

Sustainability September: Agroecology at Duke Farms

Some of the most common questions we're asked at Duke Farms have to do with the "farm" part of our name; it may surprise you to know that we have a fully operational farm! Included in the 2,740 acres of preserved land owned by Duke Farms is a functioning and sustainable cattle and chicken program, a permaculture garden, and the nation's largest allotment-style community garden. All these practices provide environmental research opportunities to improve agricultural systems throughout the country, while actively providing local and ethically grown food for our café, local charities (to date donations total 2,300lbs fresh produce, 725 dozen eggs, and 1,875lbs of beef!) and weekly farmers markets. Although these sites are not accessible to the public, you can enjoy the benefits of their production and you can keep up with operations through our social media, blog, newsletter, and programs.



Neil and Laura, Agroecology Apprentices, with produce donations ready to go!

Our staff works tirelessly to uphold these mandates, but it has not been an easy journey due to the extensive damage done by historical agricultural land use in the area. Before the first colonists arrived, the land in this part of New Jersey was peopled by the Naraticong Tribe of the Lenni Lenape, and they spent much of their time managing small-scale farming as part of their hunter/gatherer lifestyle. When the Europeans arrived, they quickly began clearing large swaths of forests and riparian areas (*riparian* means bordering a body of water) along the Raritan and Hudson Rivers to take advantage of the nutrient-rich soil. This soil was quickly depleted by the middle of the 18th century, and by the 1840s the pressure was truly on local farmers to use commercial farming methods, even though these practices further taxed the already struggling land. This paradigm continues to this day but is compounded by regular use of petroleum-based fertilizers, pesticides, and heavy machinery - all of which damage the soil, air, water, and the plants and animals that live alongside us.



Lauren, Sustainable Ag. Coordinator, and Laura, Sustainable Ag. Apprentice

We use practices that are helping prove to the agricultural community that sustainability AND productivity can go hand in hand. A well-rounded example is the use of **rotational grazing**, which is a way for us to naturally maintain and cultivate a hayfield, while providing habitat for threatened grassland birds. We can provide habitat by rotationally grazing (or moving our herd of cattle from pasture to pasture) to mimic the natural movements of the native grassland bison from long ago. This feeds the cattle herd a natural and pesticide-free diet, while also ensuring the safety of the small animals that rely on the grasses. With the amount of donated beef mentioned at the beginning of this article, it's easy to see how Duke Farms is making the case for sustainable grass-fed cattle as a viable option for food production!



A mixed herd of simmental, red angus, and British white park cattle help maintain Duke Farms' grasslands.

To top it all off, the research being done through this system shows it also stores, or **sequesters**, significant amounts of carbon from the atmosphere into the soil and the deep roots of the native grasses! The grasslands and pastures are kept in balance with the natural rhythm of the **carbon cycle** (the constant recycling of carbon between air and organic matter through animal and plant respiration and the decay of animal and plant material into the earth) by allowing the plants and animals to interact in as normal a pattern as possible. As the pasture grasses and flowers grow, they take nitrogen from the soil and carbon from the air, storing it into their systems. As the cattle graze, they replenish the nutrients taken up by the growing plants by defecating and mixing the manure into the soil with their hooves as they walk. The cycle continues as they move to new areas, thus not stressing any sections by taking or giving too much nutrients.

The next time you enjoy a meal at our café or pick up some products from our farmers market, you can do so knowing that not only are you going to enjoy some beautiful and delicious food, but that you are supporting wonderful system working towards a better agricultural future!

Interested in getting involved in organic gardening or homesteading? How about raising chickens in your backyard? You can maintain your own sustainable agriculture program right in your own yard!

[Mother Earth News](#) is a great resource for all things organic and independent gardening/homesteading! You can find endless articles about living more in tune with the natural cycle and taking control of where your food comes from. It may seem overwhelming at first, but just starting to browse these articles may be a good way to start learning!

