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Edited by Del Fanning

In this issue:

Editor's Comments.

This issue of Pedologue is again available from the MAPSS Web Site, http://sawgal.umd.edu/mapss/ . Hard copies are not sent unless the editor, dsf@umd.edu or 301-405-1308, is informed of someone who needs one.

This issue is a bit of a hodge-podge of items. The article on Great Oaks by my VT colleagues and me was prepared for ASSAY, the Australian acid sulfate soils newsletter. The ASSAY editor, Chrissy Clay, found it too long, a lesson for my verbosity, so it didn't appear is the last ASSAY issue -- for which it was intended. A condensed version may appear in the next issue, we'll see. Maxine Levin sent me her state soil article, which appeared in the newsletter of the European Society of Soil Conservation and is also on their web site: www.essc.sk <http://www.essc.sk/>. She suggested that I could use it for Pedologue. I have, with a little editing in the process. Charlie Hanner sent along the Environthon article and picture. Thanks Charlie. I decided to put in my icebox theory of global warming. I have previously shown it to a few people and requested comments, but haven't gotten much response. I wrote it partly for a grandson who just graduated from high school and say's he doesn't believe in global warming. He likes to drive 4-wheelers and other vehicles at top throttle and not think there are any consequences. With the calendar, Brian Needelman wants to make sure everyone is aware that MD is hosting the regional soil judging contest this fall.

ACID SULFATE SOILS AT THE GREAT OAKS, VIRGINIA-USA, HOUSING DEVELOPMENT -- UPDATE

By Del Fanning, DelvinDel@aol.com or dsf@umd.edu , University of Maryland and W. Lee Daniels, wdaniels@vt.edu and Zenah Orndorff, zorndorf@vt.edu Virginia Tech

This story provides background and an update on active acid sulfate soils at the Great Oaks development in Fredericksburg, VA, visited by the World Congress of Soil Science Acid Sulfate Soils Tour, July 8, 2006. Some affected yards at Great Oaks underlain by acid sulfate soils are pictured on pages 83-85 of the tour guidebook http://www.sawgal.umd.edu/MAPSS/WCSS_Guidebook.pdf .

The picture here from the guidebook shows Dr. Daniels on iron (hydr)oxide stained sidewalk around a house at the corner of Great Oaks Lane and Hickory Court on May 22, 2006, about 7 weeks before the tour. Grass could not grow due to the ultra acid conditions of the soil here, dubbed Iron Mountain (see below), even though new turf sod was installed at least twice during the two-year period prior to this photo. Grass growing along the edge of the concrete was attributed to the liming effect of the concrete. This yard was one of the worst of about 30 acid-sulfate affected lots in the development. Another yard examined by WCSS tour participants, pictured in the guidebook, pg.85, was previously in a similar condition, but had good turf after heavy liming and other reclamation practices recommended by Virginia Tech, installed and paid for by the homeowner, Mr. Les Hazen.

The Great Oaks subdivision was started by the developer, Sona Homes, in 2001. Problems arose during phase 2 in 2003 when major land disturbance exposed *sulfidic materials* (see definition on page 28 of 10th edition of Keys to Soil Taxonomy, http://soils.usda.gov/technical/classification/tax_keys/keys.pdf). Residents began moving into this area in early 2004, according to Christina Dixon. She and husband Marv live on Great Oaks Lane, across the street from the yard above. The Dixons and Mr. Hazen were

the main sources of our information on the history of the development. Christina interviewed the WCSS tour participants on the morning of July 8, 2006 for inclusion in the homeowner's newsletter. Christina gave the name "Iron Mountain" to the property shown because of its location, color and inability to sustain plant life. Coincidentally, Iron Mountain is also the name of a California mining area with very serious acid sulfate soil and water problems studied by Kirk Nordstrom, U.S. Geological Survey and others with results detailed in a special publication on Sulfate Minerals (Alpers et al., 2000) and elsewhere. In addition to the iron (hydr)oxides precipitate, some of the concrete in the picture exhibited significant removal/solution of the cement binder, revealing a surface of stripped aggregate.

