Angels of Apiculture: Setting the Stage for Healthy Bees, Trees, and Families

Final Report

Mission

Green Forests Work's (GFW) mission is to re-establish healthy and productive forests on formerly mined lands in Appalachia.

Vision

GFW's vision is to create a renewable and sustainable multi-use resource that will provide economic opportunities while enhancing the local and global environment by converting reclaimed, non-native grasslands and scrublands into healthy, productive forestland.

Our reforestation projects provide jobs for equipment operators, nursery workers, and tree planters, and improve the environment by eradicating exotic species and restoring ecosystem services. With the help of our partners and volunteers, this vision is quickly becoming a reality…

Since 2009, we have planted more than two million trees on more than 3,200 acres,

but there are nearly one million acres left to reforest.

Michael French
Director of Operations
812.447.3285
michael.french@greenforestswork.org

Green Forests Work
T.P. Cooper Building
730 Rose Street
Lexington, KY 40546

Kylie Schmidt
Reforestation Coordinator
859.421.9222
kylie.schmidt@greenforestswork.org

Twenty year old research plots on a surface mine in Breathitt County Kentucky show how the Forestry Reclamation Approach allows native forests to be re-established after reclamation.

Front Cover: Students planting pollinator-friendly plants along the Cane Run Creek. Photo Credit: Steve Patton, UK College of Agriculture, Food, and Environment.

Table of Contents

Image Credits

BACKGROUND

This project was a collaborative effort between Coal Country Beeworks, Green Forests Work, the University of Kentucky, the Appalachian Regional Reforestation Initiative, and Monsanto to conduct various pollinator workshops, displays, and presentations, primarily for youth in Kentucky.

Honey bees are often called "angels of agriculture" because they increase the seed-set and fruit and nut production of many row crops, berry-producing brambles, orchard plants, and food sources for livestock (e.g. alfalfa for cows). Many trees in the Appalachian region are good nectar and pollen producers, providing much needed support for agriculture's angels. However, in the past many surface mines were reclaimed in a way that resulted in a loss of pollinator habitat. Green Forests Work and the Appalachian Regional Reforestation Initiative have been working together to return the native forest, and thus pollinator habitat, to these formerly mined, grass– and shrub-lands in Appalachia. The volunteer planting events provide an excellent opportunity to educate participants on the need for pollinators and hence reforestation and to generate interest in these fields. As many active surface mines are being reclaimed to pollinator habitat and as reforestation is occurring on previously mined lands, forest-based beekeeping has become an increasingly viable option for a region that is struggling economically and looking for more sustainable solutions.

Forest-based beekeeping could help to restore the cultural heritage of the region by re-connecting people to their landscape and helping them realize their dependence on a healthy, productive ecosystem. The introduction of forest-based beekeeping could also help promote healthier eating and lifestyle habits by educating the community on how honey can be used to replace refined sugars and how other bee products are healthier alternatives to many traditional products.

To set the stage for healthy bees, trees, and families, four different workshops were conducted throughout Kentucky: 1) Honey Cookery, 2) Soap Making, 3) Candle Making, and 4) Pollinator Habitat Creation. Angels of Apiculture workshops introduced participants to Appalachian forest-based beekeeping while teaching skills and conservation techniques related to forest fragmentation, pollinator health, pollinator habitat, and hive maintenance. Angels of Apiculture began with educational activities concerning the local environment and ecology, particularly the trees, and then immersed students in bee-keeping and associated skills in the bee-arts in a variety of ways (cooking, wax classes, soap-making, salves, balms, etc.). These workshops were tailored to the age of the audience and were meant to instill an interest in pollinator protection and support. Other information presented during the workshops included the following topics:

- importance of honey bees to modern agriculture,
- the plight of managed honey bees,
- how and why honey is made and storage methods,
- different honey characteristics,
- honey's practical and health benefits,
- how bees produce wax and honeycomb,
- various uses for beeswax,
- beeswax candle benefits as air purifiers,
- how to avoid being stung, why bees sting, and what happens when they do,
- beginnings of apiculture, and
- forest-based beekeeping.

The following pages provide details about a few of the events with a discussion following.

