Soil Vegetative Standards, Common Plants, and Their Importance to Humans

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Natural resources such as air and water are often attributed to being two key factors to human life and tend to gather more attention than another key component to supporting human life, soil. The Earth we reside on spent countless years creating soil composed of minerals that would provide nutrients for the plants that consumers would eventually use to fuel our bodies. Unlike other natural resources such as sunlight or air, soil is a non-renewable resource that can take hundreds or even thousands of years to replenish depending on many different factors. Climate, temperature, topography of the land, organisms influence, parent materials of the original rocks within soil, and time work in conjunction to impact the type of soil being produced. When planting, it is important to consider this, as it will directly affect the growth of the plant. Without certain soils, certain plants would not be able to survive in the natural environment. This elimination will directly affect the food chain and interrupt the natural flow of an environment. To prevent this, humans established soil conservation teams to protect our usable soil and prevent accidental erosion due to human use. By the enforcement of standards created by this organization, it will ultimately save our usable soil for the use by future generations. In New Jersey, there are thirty-two soil standards in total, with ten of them pertaining to vegetation and using natural plants and ground cover to stabilize soil. Understanding these standards will greatly impact the ability to conserve usable soil, but give a profound appreciation for the soil that we use every day.

Based on past historical events, it is evident that civilization depends directly on soil. Mesopotamia is regarded as the world's first civilization and was located around modern day Iraq and surrounding countries. According to scholarly journal by Sameer Lal, “MESOPOTAMIA: AN ANTIQUE LAND IN DISTRESS”, it is stated here that the soil was rich in silt which acted as a natural fertilizer for their crops as well as practicing crop rotations, saving the nutrients

within the soil and allowing them time to replenish (Lal, 207). This civilization being nestled near the Euphrates river also supported their success and their downfall. The people of these times believed that watering plants more would cause more crops to grow. Combining this with their irrigation techniques that over time led to saltwater intrusion, or an overly-salinated soil, and caused nearly all crops to wither away, leading to the first civilization's end (Lal, pg. 207). While this all happened centuries ago, saltwater intrusion is a problem that humans face to this day. Forests such as Cattus Island County Park in Toms River, New Jersey face this issue currently. Due to issues such as sea level rise, it is allowing saltwater to enter the soil more than it has in previous years leaving many trees to die, creating a ghost forest (Davis, p. 13). As the water continues to rise it will eat away at more of the park until it is a portion of the size it stands today. Whether it be implementing the irrigation techniques we practice today or initiating a plan to protect our soil from being destroyed, soil standards can be implemented to mitigate the loss from improper usage.

Soil loss can lead to economic trouble as seen by the Dust Bowl of the 1930s. According to the scholarly journal "From Dust Bowl to Dust Bowl: Soils are Still Very Much a Frontier of Science" by Philippe C. Baveye and others, farmers could lose all of their topsoil in a single day. (Baveye et al., p. 2)This would leave farmers without a livelihood and people without food. During a time where an economic crisis was already occurring, improper soil management to the point where there was drastic loss would only make the economy worse. The shining light at the end of the tunnel of this disaster would be the acknowledgement of how valuable soil is and the passing of the soil conservation act on April 27, 1935, as well as beginning the Soil Conservation Service, later becoming the Natural Resources Conservation Service (NRCS) which is a branch of the United States Department of Agriculture (USDA). Now that soil conservation was a

country-wide concern, New Jersey would develop a set of standards in 1976 with the primary focus of reducing erosion such as that that occurred in decades past called the NJ Soil Erosion and Sediment Control Act. These standards focus primarily on construction rather than agriculture, however both have the same goal of keeping soil usable and contained. As of 2017, there are thirty-two standards in total, with ten regarding vegetation and the use of nature to keep soil stationary. Properly adhering to each of these ten standards will save construction sites time, money, and do the people of the future a favor by protecting this precious soil.

