and College woods management.

**OBJECTIVES**

**Restoration and maintenance**: Prioritizing areas of outstanding natural value, we will maintain or expand net woodland interior while dramatically reducing the impact of the most damaging invasive plants, storm-water runoff, deer, and other threats. Immediate priorities include:

1. Invasive plant management and reforestation
2. Continued/ ongoing deer population management
3. Hydrology: stormwater runoff and erosion

**Teaching**: We will encourage, support, and document teaching in the Woods across all appropriate disciplines at the College. A Crum Woods Steward will coordinate with academic departments and manage a database of all projects conducted in and regarding the woods.

**Research**: We will encourage, support, document, and oversee research in the Woods across all appropriate disciplines at the College. The Crum Woods Steward will curate long-term data on ecosystem health.

**Access, safety, wellness**: We will maintain and identify safe trails of varying challenge as we encourage college and local community members to access the Woods for wellness and passive recreation with minimum disturbance to local ecosystems. Day-to-day activities in the Crum will be managed by the Crum Woods Steward.

**Community engagement**: Through celebration, education, and stewardship events we will engage College and local community members as stewards of the Woods, increasing their own expertise and resilience as they give back to the Woods through restoration and maintenance projects. The Crum Woods Steward will collaborate with community members and volunteers.

**GOALS:**

**Restoration and maintenance**

**Biodiversity**

* Design and implement protocols for surveying and quantifying the richness and abundance of native and non-native plant species present in the Plant Communities Units delineated in the Crum Woods Conservation and Stewardship Plan (Figure 4).
* Design protocols to survey other organisms such as amphibians, stream invertebrates, birds, small mammals, etc.
* Establish partnerships with local and state organizations to help with the surveying and quantification of the biodiversity of organisms.
* Seek funding at state and federal levels for woods restoration; apply for 4 grants within 3 years.
* Publish annual biodiversity progress reports on CWSC website

**Deer Management**

* In consultation with Biology faculty and Roger Latham, maintain deer exclosure plots and supervise student interns and researchers in gathering data
* Manage annual hunting season and deer cull by communicating with state agencies and contractors; submitting permit applications; arranging archery hunting; arranging, preparing for, and overseeing cull; informing campus and local communities.
* Oversee production of annual report on deer monitoring efforts and evidence of ongoing deer pressure on native flora

**Invasive Species Management and Reforestation**

* Develop and implement a comprehensive 5-year invasive species management plan for the woods, including replacement with native species.
  + create separate plans for the east side of the creek, the west side of the creek, and the Martin Forest
  + individually target invasive species of highest concern,
  + protect four areas of highest ecological value (Martin Forest, Wister Forest, Skunk-cabbage Hollow, and Southern Red Oak Forest),
  + incorporate the mowing of meadow and ROW areas into the management plan, and
  + incorporate the annual efforts of the Woods Crew.
* Develop and implement a comprehensive invasive species management plan for each of the the most problematic species or groups of plants, including:
  + vines & lianas (English ivy, Japanese honeysuckle, Japanese hops, Oriental bittersweet, porcelain-berry)
  + trees (Norway maple, Japanese angelica tree, castor aralia, empress-tree, tree-of-heaven, bee-bee tree, cork tree)
  + shrubs (privet, Amur honeysuckle, burning bush, barberrry, jetbead, sapphireberry)
  + herbaceous plants (Japanese knotweed, Japanese stiltgrass, garlic mustard, lesser celandine, mugwort)
  + References should include the Pennsylvania Department of Conservation and Natural Resources and the USDA's report Future Forests of Northern United States (2016).
* Develop and implement 10-year invasive species management plans for each of the four areas of highest ecological value (Martin Forest, Wister Forest, Skunk-cabbage Hollow, and Southern Red Oak Forest), including the documentation of native species present to determine best reforestation plantings for these areas and of the reduction of invasive species with before and after photography.

**Afforestation**

* In consultation with the Crum Woods Stewardship committee and the Woods Crew, develop a 5-year comprehensive plan for increasing net forest interior.by planting the edges of the woods with native species.

**Rights of Way Management**

* Develop and implement a planting and maintenance plan for Central Delaware County Authority (CDCA) right of way (sewer line).
* Collaborate with SEPTA on restoration efforts from the disturbance of the viaduct.
* Discuss with petroleum right-of-way the possibility of planting native grasses along gas line.
* Update rights-of-way on GIS maps.