EVENTS

Riparian & Wetland Planting

Date: October 28, 2015

Location: Lexington, KY

No. of Participants: 200

Age Group: Middle School

Audience: Leestown Middle School

Event Type: Pollinator Habitat Creation

The entire eighth grade class from Leestown Middle School in Lexington spread out along a tributary of Cane Run Creek on the University of Kentucky College of Agriculture, Food and Environment's Spindletop Farm. Under the direction of UK undergraduate and graduate students, staff and alumni, the middle-schoolers' mission was to plant native wildflowers and wetland plants that will entice a variety of pollinators, including seriously threatened honeybees, as well as improve water quality in the heavily impaired Cane Run watershed (Figures 1-2). The students planted 4,000 plants of 25 different species with interesting common names like lizard's tail, monkeyflower, beggar's ticks and sneezeweed in a 10-foot riparian zone on both sides of the stream channel (Table 1). The event was as an opportunity not only to improve water quality but also to educate students—both eighth graders and college students—about riparian restoration, water quality, habitat improvement, and the decrease in honeybee populations (Figures 3). UK Ag News covered the event: http://news.ca.uky.edu/article/bee-happy-eighth-graders-plant-native-wildflowers-cane-run-watershed

Figure 1. Groups of students were led by an experienced volunteer as they plant a section along the Cane Run. Photo Credit: Steve Patton, UK College of Agriculture, Food, and Environment.

Figure 2. Groups of students planting a section of the creek that is visible from a nearby multi-use trail. Photo Credit: Steve Patton, UK College of Agriculture, Food, and Environment.

Common Name	Scientific Name	Number
Lizard's Tail	*Saururus cernuus*	100
Monkeyflower	*Mimulus alatus*	50
Foxglove Beardtongue	*Penstemon digitalis*	50
Halberdleaf Rosemallow	*Hibiscus laevis*	50
Dense Blazing Star	*Liatris spicata*	50
Blue Lobelia	*Lobelia siphilitica*	50
Green Bulrush	*Scirpus atrovirens*	150
Fox Sedge	*Carex vulpinoidea*	100
Frank's Sedge	*Carex frankii*	50
TOTAL		**650**

Table 1. A partial list of the species planted along the tributary.

Figure 3. Dr. Chris Barton and others gave presentations to the students on riparian restoration, water quality, habitat improvement, and the decrease in honeybee populations.

Beeswax Candle Making

Date: May 18, 2016

Age Group: High School

Location: Pikeville, KY

Audience: Pikeville High School—AP Biology

No. of Participants: 85

Event Type: Bee Products Workshop

Advanced Placement Biology students were given a presentation and demonstration on how to make soap and personal care products using bee products (e.g. honey and beeswax) and given soap and lip balm samples. A demonstration was given to an after-school program to educate participants on making candles from beeswax and each student was provided an opportunity to make their own (Figures 4-5).

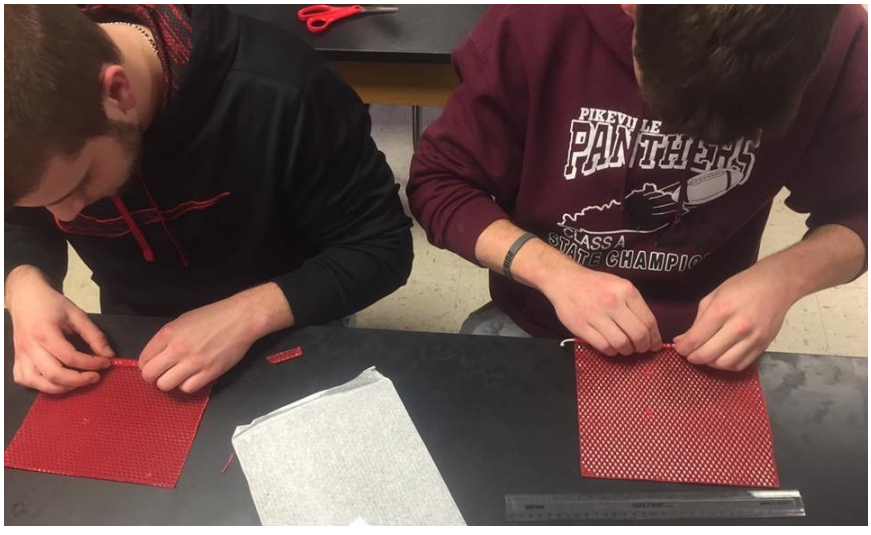

Figure 4. Students constructing their own beeswax candle.