One of the most important standards out of all ten would be the standard for permanent vegetative cover for soil stabilization. Permanently stabilizing the soil is important as it will conserve it for future use and prevent erosion on sites where there is exposed soil that could later lead to environmental troubles such as the pollution of our waterways. Soil that travels through wind or rain into water sources effectively pollutes the water and obstructs sunlight from the aquatic plants that need to photosynthesize. Without photosynthesis, oxygen will be depleted from the water source as the aquatic animals use it and will die from asphyxiation. Having vegetation to permanently stabilize the soil will minimize the effect of erosion and protect the nearby ecosystems. It is important to consider the environment in which the soil is being stabilized when selecting seed to plant. Temperature is a key component in this, as there are warm season seed mixtures as well as cool season seed mixtures. Warm seed mixtures are grasses and legumes that grow well at temperatures that exceed eighty-five degrees fahrenheit while cool season mixtures grow well at temperatures below this threshold. Some warm season grasses that are native include little bluestem (Schizachyrium scoparium) and deertongue (Dichanthelium clandestinum). Cold season native plants used for permanent soil stabilization include switchgrass (Panicum virgatum) and canadian wild rye (Elymus canadensis). Included in

the warm season mixture are pineland specific mixtures. These include little bluestem, deertongue, and switchgrass as mentioned previously. When planting seeds for stabilization, another important factor to consider is the pH of the soil. This can influence the types of plants that will be grown to stabilize the soil. In accordance with another vegetative standard, soils with a pH less than four which are highly acidic must be covered with twelve inches of soil with a pH of five or greater to be seeded. While waiting for the seeds planted in soil to sprout, there must be a temporary vegetative cover over said soil, leading to the application of the standard for temporary vegetative cover for soil stabilization.

The standard for temporary vegetative cover for soil stabilization is a standard that works in conjunction with the previous standard. While an area may be seeded for growth and stabilization, it will take time for the plants to germinate. This is especially prevalent in the cold winter months faced in New Jersey. Soils that are expected to be bare for two to six months and are not being graded are to follow the protocols of this standard. One method used to stabilize soil is through the use of mulching the exposed soil. Mulching will promote faster establishment of grasses and lessen the extent of erosion. Using straw or hay is another form of temporary cover that is acceptable in allowing the establishment of new grass to grow. Mulch and straw netting should be created using biodegradable materials, especially if the area will be mowed at a later point in time when the grasses have established themselves. Anchoring this netting down will ensure that during inclement weather, the stabilization of the soil is not jeopardized. During a trip to a newly constructed car wash located on Bay Avenue in Toms River, straw stabilization was observed to cover bare soil. In an independent trip to the same location during warmer weather, it could be seen that the sprouted grass began to overtake the previous straw that was

there. Planted in this location may have been annual ryegrass (Lolium multiflorum) which is a cool season grass listed within this soil standard.

Falling in line with the previous standard is the standard for stabilization with mulch only. This standard is in place to protect exposed soil that is to be exposed for longer than a fourteen day period with mulch materials. This may include straw, wood or paper fibrous mulch, mulch netting, and crushed stone. These materials will allow for permanent stabilization growth to grow through until the mulch stabilization is no longer needed. It is important to take in account rivers that may flow near a site with this protective covering. If the water picks up the material and transports it to another location, it can over time cause blockage within the water source. This can potentially lead to erosion as the moving water will do whatever it can to move forwards. Properly stabilizing the mulch soil cover can reduce the risk of this from occurring. Reducing offsite environmental damage is a key factor in all of these standards listed, and the standard for stabilization with mulch is of no exception.

An alternative way to permanently stabilize soil without the use of seed is through the usage of sod. The standard for permanent stabilization with sod is an immediate solution for soil stabilization, however proper irrigation is extremely necessary for successful stabilization. Typical sod consists of Kentucky bluegrass (Poa pratensis) which is a non-native species to New Jersey. It is recommended that for locations where drought is common, the sod is mixed with tall fescue (Festuca arundinacea) or is completely tall fescue. Fescue is an evergreen grass that is more hardy than Kentucky bluegrass. One downside to this grass as sod is that fescue when cut leaves a less “manicured” look when compared to sod composed of Kentucky bluegrass. It is also important to consider the quality of the sod that is being installed. Only sod that is unbroken and able to retain its original shape should be used. In the summer months when conditions are

warm and dry, sod should be ordered, delivered, and installed within twenty-four hours in order for the best chance at stabilization to occur. Sod farms are relatively common and there are several located in New Jersey, meaning that the sod should have no issue being delivered within the twenty-four hour period. Using sod is a very aesthetic form of soil stabilization, but can also be costly in water usage. It is important to consider this fact prior to deciding to commit to sod.