Marv Dixon was elected Fredericksburg City Councilman for Ward 1 in 2006, an area that includes Great Oaks. He helped pass a city ordinance to regulate future developments to prevent new acid sulfate soil problems in the city. The policy may be viewed at http://www.cses.vt.edu/revegetation/remediation.html . Marv thinks it likely that such regulations will be adopted by other local jurisdictions and perhaps eventually by the entire Commonwealth of Virginia. Our examination of the Iron Mountain property at Great Oaks showed that the upper portion of the soil is fill/spoil, presumably brought to this property from deep disturbance elsewhere in the development. The new Acid Sulfate Soils Testing Policy, effective March 1, 2007, should prevent such severe acid sulfate soil affected lots in future developments. The purpose of the policy is to "insure that soils contain acceptable levels of active acidity (pH) and potential acidity (long term lime requirements to offset sulfide oxidation), such that they will: (A) Support adequate and permanent vegetation, (B) Minimize degradation to concrete, metal, and other building materials, and (C) Minimize damage to surface and ground water resources." – quoted from the policy. The policy requires that "The permit holder, developer, or contractor of any newly developed lot for residential or commercial construction shall have the soil tested for pH and for potential acidity to the maximum depth of excavations, and prior to placing any ground cover, to determine if soil remediation is needed to maintain acceptable short and long term soil pH levels in the soils."

Since the 06 visit by the WCSS tour group, the developer applied reclamation measures, similar to those recommended on the above noted Virginia Tech web site, to many of the acid sulfate affected properties at Great Oaks. These measures have resulted in the establishment of grass vegetation on affected lawns. Alpesh Patel of Sona Homes stated that the measures applied consisted of up to 12 tons/acre of pelletized dolomitic lime, depending on the PPA (peroxide potential acidity) recommendation, and at least 7 pounds per 1,000 square feet of compost, and screened topsoil incorporated to a depth of 4 to 6 inches. Patel said that the lots were treated and seeded between September 13 & October 19, 2006 and that the recommended seed rate called for 2.3 lbs. fescue and 0.3 lbs. rye per 1,000 square feet.

A picture taken April 2, 2007, demonstrates the preliminary success of the Sona-applied measures in establishing grass on the lawn of the house of the Iron Mountain property. Some spots with thin vegetation may be seen in the photo. A recent site visit indicated that much of the grass established was annual rye and not perennial tall fescue. Some of this problem may be attributable the homeowner's current lack of management.

It will be interesting to see how well vegetation on this and other treated yards at Great Oaks stays established over the 2007 summer and beyond; eastern VA is subject to protracted summer droughts. The iron (hydr)oxide stained sidewalk and gutters are visible reminders of the active acid sulfate soil processes that released iron from iron sulfides in soil materials exposed by construction. The high pH of the concrete triggered the oxidation and hydrolysis of soluble iron in soil solutions that flowed over the concrete to precipitate an iron (hydr)oxide paint on the concrete surface. This coating was recently pressure-washed with plain water by the developer and it is hoped that the sun will eventually bleach the remaining color from the concrete. If so, and if grass is established on the properties, there will be no visible reminders of the presence of active acid sulfate soils in the development. Residents should still be concerned about possible acid sulfate corrosion of concrete and metal pipes on their properties and possible continued detrimental acid sulfate effects upon the quality of surface and ground waters within and leaving Great Oaks. On a positive note, Sona Homes reportedly applied a tar coating on home foundations and it is hoped this will prove acid-resistant over the long term.

Unfortunately, developers and engineers continue to expose *sulfidic materials*, ignoring the chemical and mineralogical nature of soil materials during earth-moving activities. Virginia Tech has been involved in an intensive outreach/extension effort for the past two years to inform the development and engineering community of the dangers of disturbing *sulfidic materials*, but the vast majority has not been trained and do not recognize these materials in the field. Perhaps ordinances such as the one developed by Fredericksburg will bring enhanced awareness of the need to prevent the exposure of sulfide-bearing soil materials that lurk within the soil-geologic column in many parts of the world.