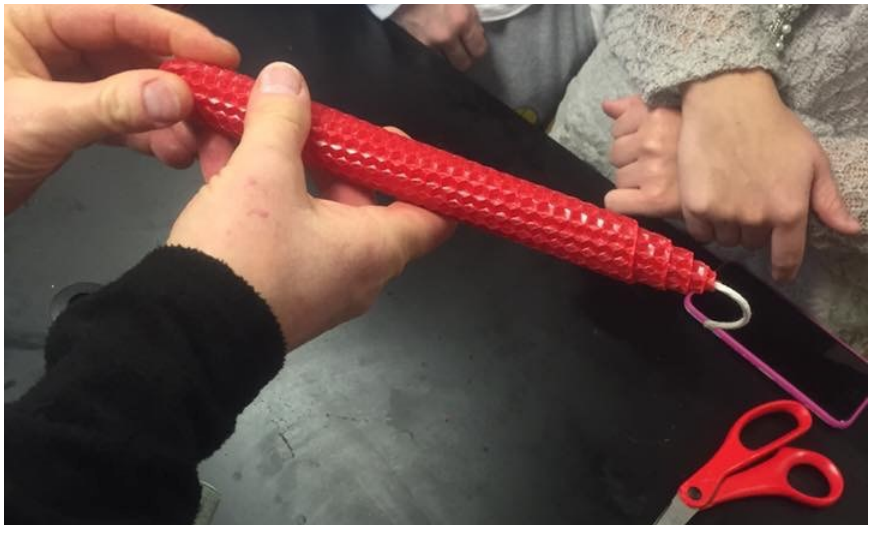

Figure 5. A completed beeswax candle.

Robinson Forest Tree Planting

Date: April 15, 2016

Location: Clayhole, KY

No. of Participants: 108

Age Group: Elementary & High School

Audience: Viper, Hazard, & Buckhorn Schools

Event Type: Pollinator Habitat Creation

Students from Viper Elementary, Hazard High School, and Buckhorn High School participated in a reforestation event on a former surface mine in the University of Kentucky's Robinson Forest, which included a focus on pollinator-friendly species. Prior to planting trees, the students were educated on the need for reforestation on surface mines, how reforestation benefits pollinators, and forest-based beekeeping (Figure 6). The students were provided with lunch and given a seedling to take home and plant. A local news station covered the event: http://www.wymt.com/content/news/Students-help-restore-old-reclaimed-coal-mine-375917091.html

Figure 6. Mary Sheldon of Coal Country Beeworks fields a question from an elementary student following her presentation.

Pollinator & Reforestation Presentation

Date: May 18, 2016

Location: Stone, KY

No. of Participants: 80

Age Group: Elementary & High School

Audience: Southside Elementary & Belfry High

Event Type: Presentation & Display

Second graders from Southside Elementary School and Honors Biology students from Belfry High School met at Grants Branch Park for presentations on honey bees and reforestation, given by Mary Sheldon and Michael French of Green Forests Work (Figures 7-8).

Figure 7. Michael French connects the dots between pollinators and reforestation.

Figure 8. Students examine one of the visual aids while Mary Sheldon gives her presentation.

Cooking with Honey & Beeswax Products Workshops

Date: July 30, 2016

Location: New Castle, KY

No. of Participants: 75

Age Group: Varied

Audience: Henry County Harvest Showcase

Event Type: Bee Products & Cooking

Two workshops were given at the Henry County Harvest Showcase community event: Cooking with Honey and Beeswax Products. Participants of the Cooking with Honey workshop were given several recipes, and they were able to sample many foods that included honey as an ingredient (Figure 9). Participants were also informed about the benefits of substituting honey for refined sugar. The Beeswax Products workshop showcased many of the products made from beeswax, including soaps, balms, salves, and candles (Figure 10). Participants learned the basics of how to get started making these products at home.

Figure 9. Participants of the workshops were able to sample a variety of honey-based foods (see below).

Figure 10. Beeswax soaps, balms, salves, and candles were put on display at the workshops.

Cooking with Honey

During the honey cookery workshops, participants received recipes for the following recipes and were able to sample some of them as well.

- *Honey Sesame Chicken*
- *Honey Rice Krispy Treats*
- *Honey-sweetened Peach & Rooibos Tea*
- *Honey Mustard Dressing*
- *Honey Roasted Carrots*
- *Honey-sweetened Greek Yogurt Parfaits*

The Science of Bees

Date: December 8, 2016

Age Group: Elementary & Adults

Location: Lexington, KY

Audience: Julius Marks Elementary School

No. of Participants: 300

Event Type: Display

Science Night at Julius Marks Elementary School attracted approximately 300 students and parents. At the pollinator display, students could explore different hives (honey bee, mason bee, bumblebee) and bee-keeping equipment and clothing, examine posters showing the honey bee life cycle, pollination process, honey and wax making processes, or sample a variety of bee products (Figures 11-12). Educational pamphlets and bee products and foods were also available for the students to take home.

