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Frostburg Grows was born as an initiative of Paul Kazyak. After walking into a friend's tree nursery on a cold but sunny February day, he made what he called the “master-of-the-obvious” observation that it was possible to grow food in winter by using high tunnels. With this in mind, Kazyak set out on an endeavor to attempt to solve the problems in environmental degradation, poverty, and food insecurities in Western Maryland. His initial intentions were to work on biodiversity, focusing on endangered Brook Trout. However, he realized after talking to the people of Western Maryland that most people felt poverty and job scarcity were greater concerns (Kazyak, 1).

This was just the beginning of the visionary project that became Frostburg Grows. Over the two years that Frostburg Grows has been in existence, its work has spanned everything from planting trees for riparian buffers to growing food for area college students to training farmers and would be farmers on best agricultural practices for growing food.

The site chosen for Frostburg Grows is a five acre lot atop a former strip mine off route 36 in Frostburg. Formerly occupied by FEMA trailers, this site is now occupied by a multi-faceted agricultural complex including a series of high tunnels for growing food, a shade house for growing tree saplings, a composting structure, and two storage buildings.

Frostburg Grows may be best known for its fruit and vegetable production. Fruit and vegetable production takes up more space than any other operation on the Frostburg Grows site, and most of the income from sales made by Frostburg Grows are through fruit and vegetable production. However, although income from sales is certainly helpful as a supplemental revenue

to an organization that mostly relies on grants, fruit and vegetable production is more a tool to help Frostburg Grows reach its goals than an end in and of itself.

Fruit and vegetable production is instrumental in supporting farmers in Western Maryland by enabling Frostburg Grows to hold a training program held in a real production facility. This program is oriented toward helping growers in Western Maryland update their skills and helping those who are interested in learning to grow food get started. While this training program is targeted to the needs of growers in Western Maryland, the program also caters to individuals from all over the country by offering food and lodging to those who do not live locally. Training sessions are held during the summer, during which experienced growers teach participants about building high tunnels, plant nutrition, irrigation, crossbreeding, soil testing, and much more. Some of the training takes place at the Frostburg Grows site, but much of the training takes place at area farms, giving a perspective for participants on how to grow different crops in different settings (Daily Agenda, 2015).

Additionally, Frostburg Grows is working with local food coop Garrett Growers to give them support needed to reach a higher level of local retail sales. One example of how this happens is through season extension. Food production through high tunnels allows Frostburg Grows to extend their growing season in a region known for its long, cold winters. The temperatures in the high tunnels are about 20 degrees warmer than the outside temperatures, allowing season extension of about two months. This means, for example, that local growers in collaboration with Frostburg Grows could potentially offer retailers tomatoes two months of the year more than they otherwise would be able to. Additionally, Frostburg Grows has business connections that area growers do not have access to on their own, such as Chartwells, the FSU dining service. Frostburg Grows currently supplies fresh produce to Chartwells, and is working

on providing more to them. However, they cannot provide all the produce that Chartwells needs. Chartwells continues to use other sources for produce as well as Frostburg Grows. Chartwells is open to working with area growers in collaboration with Frostburg Grows, on the condition that the transactions will be through Frostburg Grows. Chartwells is not comfortable working with multiple small growers. Frostburg Grows can potentially open up the Chartwells market to several Western Maryland Growers.

Although encouraging fruit and vegetable production is crucial to helping growers in Western Maryland, it is only one piece of the picture. Western Maryland faces various environmental issues that make fruit and vegetable production more difficult, even with the best support network. One of these is soil quality. Strip mining practices such as those that have occurred in Western Maryland erode soil, damage soil fertility, destroy beneficial microorganisms, pollute water, and lead to the declination of wildlife. This happens by means of the step by step process of environmental degradation that is needed to facilitate mining. First, vegetation such as trees are removed. Next, top soil is removed. Then, the overburden is drilled and blasted, further disturbing soil layers. Overburden is then transferred to previously mined land or simply pushed downslope. After the land is mined, the coal mining company redistributes top soil and revegetates the mined area (Squillace, 2009).