Along the coast of a barrier island are dunes that can be naturally forming or man-made. Different species of grasses and plants are planted in this sandy environment to stabilize this soil. The standard for dune stabilization requires the usage of just this as well as through mechanical means to reduce wind erosion that shifts the sand. This is a very interesting standard, as it combines both vegetation as well as engineering practices to stabilize this soil type. When establishing dunes, the consideration of the average high tide must be calculated. For the most effective stabilization, dunes must be at least one-hundred feet away from the average high tide. At this distance, vegetation may still be subjected to sea salt spray from the water. The plants suitable for dunes must be able to tolerate the salt water spray which many other species are not adapted to. Some of the recommended vegetation based on this concept are American beachgrass (Ammophila breviligulata), coastal panicgrass (Panicum amarum var. amarulum), and saltmeadow cordgrass (spartina patens). Saltmeadow cordgrass was seen in Tilton's Creek Preserve in Toms River while walking out towards the bay. This grass grew in Barnegat Mucky Peat soil. Other species of plants that are suitable for sand dune stabilization include seaside goldenrod (solidago sempervirens), switchgrass (Panicum virgatum), and eastern red cedar (juniperus virginiana). Due to the roots of several of these plants being so fragile, there are often signs that tell passerby to not step on the dunes or there will be a fine. These dunes not only provide protection for those who live near them, they also are home to several animal species.

The monarch butterfly (Danaus plexippus) enjoys eating seaside goldenrod which is a common plant on dunes. The Atlantic ghost crab (Ocypode quadrata) is also native to New Jersey and will bury itself into the beach dunes as shelter. Man made structures also help to keep dunes stabilized. Sand fencing is often installed prior to the formation of the sand dune. Over time, sand will begin to accumulate. At this time vegetation may begin to be added. Once the accumulation reaches a point where the original sand fencing is covered, a new fence will be added in the middle region of the dune. Accumulation will continue until a hill is formed and vegetation covers the sand dune.

The most recent update to the New Jersey standards for soil stabilization would be the standard for topsoiling done in 2017. This standard is very important, as it pertains to the preserved and suitable quality for topsoil that is being placed down to support plant growth. Using temporary stabilization on stockpiles of topsoil is crucial to prevent environmental damage from erosion. When applying the topsoil, it should be a uniform thickness of at minimum four inches and is looking to average at five inches.This number can vary depending on the acidity of the soil as well as where special regulatory standards are enforced. Some locations of these special cases include the creation of golf courses, sports fields, and capping over a landfill. Ideally, the pH of soil should be at 6.5 or slightly acidic, but this does depend on the surrounding soil pH and vegetation. Prior to putting down topsoil, the subsoil should also be checked for compaction according to the standard for land grading. Compaction is important to know prior to topsoiling as it will impact the plants that are able to grow. If the subsoil is compacted, looking for plants with shorter roots or adding additional top soil may be advisable. Plants like english lavender (Lavandula angustifolia), a non-native but non-invasive plant to New Jersey, have

shallow root systems of around eight to ten inches which may be ideal for this area. Once the topsoil is applied, permanent vegetative standards are enforced to ensure that the soil is stable.

