

Sustainability

Sustainability is a challenging topic. It encompasses everything from the basic needs of the most primitive species on earth to more complex issues such as the social implications of global warming. The subject invites opportunities for people to see the world from different perspectives.

Students should be encouraged to gather, process and act upon information to become effective citizens. The issues surrounding sustainability can be complex; they are also challenging to understand and to teach. It is important to highlight the relationships among the different concepts and potential they possess to play with and play against one another. While no single activity can teach any of the

concepts completely, individual concepts and activities can contribute to a student's cumulative understanding.

Social equity plays an important role in creating a more sustainable world. Education about sustainability must include the recognition that people of all races, cultures, and incomes have equal rights to live and work in a healthy environment. By encouraging students to examine issues from all viewpoints, they will be encouraged to develop a personal ethical framework for making decisions and taking action. This approach can broaden environmental literacy while expanding knowledge about how to balance limited natural resources with everyday consumer demands.

Concepts of Sustainability

- Sustainability meets our present needs without compromising our ability to meet our future needs
- Sustainability balances the relationship between ecological integrity, economic prosperity and social equity
- Sustainability requires thinking beyond our immediate needs and interests
- Sustainability considers the perspective of other individuals, communities and cultures and looks forward to assess the way actions will affect the lives of people and other species in the United States and around the globe in the future

The topic of Sustainability has been broken down into ten teachable subjects:

<p>AGRICULTURE Preserving our future in farming Sustainable practice on the ground Supporting our economy</p> <p>ECONOMICS Doing more with less Sustaining people, places and profits Mending our ways</p> <p>ENERGY "Renewing" our commitment to sustainable energy Using less, saving more through energy efficiency Cleaner energy for a cleaner environment</p> <p>FORESTRY Managing our forests for the future Revitalizing our community forests Forest stewardship by conserving Penn's Woods</p> <p>INDUSTRY The Power of P2E2: Pollution Prevention The new frontier of businesses for sustainability Building lightly on the land—re-</p>	<p>LAND USE Innovation in Transportation Green Communities Building lightly on the land—re-using old footprints</p> <p>PRODUCTS AND SERVICES Choice: the power of the consumer Recycling: closing the loop Green from the ground, up!</p> <p>TECHNOLOGY Supporting sustainable practices Monitoring our progress Using internet resources to learn more</p> <p>WILD RESOURCES Conserving our natural heritage Support our outdoor economy Public lands leading by example</p> <p>WATER RESOURCES Balancing supply and demand Protecting land and water, hand in hand Managing multiple uses</p>
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Pennsylvania Academic Standards

The Pennsylvania Academic Standards for Environment and Ecology mandate that Pennsylvania's public schools shall teach, challenge, and support every student as they acquire the knowledge and skills needed to understand sustainability (Humans and the Environment standard 4.8). Since concepts and issues of sustainability are all-encompassing to the life sciences, sustainability concepts are linked to many other academic standards.

The World as a Global Community

If you were to shrink the planet Earth where only 1,000 people lived, this is how your world would appear.

Of the 1,000 people, 50 (less than 1%) are Americans, and 1 is from Pennsylvania (you!).

70 neighbors own a car (some of them more than one)

Your community consists of a total of 6,000 acres which provides 4 acres of ecologically productive land per person; however, this amount will shrink due to increasing population.

70 neighbors own a computer

About 750 neighbors have clean, safe drinking water
330 neighbors don't

700 acres are farms with crops
1,400 acres are pasture
1,900 acres are forests and woodlands
2,000 acres are desert, city, tundra, pavement, and other wasteland where productive crops will not grow

600 have adequate sanitation, either public or household sewage disposal
430 neighbors don't

610 of your neighbors are from Asia
130 are from Africa
120 are from Europe
50 are from Latin America
80 are from North America
10 are from Australia, New Zealand and Pacific Islands

680 neighbors have clean air
320 neighbors continually breathe air that is polluted

760 neighbors have electricity, but most use it only for light at night
240 neighbors don't have any electricity at all

This is how you and your neighbors communicate.

140 people speak Mandarin
80 speak English
80 speak Hindi/Urdu
70 speak Spanish
40 speak Bengali
40 speak Arabic

If all the food were divided equally, no one would starve.
500 neighbors are hungry, with 130 of them severely undernourished
170 go to bed hungry some of the time
240 always have enough to eat

(This accounts for only 450 people. The rest speak Portuguese, Russian, Indonesian, Japanese, German, French, and 200 other languages!)

Your community allocates 83% of its fertilizer to 40% of the cropland.
The cropland is owned by the richest and best-fed 240 people.
Excess fertilizer running off this land causes pollution in wells, lakes and estuaries.
The remaining 60% of the land, with its 17% of the fertilizer, produces 28% of the food grain and feeds 73% of the people.

260 of your neighbors are under age 15
80 are over the age of 65

There are 670 adults in your community.
335 are literate, the other half are unable to read

70 adults have a college education

This information was adapted from the original State of the Village Report, published as a Global Citizen column by Donella Meadows in 1990 and a version in that appeared in the Population Press, Volume 8, No. 3 published by the Population Coalition.

Top 10 List

Top 10 Things You can do to Promote Sustainability for Pennsylvania!