Often, overburden pushed downhill causes landslides, sedimentation, and flooding. The unstable high walls of the mine tend to crumble and erode, disrupting drainage patterns and causing water pollution. https://sites.google.com/site/stripmininghandbook/chapter-2-1

On top of eliminating vegetation, the altering of natural soil layers caused by strip mining creates acid mine drainage. Acid mine drainage occurs when pyrite reacts with air and water, forming sulfuric acid and dissolved iron. Water containing this mixture will turn red, orange, or

yellow. This yields contaminated drinking water and disrupts the growth and reproduction of aquatic plants and animals (What is Acid Mine Drainage, n.d.).

Since mining took off in the Western Maryland in 1842, the area has suffered from environmental degradation. The nearby New George's Creek and Wills Creek watersheds have both suffered from acid mine drainage, as well as excessive sediment loads from land that has been deforested for mining (Project Environmental Proposal, 2012).

Frostburg Grows grows and sells local species of trees, such as Black Walnut, Northern Red Oak, White Oak, Spicebush, and Sycamore to help reforestation efforts and building of riparian buffers in Western Maryland. Riparian buffers help prevent pollutants from reaching the stream. In addition, riparian vegetation is a significant source of nutrients for the stream community. Riparian buffers slow flood water and rainfall runoff, which allows water to soak into the ground, improving ground water.

Reducing stream pollution means cleaner drinking water for human and wildlife consumption, but it also means that fewer toxins are being transferred from streams to storm water because 1) there is reduced risk of flooding due to riparian buffers and 2) storm water contains a lower concentration of pollutants. In addition, this means that farmers can safely use local water for crops, knowing that it will not poison the potential consumers of the food nor will it damage soil fertility.

In addition, Frostburg Grows is looking at growing varieties of trees that can fix nitrogen suck as Black Locust to restore land fertility. These trees have enormous potential to help the ecosystem, as they have the double benefit of improving the soil while serving as riparian buffers. These trees are deep rooted, which allows them to access soil in the lower subsoil layers that may be less likely to be disturbed. They drop leaves at a higher frequency. These leaves

nourish the soil, feeding surrounding plant life. However, nitrogen fixing trees do have some negatives. These trees can thrive under poor conditions, which can be beneficial in that they are easy to grow but can be negative in that they can easily dominate the ecosystem and become weeds. If nitrogen fixing trees become too plentiful, they can pollute ground and surface water by over nitrifying the soil (Elevitch, 2008).

Frostburg Grows uses composting as a way to replenish the soil but also to reduce waste within the community and reuse material that would otherwise end up in landfills. The primary source for composting material is yard waste. Once a month in the summer and twice a month in the fall, the city of Frostburg collects residents' yard waste with a garbage truck. The city previously took their waste all the way down to Cumberland for composting, which costs them significant time and money in gasoline. Later, they dumped the yard material in the Frostburg Landfill, which costs the city $45 a ton. It is much less expensive and more convenient to take their compost to the Frostburg Grows windrow. In addition to delivering compost to Frostburg Grows, the City of Frostburg turns the pile with a front end loader in order to let oxygen mix in with the compost material. Later, this compost is mixed into the high tunnel gardens.

Frostburg Grows is also starting to obtain compost from Chartwells. Chartwells has a machine called the Rocket that processes FSU food waste. The food waste left on plates goes from a pulper that grinds up the food and then goes to the centrifuge, which takes out 80-90% of the water. From there, the dehydrated food material is mixed with wood chips and placed in the Rocket, the machine that completes the process (Composting at Frostburg State University Fueled by The Rocket, 2015).

While composting reduces the need for chemical fertilizer, it also has the potential to reduce the need for pesticides. Eco City Farms, a community agriculture project in Prince

George's County Maryland, uses a solution they call compost tea as both an organic liquid fertilizer and as pest/disease control for their crops (Keske and Lohman, 2012). This efficient practice has the potential to reduce any negative impacts on crops or the surrounding ecosystem.