In New Jersey, places such as the pine barrens in the coastal plains region of New Jersey contain highly acidic soil to support life. Plants and trees such as lowbush blueberry (Vaccinium angustifolium) and pitch pine (Pinus rigida) both thrive in soils with a medium to high range of acidity. This acid soil can prove to be harmful to humans when mixing into freshwater systems, so by following the standard for management of high acid-producing soils, it can cut down this risk. A soil with a pH of four or less is listed under this standard as being high acid-producing. While it does not fall under this category, Evesboro is a common soil series found in the pine barrens and on average has a pH of 4.6 which is still relatively high. During construction, if a soil is tested and the pH reaches this threshold, developers should limit the time spent excavating this soil to minimize chance of erosion, properly store the acid soil in a stockpile separate from soil with a higher pH, and if possible, cover the acid soil with limestone to decrease the pH. Sites that build upon highly acid-producing soil must cover the soil with at least twelve inches of topsoil and monitor the location for at least six months to make sure vegetation for soil stabilization takes root. Being that there is potentially hazardous exposure to the environment and to people, this is a standard that can prevent tragedy from striking at a later point in time.

Before a construction site can be worked on, the land must be cleared including plants and trees. In some cases, the contractor may want to keep trees for aesthetic purposes meaning that the land will have to be dug around the tree. The standard for tree protection during construction is aimed at protecting trees from environmental or mechanical injuries on the worksite. Prior to a tree being considered to stay or be removed, many factors must be evaluated, The vigor or overall health of the tree, the age of the tree, the tree species, if it has disease, the

aesthetics relating to the surround area, tolerance of urban stress, longevity, and the benefits to local wildlife all must be a topic of conversation before a decision is made. If a tree is already in a state of decay where it could eventually cause damage, it would be wise to take it down and possibly even plant a new one. Some tree species can also tolerate urban environments better than others. If the area of land being developed was once a forest and now is becoming a highly industrialized area, making sure the tree can tolerate that stress could be a deciding factor in keeping the tree. Disrupting wildlife is another important conversation that must be had. This was their home first, so to prevent intense habitat fragmentation, keeping several trees or natural spaces can help them get from one area to another without being harmed. If a tree is to be kept, there are precautionary measures that must be taken to ensure its safety. The protected root zone of a tree must be left alone and no roots are to be cut within it to give the tree the best chance of survival. If any roots are to become exposed, they must be re-covered after excavation. In the New Jersey Soil Erosion and Sediment Control Standards manual, table 9-1 gives a list of common trees in New Jersey as well as important characteristics to consider while working on a site. Some of these include the trees resistance to root severance and soil compaction and flooding. A species such as an eastern red cedar (Juniperus virginiana) has a high tolerance to root severance but a very low tolerance to soil compaction and flooding. A red maple (Acer rubrum) on the other hand is tolerant to both root severance, soil compaction, and flooding making this tree heartier than the eastern red cedar in some cases. Being knowledgeable in this subject can improve the natural ecosystem after construction as well as providing benefits to both animals and humans.

Mentioned in the previous standard was the importance of considering aesthetics into the trees that are planted. Having trees that flower in the spring and turn vibrant colors in the fall can

add appeal to passersby. The standard for selection of trees, shrubs, and vines for planting use plants to aesthetically enhance as well as restore disturbed soil. When looking into this standard, a landscape architect can be called in to determine the plants that will be placed in specific spots around the site. Common trees that can be used under this standard and are native to New Jersey include american holly (Ilex opaca), american beech (Fagus grandifolia), flowering dogwood (Cornus florida). These are species of evergreen as well as deciduous and small deciduous trees. Shrubs and vines that can be planted include common lilac (Syringa vulgaris), sweet pepperbush (Clethra alnifolia), and trumpetcreeper (Campsis radicans). Common lilacs are not native to New Jersey, but are not invasive. This plant has a very distinct sweet and floral smell that makes them a great addition to a landscape. Trumpetcreeper are vines that produce flowers that support hummingbirds. Supporting the wildlife is an additional benefit to planting these species other than just for human aesthetics as well as soil recovery after being disturbed.