Figures 11 & 12. Students being inquisitive about the many attractions at the display.

Beekeeping as a Career

Date: March 31, 2016

Location: Versailles, KY

No. of Participants: 25

Age Group: Elementary

Audience: Simmons Elementary

Event Type: Display & Presentation

Students at Simmons Elementary learned about the importance of agriculture and opportunities available for bee-keeping during their Career Day. A display of bee-keeping equipment, posters, and bee products were available for the students to explore (Figure 13).

Figure 13. A student interested in becoming a beekeeper tries on some of the equipment.

EVENTS

Agriculture Day

Date: April 7, 2017

Location: Buckhorn, KY

No. of Participants: 200

Age Group: Varied

Audience: Buckhorn Schools

Event Type: Display & Presentation

Approximately 200 students from kindergarten through 12th grade in Buckhorn, Kentucky signed up to learn about beekeeping during Agriculture Day. The students were divided into groups by age and each group received a presentation tailored to the audience. A display with items the students could take home accompanied the presentations (Figures 14-15).

Figures 14. Students pose next to the display.

Figures 15. Several students were enthusiastic about planting wildflower seeds.

Green Living Fair

Date: April 8, 2017

Location: Somerset, KY

No. of Participants: 200

Age Group: Varied

Audience: Green Living Fair

Event Type: Display & Workshop

The Green Living Fair in Somerset, Kentucky attracted approximately 200 people. Green Forests Work and Coal Country Beeworks shared a booth that contained information about each organization and the Angels of Apiculture program (Figure 16). Bee products and other educational materials were on display, and a workshop focused on teaching candle and soap making and creating lotions, salves, and balms, along with honey cookery was given to 10 participants.

Figure 16. Part of the display at the Green Living Fair contained information about Green Forests Work, Coal Country Beeworks, and the Angels of Apiculture program.

Beeswax Candle Making

Date: April 14, 2017

Location: Lexington, KY

No. of Participants: 105

Age Group: Middle School

Audience: Southern Middle School

Event Type: Bee Product Workshop & Display

The 7th grade class of Southern Middle School learned all about bees with the help of numerous visual aids prior to constructing their own beeswax candle (Figure 17). Students were also able to take home samples of local honey, handmade soaps, lip balm, and salves, along with information concerning how using bee by-products promotes a healthier lifestyle.

Figure 17. The 7th graders at Southern Middle School proudly show-off their handmade beeswax candles.

A few of the display and workshop materials that were used during the events.

Bee product samples that were available to event participants.

RESULTS & DISCUSSION

The goal of this project was to conduct 15 workshops in Kentucky. A total of 25 workshops were conducted, reaching nearly 2,500 students and adults in 14 different Kentucky counties (Table 2). Of the 14 Kentucky counties reached, nine of which are in the Appalachian Region, and eight of the nine Appalachian counties are economically distressed or at-risk (Figure 18).

Angels of Apiculture workshops introduced youth groups and elementary-level children to Appalachian forest-based beekeeping while teaching skills and conservation techniques related to forest fragmentation, pollinator health, pollinator habitat, and hive maintenance. Angels of Apiculture began with education about the surrounding environments and ecosystems, particularly the trees, and then immersed students in bee-keeping and associated skills in the bee-arts in a variety of ways such as cooking, wax classes, soap-making, salves, balms, etc.

Reaching non-transitional counties was a goal of the project because these areas stand to benefit the most from the sustainable economic opportunities that beekeeping provides and from the health benefits of using honey and bee products as sugar and traditional product substitutes. New social networks were established along with existing social networks, providing guidance and influence for pollinator studies/business interests in the region. This has set the groundwork for establishing overlapping generations of beekeepers by making sure younger generations are included. Classes concerning the art of using bee products for healthy living generated enormous interest from even the youngest of students. As many young people in eastern Kentucky do not have ties to beekeeping and are generally not socialized to immerse themselves in science and conservation of their environments, the workshops stimulated considerable curiosity and interest in pollinator health, beekeeping, and forest ecology. This has also prompted more awareness of the health benefits of using honey and bee products instead of sugar and sugar substitutes thereby developing the skill to make healthier choices.