Reference:

Alpers, C. N., J. L. Jambor, and D. K. Nordstrom (Eds,). 2000. Sulfate Minerals – Crystallography, Geochemistry and Environmental Significance. Reviews in Mineralogy & Geochemisty, Volume 40. Mineralogical Society of America, Washington, DC.

The authors acknowledge Christina Dixon for editorial improvements to this article.

Marketing State Soils in the United States: Expanding Public Awareness of Soil as a Vital Natural Resource

Contact: Maxine Levin, United States Department of Agriculture, Natural Resources Conservation Service, Soil Survey Division, Washington D.C. Email: maxine.levin@wdc.usda.gov Phone: (202)720-1809

The "State Soil" designation in the United States (U.S.) has served to expand public awareness of soils as vital to the health of all natural resources. Professional soil science societies and the U.S. Soil Survey partners have chosen state soils in all the U.S. states. Elementary and junior high students are often the ones responsible for pushing state legislatures to ratify a state soil. Their quests have resulted in 20 states officially signing a state soil into law. Nationally-distributed newspapers and magazines have run stories about the students and their quest for the recognition of soil's importance.

A good example of this process was in the state of California. Middle school teacher Alex Lehman seeking to engage his students with a meaningful activity and an integrated curriculum approach, proposed the idea of naming the local San Joaquin Soil of central California the official "State Soil". Mr. Lehman solicited the aid of State legislators, as well as local professional soil scientists to assist the students. The students did their own research, looking at other states, which already had an official state soil. The students collected papers on "History of the San Joaquin Soil," "The Origin and Formation of the San Joaquin Soil," and appropriate maps and soil descriptions to be prepared to talk to their state lawmakers. With the help of a State Senator and the students, San Joaquin Soil was chosen as the official state soil in 1997, the same year that the students proposed it. Similar experiences occurred in the United States (U.S.) in Nebraska (1979), Nevada (2001), Oklahoma (1987), Kentucky (1990), Mississippi (2003) and Alabama (1997) to name a few. As one sixth grader remarked to his Governor at the signing-in ceremony in Nevada, "We want people to understand how farming the soil puts food on the table."—A lifelong memory and learning moment for both of them.

What is a "State Soil"? An official state soil is represented by a soil series that has special significance to a particular state. In the U.S., areas with similar soils are grouped and labeled as soil series because of their similar origins, as well as their chemical and physical properties. A soil series generally is named after a town or landmark in or near the area where the soil series was first recognized. (A soil series is a naturally occurring entity on the landscape. Therefore, a given series does not necessarily occur within the confines of only one state. Several state soils range beyond the respective states in which they are honored.) Each state in the United States has selected a state soil, twenty of which have been legislatively established. These "Official State Soils" share the same level of distinction as official state flowers and birds. Also, representative soils have been selected for Puerto Rico, Virgin Islands and Guam. In 1979 Nebraska was the first state legislature to ratify a state soil into law.

State soils have done much to educate a broad public about the importance and benefits of healthy soils. "Why a state soil, --isn't that just dirt?" is often asked during the

legislative process. This provides a public opportunity for soil scientists to educate legislators and general audiences about why soil is an important resource. Using the designated "State Soil" as a focal point for teaching both young and old, the U.S. Soil Survey and soil science professionals have provided informational web sites, hands-on demonstrations, posters and public information campaigns. Examples of these web sites can be found at: http://soils.usda.gov/gallery/state_soils/; http://www.ieway.com/wspss/wspss_statesoil.html ; or http://www.soils.org/smithsonian/index.html. The USDA-Natural Resources Conservation Service and professional soil scientist organizations and societies have "State Soils" in a variety of educational and promotional products such as bookmarks, t-shirts, planners (date books or calendars), magnets, brochures and trading cards (sort of like sports trading cards for children that have the statistics of the state soils as well as a picture.)