After all vegetation is planted and growth has begun, it is important to maintain the vegetation to support the health of the plants, soil, and overall aesthetics of the environment. The standard for maintaining vegetation provides instructions on just this. This applies to nearly everywhere, ranging from public parks to our forests including the pine barrens. Mowing, applying the proper amount of fertilizer if needed, pruning shrubs and trees are all important to keep the overall health of the soil appropriate. If seed such as for Kentucky bluegrass did not take, it is important to reseed the area to ensure that the soil is being taken care of. Another aspect of this standard includes the removal of invasive plants or trees. Planting new trees and plants that are native or at least non-invasive are recommended. An example of this include the flowering dogwood (Cornus florida) and the kousa dogwood (Cornus kousa). Flowering dogwood is a native species to New Jersey that provides beautiful flowers in the springtime. The

kousa dogwood, while very similar, is not native and considered an invasive species. While observing the local vegetation of an area, special attention should be placed on plants that have counterparts that look similar but are invasive, such as the two species of dogwood. Knowing that this is the case, the kousa dogwood should be replaced with the flowering dogwood to promote New Jersey's native species. Prescribed burns are also listed under this standard impacting our pine barrens regions. By introducing controlled burns, it reduces the risk of intense fire by removing accumulated brush as well as promoting the growth of pitch pine (Pinus rigida) which thrive particularly well after a fire. The range of this standard applies to many aspects of the everyday lives of people. Whether it be the act of mowing grass and pruning trees for aesthetic reasons to replacing existing plants with native ones, anyone can do their part and implement this standard into daily life.

As mentioned in the standard for dune stabilization, sometimes mechanical methods of erosion control can be combined with vegetative stabilization. The standard for grassed waterways is listed under engineering standards, but combines vegetation to help reduce the risk of erosion from the flow of water. Oftentimes, the channel itself is engineered which is why it falls under the engineering sediment control standards, but is assisted through the permanent vegetative standard. The vegetation, which includes sod listed under the permanent vegetative standard for sod, is used to slow the water down which reduces the amount of erosion and sediment lost. Seeing an engineering standard that is heavily influenced by vegetation shows the importance of the vegetative standards and how effective they can truly be. Without the use of vegetation, the waterways would be constantly eroding making the engineering that was done to construct the waterway useless. Understanding the interconnected roles that engineering and vegetation have with each other is crucial to the success in stabilizing our soil.

Understanding soil is a complex matter that can take a lifetime to truly understand. Understanding even a fraction of this is beneficial to anyone as there is a deep history between humans and the soil. There are economic benefits to understanding and protecting our soils and through the practice of these standards, we can effectively protect the soil while saving money. These standards are designed to incorporate sustainability, aesthetics, and preservation for future generations and do so by taking history as a lesson so we never repeat past mistakes.

References

Lal, J. (20 September, 2023) “MESOPOTAMIA: AN ANTIQUE LAND IN DISTRESS”. RISUS - Journal on Innovation and Sustainability. https://revistas.pucsp.br/index.php/risus/article/view/60927/43136

Davis, S. (29 June, 2023). “The Jersey Shore I’ve never seen before”. Literary Sara. https://literarysara.net/2023/06/29/the-jersey-shore-ive-never-seen-before/

Baveye, P. et al. (1 November, 2011) “From Dust Bowl to Dust Bowl: Soils are Still Very Much a Frontier of Science”. Soil Science Society of America Journal. https://acsess.onlinelibrary.wiley.com/doi/full/10.2136/sssaj2011.0145

USDA. “NRCS History”. https://www.nrcs.usda.gov/about/history/brief-history-nrcs#:~:text=The%20Soil%20Conservation%20Act%20was,in%20the%20New%20Deal%20administration.

State of New Jersey Department of Agriculture. “NJ Soil Erosion and Sediment Control Program”. https://www.nj.gov/agriculture/divisions/anr/nrc/njerosion.html#:~:text=Since%201976%2C%20New%20Jersey%20has,and%20 Sediment%20Control%20Act%20

Fisher, D. et al. (January, 2014). “The Standards for Soil Erosion and Sediment Control In New Jersey - 7th Edition, January 2014, Revised July 2017”. New Jersey Department of Agriculture—State Soil Conservation Committee. Download 2017 NJ Soil Erosion and Sediment Control