Composting has become more popular in recent years, but it is not in fact a new practice. Prehistoric farmers discovered that if they mixed manure with straw and other organic waste, such as crop residues, it would provide nutrition for their crops. Overtime, the residue would change into a soil-like material that enriched the soil and helped crops grow (Composting History, 2015). In the Amazon rain forests of Brazil, native peoples long ago created terra preta, a rich black soil that sustained large settlements on Amazonian lands for two millennia. Sustaining settlements on Amazon land is not an easy feat, as the red and yellow soils there are weathered, highly acidic, and low in organic matter and essential nutrients. In Amazonia, most nutrients are not stored in the soil but rather in the dense vegetation that grows there. When the forest is cleared, the intense rain and sun of the region quickly depletes the soil. Yet, through the use of terra preta, Amazonian farmers cleared the forests to practice agriculture and not only did not deplete the soil of its nutrients, but improved it. Modern farmers in Amazonia are able to cultivate crops on lands with terra preta with minimal use of fertilizer. Terra preta is so valuable that it is even sold as potting soil. Terra preta's long term fertility is maintained through use of charcoal combined with excrement and waste such as turtle, fish, and animal bones (Mann, 2002).

More recently, there have been suggestions of using biochar, a substance similar to charcoal, to help replenish the soil around strip mines. Biochar absorbs heavy metals often present in former mines, which holds them in place so they cannot distribute throughout the soil. Research on mine reclamation sites has indicated that adding biochar to formerly mined soils

leads to increases in pH and soil water content, which is linked to increase in vegetation. We have seen beneficial long-term effects from similar practices in the Amazon through the use of terra preta, so it seems that the use of biochar to replenish former mine sites would have long lasting results (Keske and Lohman, 2012).

While all of the facets of Frostburg Grows seam together to build a strong community and a strong ecosystem in Western Maryland, the most important element is arguably education. How are we to improve the food system and ecosystem if we do not work together to do so, and how are we to work together if we do not understand the challenges we are facing? On top of the training program, Frostburg grows works to educate the public through presentations, tours, and experiential learning opportunities such as independent studies, internships, and projects integrated into regular high school and college coursework.

The hope is that, through education, the proportion of food grown locally will rise as well as support for farmers. Many parts of Western Maryland, even parts of Frostburg, are characterized by the USDA as a food desert (The Maryland Food System Mapping Resource, 2015). This is partially due to the fact that, although Western Maryland is a chiefly agricultural area, most of the crops grown in Western Maryland are animal feed rather than fresh produce (Proposal Questions, 2015). The small number of existing growers face risk of further decrease in numbers due to the fact that young people do not tend to stay in Western Maryland. Indeed, young people around the country are leaving the business of farming. In 2012, the median age of a farmer was 56 years old and the median income was negative $1,453 per year (Smith, 1). Looking at these statistics, we can see why so many young people are not looking at farming as a possible livelihood. However, the prospects for farmers may start to look brighter if they have more access to education. Education on modern innovative farming methods and successful

business techniques may mean that farmers will be able to produce more food more efficiently, make money rather than lose money, and more young people may want to get into farming.

Even for those who may want to grow food despite farmers being notoriety for low incomes, they may not know where to start. As of 2010, over 80% of the US population lived in urban areas, which are largely detached, spatially and socially, from agricultural areas (Urban and Rural, 2010). Often, residents of urban areas do not realize that growing food where they live is viable because they are so accustomed to buying food from grocery stores. Gone and largely forgotten are the victory gardens of World War II, from which our country was able to produce 40% of its vegetables locally through means as simple as school gardens and window boxes (What is a Victory Garden, n.d.). These, like war bonds, seem to reflect to us the necessities of war rather than a beneficial method to promote long-term sustainability.

Education has become key to so many professions today, and those without education have been left behind in today's fast paced world. No matter how much mechanization we adopt, quality food will not grow itself. It's important to provide the same quality of education to farmers that we provide to so many other professions at a price they can afford. It's also important for the general public to know more about how food is grown and how growers contribute to the process. As a result, some people may choose to have a farm, some may choose to grow food on a small scale, while others may simply choose to buy local from the grocery store. The key point is that education gives us power. It is crucial that we make that power generally accessible so that everyone has the power to understand the intricacies of how our food is grown and handled so that they can know how to take part in sustainable agriculture through whatever means they choose.

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