NRCS Missouri State Soil Scientist Dennis Potter remarked on the success of State Soil trading cards as a very successful informational tool with younger children. For the high school level, Missouri used the Menfro State Soil landscape as the location of the state soil judging contest. "It really captured the attention of those high school students, "said Potter. As an adult marketing tool, the Menfro soil monolith from Missouri has been used by the Smithsonian Museum to advertise their planned exhibit on soils. In addition, a conference is scheduled for 2007 for the American Tree Farm System in Missouri, and, very purposefully, the conference planners have used the Menfro Soil complex to illustrate all their demonstrations. Kentucky State Soil Scientist Bill Craddock, pointed out that his State's soil (the Crider Soil) is valued during farmland sales as the market standard for the best of agricultural soils in the area.

Starting in summer 1998, USDA Natural Resources Conservation Service (NRCS) assembled a comprehensive U.S. Soil Monolith collection that included all 50 state soils as well as the U.S. Territories that have soil surveys. On April 22, Earth Day, a day dedicated to raise awareness of the health of our planet, these monoliths were displayed on the National Mall (between the Capitol Building and the Washington Monument) in tribute to the Centennial of the National Cooperative Soil Survey. 1,000 visitors per day visited the display and learned about the soils in their States. The monoliths will be assembled together again for the 2008 Smithsonian Soils Exhibit. The Soil Science Society of America (SSSA) and USDA NRCS are now working with the Smithsonian Institution's National Museum of Natural History in Washington, DC, to plan a soils exhibit as part of their Forces of Change Program. The exhibit will include a display of U.S. State Soil Monolith collection and an educational, interactive section to help the museum's over 6 million annual visitors understand how soil is intricately linked to the health of humanity, the environment and the planet. Related publications and web activities will reach millions of additional people. A traveling exhibit will be sent to hundreds of other museums and libraries to reach additional communities. Never before have we had such an opportunity to advance the understanding of soil. This work will move forward our journey to sustain Earth and its people by educating visitors to the Smithsonian on the importance of Soil and Earth sciences.

In the spring of 2007 the U.S. Department of Agriculture added its newest addition to the U.S. Soil Monolith collection with a profile from the District of Columbia. Aside from ratifying state soils in each state in the U.S., a new challenge may be to support approval of a "National Soil." Acknowledgment of a "National Soil" in the U.S. would lead the way for other countries to name nationally important soils in their own countries that will then be recognized on a global scale. We encourage Soil Scientists all over the world to consider this concept of a designated soil to represent a province or state or country. Bringing attention to soils all over the world not only gives inspiration to our profession but encourages the public to have more awareness and support for our most precious natural resource.

Mike Risinger (right)State Soil Scientist in Texas presenting a plaque and Soil Monolith to the manager of the King Ranch at the National Cooperative Soil Survey Conference in Corpus Christi Texas in 2005.

Missouri State Soil and Monolith is featured in a display for the Smithsonian Soils Exhibit scheduled to open in the Museum of Natural History, Washington D.C. in 2008.

Students in Reno, Nevada are with their Governor signing the Orovada State Soil into law in May 2001.

Two of the soil monoliths to be used in the Smithsonian Exhibit.