**Hydrology**

* Develop a holistic plan for monitoring and managing hydrology in the woods
  + Complete the restoration of the Lang swale by 2021
  + If possible, obtain data on water volumes and erosion loads before SEPTA project
  + Document areas generating large volumes of storm runoff (Art McGarity student project 2011)
  + Design and begin to implement strategies to reduce and mitigate those volumes
  + Repair the riparian buffer along the Crum- particularly in the sewer line swath.

**Teaching**

* Work with PSRF fellows and others to create a database of courses, activities, and assignments engaging the Crum Woods.
* Encourage faculty on and off-campus to use components of that database: 300 hits over first three years
* Work with CWSC and faculty to support new and ongoing teaching in the woods:
  + facilitate assignments in the Crum woods for at least 3 new courses (taught by at least 2 professors) over 3 years
    - Course descriptions should note number of hours spent in woods during the semester

**Research**

* Work with the Office of Sustainability, PSRF fellows and others to create a database of research conducted in the Crum Woods.
* Develop an ecosystems services model for conservation in the Crum Woods (see rough outline below)
  + Articulate the benefits of this model as well as kinds of understanding it discounts
  + Address ethical concerns about the model’s underlying economic metaphor
* Work with CWSC and faculty to support new and ongoing research in the woods
  + Facilitate the teaching of field techniques
* Ensure that all student and faculty research is responsibly completed and any impacts appropriately remediated

**Access, Safety, Wellness**

* Work with Public Safety to ensure the Woods are a safe place to walk and that community members can call for and receive help rapidly when needed
* Develop written protocols for best practices in reducing alcohol and unsafe actions in the Woods.
* Maintain trails and reduce, remove, or provide warning of hazards that might endanger student researchers, classes, or students seeking sanctuary
* Weekly tours for campus and regional community members
* Increase number of community members enjoying the woods by 25% in two years

**Community Engagement**

* Increase campus participation in Crum clean-ups and planting events by by 50% within 2 years
* Hold community celebrations (e.g., tree planting, fall festival, spring wildflower photo safari, other)
* Support Citizen Science projects connecting campus and community
* Facilitate development of Crum Woods Neighbor network (property owners contiguous to woods) and/or Crum Woods Regional Board (with greater research expertise: CRCW, Stroud Water Research, other)
  + Organize annual or bi-annual meetings
  + Invite participation on CWSC (without constraining scheduling of meetings)
* Seek federal and state funding for community engagement projects, especially a Student Naturalist program

**Staffing Section**

* Within 5 years, establish a 2-person team in order to have one Crum Caretaker dedicated full-time to hands-on woods management and one Crum Coordinator dedicated full-time to community engagement, administration, advancement, and coordination/facilitation between various stakeholders.
  + Begin with one full time position with 70/30 woods management/facilitation split

Crum Caretaker

60% time working in woods

20% time coordinating with grounds department’s Woods Crew, volunteers, student workers

20% planning and reports

Biodiversity report; invasive plants; reforestation plan and implementation; safety

Crum Coordinator

40% Oversee student naturalist program, starting with 3 students and growing 1/year to maximum

of 10 [10 students 8 hours a week (800/week x 10 weeks: $8K)]

20% Research and teaching databases, website; reports

20% Teaching and research support

20% Writing grant applications

Outline of Ecosystems Services Model for Crum Woods Conservation

The conservation and stewardship of the Crum Woods will secure the ecological functioning of the various ecosystems types present in the Crum to supply ecosystem services that will benefit the Swarthmore College community. Special attention will be placed on the restoration and maintenance of the biodiversity of organisms that make the ecosystem types that are part of the Southeastern Pennsylvania’s Piedmont Region.

A successful program will provide measurable ecosystem services that can be classified as

* supporting (i.e., primary production, nutrient cycling, soil formation, etc.),
* regulating (i.e., flood regulation, water quality, resistance to non-native species, etc.), and
* cultural (i.e. aesthetic, spiritual, educational, and recreational).

Supporting Services:

1. Protection and/or expansion of ecosystems interior through the removal of most common non-native plant species and replacement with native species.

Regulating Services:

1. Control of stormwater runoff from impermeable surfaces and reduction of soil erosion.
2. Improve flood regulation by reforestation of floodplains and plants communities along the creek

Cultural Services:

1. Teaching and research
2. Access, safety, wellness
3. Community engagement

1. Anderies JM, Carpenter SR, Steffen W, Rockstrom J (2012) ["The Topology of Non-Linear Global Carbon Dynamics: From Tipping Points to Planetary Boundaries"](http://csid.asu.edu/files/CSID_WP_2012-009.pdf) Center for the Study of Institutional Diversity, Working Paper Series #CSID-2012-009. [↑](#footnote-ref-1)