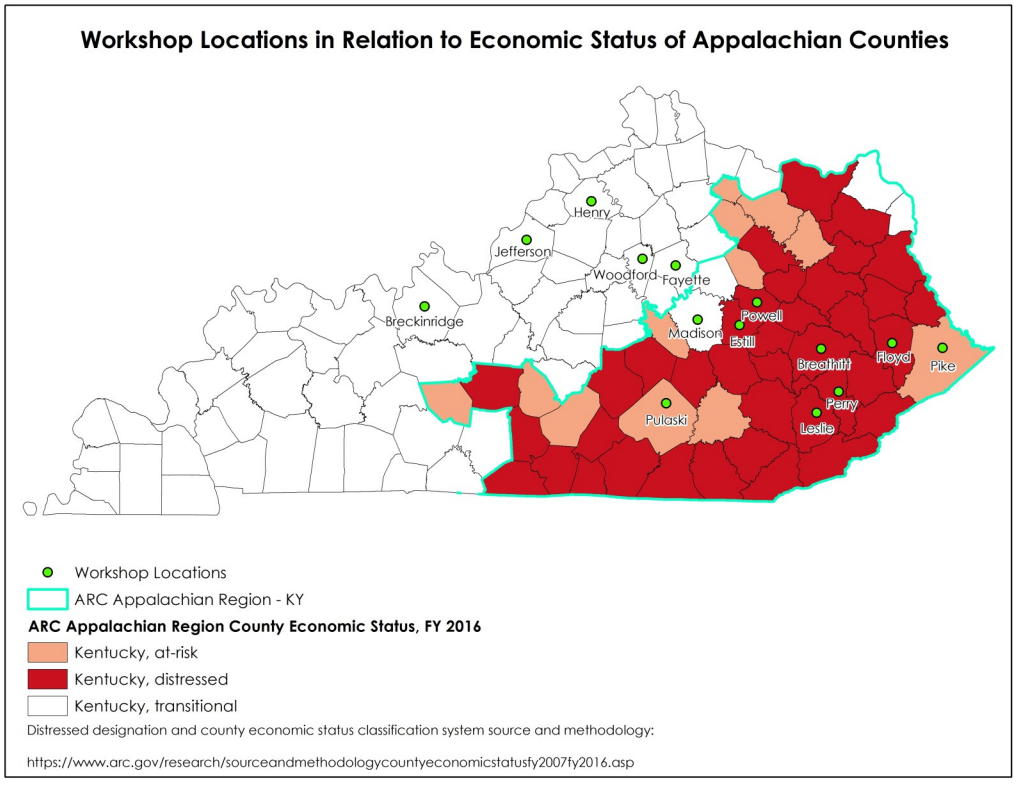

Figure 18. Workshop locations in relation to economic status of Appalachian counties.

Date	KY County	Event Type	Age Group	No. of Participants
10/28/2015	Fayette	Pollinator Habitat Creation	Middle	200
12/15/2015	Perry	Bee Products & Cooking Workshops	High	10
3/2/2016	Pike	Bee Products Workshops	High	85
3/5/2016	Fayette	Poster Display	Adults	100
3/14/2016	Powell	Bee Products Workshops	Adults	15
3/23/2016	Perry	Bee Products Workshop	Elementary	18
4/15/2016	Breathitt	Pollinator Habitat Creation	Elem. & High	108
4/19/2016	Fayette	Bee Products Workshop	Middle	45
4/29/2016	Madison	Presentation & Display	Elementary	50
5/18/2016	Pike	Presentation & Display	Elem. & High	80
6/29/2016	Perry	Cooking Workshop	Elementary	12
6/29/2016	Letcher	Bee Products Workshops	Elem. & Middle	18
7/30/2016	Henry	Bee Products & Cooking Workshops	Varied	75
8/6/2016	Floyd	Bee Products & Cooking Workshops	Varied	150
9/29/2016	Breckinridge	Presentation & Display	Elementary	275
12/8/2016	Fayette	Display	Elementary	300
1/21/2017	Perry	Bee Products Workshops	High & Adults	53
3/31/2017	Woodford	Presentation & Display	Elementary	25
4/7/2017	Perry	Presentation & Display	Varied	200
4/8/2017	Pulaski	Bee Products Workshop	Varied	200
4/14/2017	Fayette	Bee Products Workshop	Middle	105
5/10/2017	Leslie	Presentation & Display	Elementary	75
5/14/2017	Fayette	Presentation & Display	Varied	10
5/19/2017	Jefferson	Presentation & Display	Elementary	60
6/6/2017	Estill	Presentation & Display	Varied	120
7/8/2017	Fayette	Presentation & Display	Adults	10
7/10/2017	Powell	Presentation & Display	Adults	13
7/12/2017	Fayette	Bee Products Workshop	Varied	40
Total				**2,452**

Table 2. Events summary.