For more information, Duke Farms hosted and recorded a virtual class about getting your vegetable seeds started! You can check out [that video here](#).



THE HAPPY CHICKEN COOP

Backyard chickens are a wonderful

(and adventurous) way to eat a healthier diet and even maintain the health of your own backyard! Chickens are great help in controlling pests in the garden and help to



Goats are being tested as another member of the rotational grazing system because they love to munch woody invasive plants!

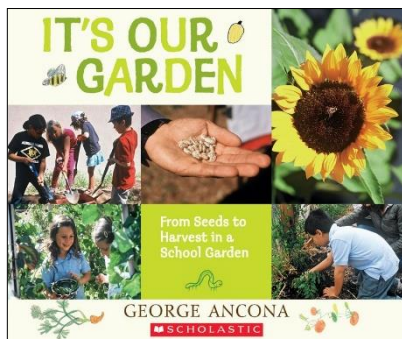


Difference between ungrazed area infested with invasive pink knapweed (left of fence) and about 4 days of 8 goats grazing (right of fence). Now, native grasses and flowers stand a fighting chance!



After mowing down woody plants and invasives to begin allowing native grasses to take over (left) vs. pasture ready to be grazed and cleared by cattle (right).

replenish nutrients into the soil as they poop and scratch their way around your land. [The Happy Chicken Coop](#) provides this comprehensive and detailed guide to getting started with backyard chickens!



[It's Our Garden: From Seeds to Harvest in a School Garden](#) by George Ancona is both a joyful celebration and a simple how-to story about the journey of a group of children and their school's garden, from first seed planting to harvest! Check it out [here](#) at Scholastic.com.

The **Book Authority's** compilation of the [98 Best Sustainable Agriculture Books of All Time](#), as recommended by various experts in various fields, is a great source for your next reading adventure. Ranging on topics from sustainable market farming to equalizing social injustices in agriculture, there is bound to be a book that catches your eye!