State Soils of the United States

STATES	STATE SOIL	LEGISLATION	STATE	STATE SOIL	LEGISLATION
Alabama	Bama	April 1997	Nebraska	Holdrege	April 1979
Alaska	Tanana		Nevada	Orovada	May 2001
Arizona	Casa Grande		New Hampshire	Marlow	
Arkansas	Stuttgart	March 1997	New Jersey	Downer	
California	San Joaquin	August 1997	New Mexico	Penistaja	
Colorado	Seitz		New York	Honeoye	
Conn.	Windsor		North Carolina	Cecil	
Delaware	Greenwich	April 2000	North Dakota	Williams	**
Florida	Myakka	May 1989	Ohio	Miamian	
Georgia	Tifton		Oklahoma	Port	April 1987
Guam	Akina		Oregon	Jory	
Hawaii	Hilo		Pennsylvania	Hazleton	*
Idaho	Threebear		Puerto Rico	Bayamon	May 1999
Illinois	Drummer	June 2001	Rhode Island	Narragansett	
Indiana	Miami		South Carolina	Bohicket	
Iowa	Tama		South Dakota	Houdek	February 1990
Kansas	Harney	April 1990	Tennessee	Dickson	
Kentucky	Crider	April 1990	Texas	Houston	
Louisiana	Ruston		Virgin Isles	Victory	
Maine	Chesuncook	April 1999	Utah	Mivida	
Maryland	Sassafras		Vermont	Tunbridge	March 1985
Mass.	Paxton	May 1991	Virginia	Pamunkey	
Michigan	Kalkaska	December 1990	Washington	Tokul	
Minnesota	Lester		West Virginia	Monongahela	April 1997
Mississippi	Natchez	May 2003	Wisconsin	Antigo	September 1983
Missouri	Menfro		Wyoming	Forkwood	
Montana	Scobey		Washington DC	Sunnyside	

*Hazleton was proclaimed the State Soil of Pennsylvania in a Governor's Proclamation on April 21, 1999.

** North Dakota does not have an official state soil. Each year the Governor issues a proclamation designating a soil of the year. The North Dakota Professional Soil Classifiers recommend the soil to the Governor.

Harford Christian School awarded first place in soils at Maryland 2007 State Environthon Competition. Article submitted by Charlie Hanner.

Harford Christian School Awarded First Place in Soils
at Maryland 2007 State Envirothon Competition

Harford Christian High School from Harford County was the top scorer in soils at the 2007 Maryland State Envirothon Competition. The competition was held June 19th to 21st at University of Maryland Eastern Shore Campus in Princess Anne, Maryland. More than 100 students from 19 counties across Maryland took part in this year's competition. The Envirothon is a team-based outdoor academic competition which challenges and tests high school students' in five disciplines; soils, forestry, aquatics, ecology, and wildlife.

The competition itself was held on the UMES campus' university farm which is about 250 acres. The students were provided with a training day in which they were instructed and shown a practice soil pit on what they might expect for competition day. The soil that was prepared for the competition was a coarse-loamy, siliceous, semiactive, mesic Aeric Endoaquults. The soil would correlate to the *Glassboro* series. The students are trained on soil texture, color, root restrictions, depth to seasonal high water tables, slope, landforms, past and present erosion, capability class, conservation practices and nutrient management. They also have to make interpretative ratings of the soil and surrounding landscape for different uses.

The top scoring five member team consisted of Emily Ledford, Jennifer Schellum, Donald McKnight, Timothy Cardemuto and Jonathon Hope. They scored a total of 96 points out of a possible 100 in soils and placed third overall in the competition. Each student was presented with a $50 cash award and certificate by NRCS soil scientist Charlie Hanner on MAPSS behalf. This is the second year that MAPSS has sponsored this award.

MY ICEBOX THEORY OF GLOBAL WARMING. By Del Fanning

Theory: The earth can be likened to an icebox that has a big supply of ice that with global warming is slowly diminishing with time.

Deductions: As long as there is a sufficient supply of ice, the air and water of the earth (the icebox system) will not rise a lot, at least not precipitously, because the heat generated is dissipated by the melting of ice and the organisms of the earth won't notice much change in the temperature of their surroundings – which they may interpret as meaning that there is little if any global warming going on. However, there will be an increase in the quantity of water relative to the quantity of ice and this will result in rising global sea levels. Even this rise may not be as great as we may expect, however, because the edges of land areas where they border the seas/oceans are not vertical in most places – they slope, often very gradually, away from the water covered areas. Thus, as water is added to the seas/oceans, their size increases laterally, and the vertical rise is not as great as it would be if the edges of the seas/oceans were vertical in all places.

But what happens when the day comes when all the ice has melted? The icebox theory predicts that when this happens, the temperature of the air and water will rise precipitously and is likely to rise so much that all life on earth will be threatened and may die, except perhaps for certain life forms, such as bacteria that now live in hot springs and geysers etc., which may expand in their extent and distribution.