- NUMBER 10**
If funds are available, encourage your family to invest in solar panels or solar hot water heating systems! – Solar installations could be eligible for a federal tax credit as well.
- NUMBER 9**
Use a rain garden to increase infiltration and decrease storm water runoff!
- NUMBER 8**
Use a rain barrel to collect storm water from the roof! – It can be used to water your garden or lawn.
- NUMBER 7**
Buy recycled and second hand clothing and furniture! – Many people give away items that are still in excellent shape. This will save all the waste and resources used to create brand new items.
- NUMBER 6**
Buy in bulk! – It reduces the amount of plastic packaging.
- NUMBER 5**
Make your own non-toxic cleaning supplies! – From simple, natural and effective ingredients such as baking soda, vinegar, lemon and soap.
- NUMBER 4**
Use a reusable water bottle made of aluminum or recycled plastic, as well as reusable grocery bags made from cloth or recycled plastic! – Using these will prevent a huge amount of non-biodegradable plastic waste.
- NUMBER 3**
Compost food waste! – This means that almost all scraps that come from food you eat get put back into the natural cycle. It can be placed on a garden or to help trees and shrubs grow better. Compost is the best organic fertilizer there is; it saves natural resources, energy, water, landfill space and money used to create synthetic fertilizers that can have a negative impact on the environment.
- NUMBER 2**
Grow an organic vegetable garden! – Try heirloom varieties as they are time tested in North America and the seeds can be collected to propagate future crops; hybrid variety seed collections will not yield the same produce as the parent plant.
- NUMBER 1**
Buy local, organic in season products! – This saves on fuel costs and pollution emitted to transport, grow and feed animals and produce, and also keeps money in the local economy.

The Three Sisters

Three crops grown in Pennsylvania by the Native Americans were known as the "Three Sisters." The Eastern Woodland Indians which inhabited Pennsylvania planted squash, corn and beans in the same hill of earth. Corn, beans and squash supplemented and complimented each other. The corn grew tall and supported the tendrils of the bean plants as they grew upward toward the sunshine. The squash plants, which sent shoots with huge leaves across the ground, protected the soil from the drying sunshine and helped the soil beneath to retain moisture so that all three plants would thrive. The nutritious vitamins from each of the plants escaped into the soil so that they each benefited from one another.



Native Americans tribes throughout the United States followed sustainable practices. Although many different Native Americans adopted this traditional gardening technique, it originated with the "People of the Long House". The Eastern Woodland Indians of Pennsylvania lived in villages of long houses, structures of wooden pole construction covered with bark or animal skins for protection from the elements. Native Americans recognized the value of their natural resources and managed the valuable land, trees and water so they would replenish themselves for future use. "Start with the rising sun, and work toward the setting sun, but take only the mature trees, the sick trees, and the trees that have fallen. When you reach the end, turn and cut from the setting sun to the rising sun, and the trees will last forever."

The Indians developed a strong cultural and spiritual bond to the land. Agriculture enabled them to produce enough food to establish large villages in Pennsylvania with as many as 1,000 persons living at one site for 10-20 years. Corn, beans and squash were very important crops, while hunting provided most of the protein in their diet. Most of the tribes in Pennsylvania were excellent farmers who grew enough vegetables to support not only themselves, but the first settlers around them through the harsh Pennsylvania winters.

It is the symbolism of The Three Sisters that runs deep in the hearts of many Native Americans. We, too, understand that we do not stand alone, we support each other, and we can only grow with the assistance of one another.

Planting a Three Sisters Garden

This Native American tradition is based on the circle of life or the idea that all living things rely on each other for survival. The Three Sisters are a harmonious trio of corn, pole beans and squash planted together to support and thrive off one another.

The traditional Three Sisters garden forms an ecosystem by creating a community of plants. This system creates a beneficial relationship between the three plants—each plant helps the others grow. This is a form of companion planting. Corn, beans and squash complement each other: corn for grain and carbohydrates, beans for protein and squash for vitamin A.

The Three Sisters all work together. Critters will find it harder to invade your garden by interplanting your corn, beans and squash. The corn stalk serves as a pole for the beans, the beans add nitrogen to the soil that the corn needs, and the squash provides a ground cover of shade that helps the soil retain moisture.

- Create a mound of soil 1 foot high by 20 inches wide. Flatten the top of the mound for a level planting surface. If you plant more than one mound, the centers of the mounds should be about four feet apart. In the center of each mound, plant five or six corn kernels one inch deep in a small circle. Water the soil well.
- When the corn is 6 inches high, plant 6-7 pole bean seeds in a circle, equally spaced, about 6 inches away from the corn. At the edge of the mound about a foot away from the beans, plant seven or eight squash or pumpkin seeds. Be sure to water the entire mound well.
- When the plants begin to grow, thin out all but a few of the sturdiest of the corn plants from each mound. Also keep the sturdiest of the bean and squash plants and thin out the weaker ones.
- As the corn and beans grow up, make certain that the beans are supported by cornstalks, wrapping around the corn. The squash will crawl out between the mounds.
- As the plants mature, the corn will support the beans, the beans will provide nitrogen to the soil and the squash will

Happy Harvesting!

The Three Sisters provided the tribe with food all winter long. As part of the circle of life, these New World crops relied upon each other for survival.

TIP: If you'd like to follow tradition even more closely, plant a little extra so that you have enough to share with squirrels, raccoons and crows; this way, you won't need to prevent pesky animals from eating your crops.

TIP: These gardens express the natural world's complexity so expect The Three Sisters to be unruly, despite efforts to control them.