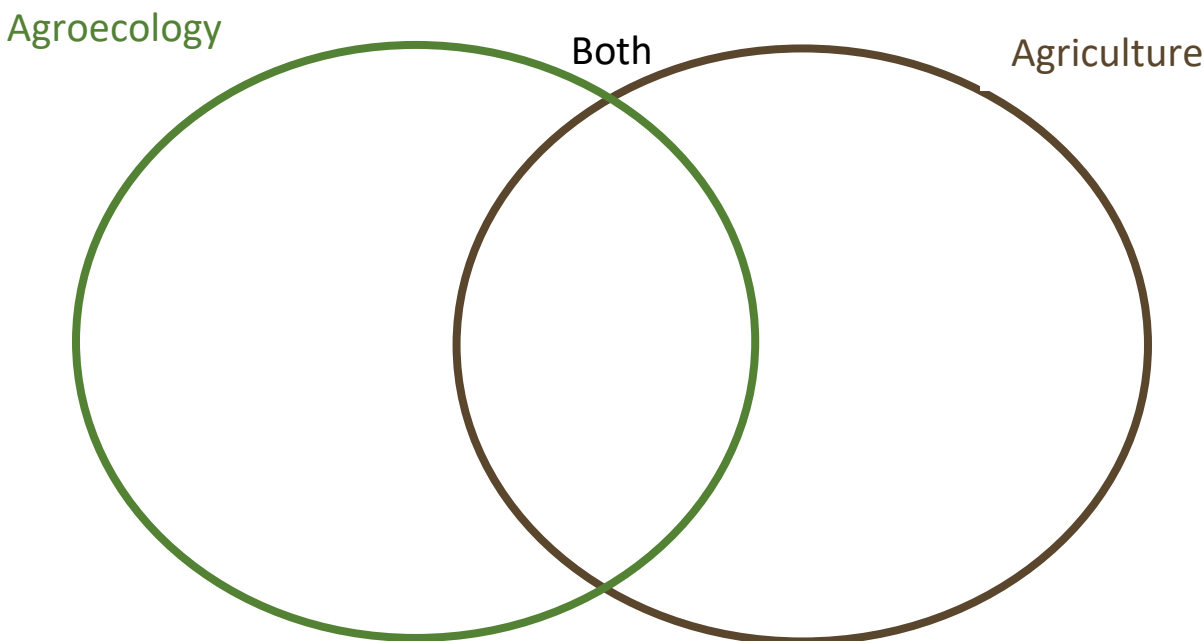


For Educators

Your younger learners can use the in-depth resources from [National Agriculture in the Classroom](#) to learn about farm animals. It may begin with simple identification; then pair the male and female animals; now add their offspring. Facilitators may want to focus of specific parts of the animal. For example, which ones have two legs and which ones have four? You can also offer animal sounds to make audio connections. As an expanded idea, learners can discover how these animals take care of their babies and how farmers take care of them. [Their e-learning center](#) offers tons of activities tailored to all school ages!



For Example: Use a Venn diagram to explore a compare/contrast activity relating Agriculture and Agroecology using information learned from both the Duke Farms and National Agriculture in the Classroom resources.



National Agriculture in the Classroom offers background agricultural connections and free products developed as guides for discussion and exploration, such as their product titled “Journeys” which states, in part:

“Journey 2050 takes students on a virtual simulation that explores world food sustainability and answers the question, "How will we sustainably feed nearly 10 billion people by the year 2050?" The lesson plans and online simulation program allows students to make decisions on a virtual farm and witness their impact on society, the environment, and the economy at a local and global scale. The lessons engage students with the important concepts regarding sustainable agriculture. The online simulation contextualizes these concepts as students experience the lives of three farm families in Kenya, India and Canada. As students interact with each family, they learn the role of best management practices in feeding the world, reducing environmental impacts and improving social performance through greater access to education, medical care and community infrastructure. There are middle school and high school resources.”

How old will you be in the year 2050? Explain that some scientists and world leaders have identified 2050 as a key moment in time when the world’s population will be nearly 10 billion – that is over 2 billion more than today. Point out to students that they will be adults with responsibilities for voting and decision making.

Journey 2050 Lesson 1: Introduction to Sustainable Agriculture (Grades 6-8)

Journey 2050 Lesson 1: Introduction to Sustainable Agriculture (Grades 9-12)





Note to Educators

As with all resources, be certain that they are exactly what you are looking for. Use questions such as these as filters and develop your own. When you review this product, are the principles of sustainability clear? Do you disagree with any aspect of the curriculum? Will it be able to be used in your district? Does it meet the needs of your learners? Does it align as Climate Change Curriculum?

Learning about Agroecology at Duke Farms aligns with the newly adopted NJ Student Learning Standards. For more information about how you may use this topic to address water treatment, flooding, and other factors related to climate change in your PK-12 and beyond classrooms, contact Kate Reilly, Manager of Education, Duke Farms at kreilly@dukefarms.org.

Adopted 2020 New Jersey Student Learning Standards (NJSLS)

Climate Change

New Jersey is the first state in the country to require climate change curriculum across all content areas and at a K-12 level. As stated by the NJDOE:

On June 3, 2020, the State Board of Education adopted the 2020 NJSLS in the following content areas:

- Career Readiness, Life Literacies, and Key Skills;
- Comprehensive Health and Physical Education;
- Computer Science & Design Thinking;
- Science;
- Social Studies;
- Visual and Performing Arts;
- and World Languages.

These standards truly represent a foundation from which districts will build coherent curriculum and instruction that prepares each New Jersey student with the knowledge and skills to succeed in our rapidly changing world. They will put New Jersey again at the forefront of national education by including the following:

- Climate Change across all content areas, leveraging the passion students have shown for this critical issue and providing them opportunities to develop a deep understanding of the science behind the changes and to explore the solutions our world desperately needs.