Critiques: One fault with the theory is in its simplicity. The earth does not just have one huge supply of ice that is slowly diminishing with time. New ice forms in some places at the same time that it is melting away in others. At given places ice melts more than it forms in the warm times of the year (summer) and forms more than it melts in cold times (winter) and all parts of the earth, where there are significant quantities of ice, do have climate seasons. However, if, overall, the rate of melting is more rapid than the rate of formation of new ice, then the icebox theory seems to have some validity. Reports that glaciers are receding and icecaps (e.g. in Antactica and Greenland) are thinning tend to make me believe that the supply of ice on earth is diminishing and that the day may come when there will be very little if any ice on the earth – at which time sea levels should be at a maximum height – no more water to add because all ice has melted. At that time, the only way for new heat, that comes from the sun and is trapped by heat trapping gases in the atmosphere etc., to be dissipated will be by raising the temperature of air/water/soil/ and rocks and by radiation back to the universe etc. The rate of radiation away from the earth may rise to a point at which some new equilibrium will develop at some new high temperature.

Experiment that students, or anyone, can do to demonstrate the icebox theory: Get an ice chest and fill it with ice (and a few cans of beer or soft drink if so desired). Put the chest in a warm place such that the ice will slowly melt. Check the temperature of the ice/water mixture/slurry in the chest periodically. What should be found is that the temperature of the ice/water slurry in the chest will stay constant at or very close to the freezing/melting point, 0 degrees Celsius or 32 degrees Fahrenheit. However, after all

the ice has melted, the temperature of the water, with no remaining ice, in the chest will rise and eventually come close to the temperature of the air outside the chest. Beer and soft drinks in the chest will then not be very satisfying to drink on a warm/hot summer day.

Editors Comments – I've been thinking about this theory for a long time and finally decided to write it down. I will be pleased if it can contribute in some way to people leading lives that will help to slow or stop global warming, which I think is happening based mainly on what seems to be a diminishing quantity of ice on earth as can be noticed by the shrinking in the size of glaciers etc. In studying my Fanning-side genealogy I have learned that there is a Fanning Island in the Pacific Ocean close to the equator, north of Australia, named for a Fanning sea captain who sailed from the U.S. a long time ago who was a descendent from the same earliest Fanning ancestor in America as me. I have heard that this Fanning Island, that I would like to visit some day, is threatened and may disappear because of global sea level rise. I don't want Fanning Island to disappear and I am trying to enlist everyone's help to keep Fanning Island from being submerged before I get there, and ideally never.

I have been trying to find information on the web as to how much ice is present on earth and how that quantity is changing with time. I haven't been able to find any quantitative data, but the sources, who have been studying the quantity of ice in Antactica and Greenland, some of whom are with NASA Goddard in Greenbelt, do all seem to indicate that the quantity of ice on earth is diminishing. How about some of you MAPSS members sounding off on this. I would love to learn that these estimates are wrong and that I am more full of baloney than most people already believe.

I would like to have a future Pedologue issue devoted to soils and global warming issues and have some possible contributors in mind, but don't know if we will be able to bring this off.

Calendar of some coming events

August 13-14, 2007. Introduction to basic soils science. Short-course sponsored by VAPSS and Virginia Tech Dept. of Crop and Soil Environmental Sciences. Fredericksburg, VA. Opportunity to earn c.e.u.'s available. Notice from Dr. W. Lee Daniels was sent to MAPSS members by Jim Brewer earlier. For more information, please contact Dr. Daniels **wdaniels@vt.edu** .

Oct. 26-27, 2007, practice pits open Oct. 23-25. Northeast Regional Collegiate Soil Judging Contest, hosted by University of Maryland.

Oct. 25 Soil judging dinner hosted by MAPSS for regional collegiate soil judgers (more information coming soon)

Nov. 4-8, 2007. ASA-CSSA-SSSA International Annual Meetings. New Orleans, LA; www.acsmeetings.org .