



President's Message

Michael Whited

This week my youngest bio-daughter hits her 18th Birthday and graduates from High School, with Honors I might add. How many of you thought they were going to be Soil Scientists when they graduated from HS? Who had ever even heard of a career studying "dirt?"

For many of us something in our youth propelled us in that direction. For me I know it was Grandfathers potato farm in northern Maine that had a big influence.

Likely all of us, it was some teacher, or another person, that really got us into soil. Many took a class from someone and it was like "pow" – hey that's interesting! For me it was my Soils 101 class, taught by "old" Doc Structemayer at UMaine. Later on Bob Rourke, he of Spodosol fame, really hooked me. Later in life, the yearn was re-kindled by interacting with Dr.'s Jimmie Richardson and Peter Veneman. I read an article this morning, it was an interview with Dr. Milo Harpstead, I

imagine for several of you readers out there, he had something to do with your decision to go into the soils field. These people that influenced us all had a passion for soil, and the desire to educate others about it.

This time of year as we look forward with the youth, let's make sure to give thanks and remember fondly those that played an important role in our career path. Let's hope that our sons and daughters are lucky enough to inter-act with someone that gets them excited to learn more.

So what? Participate, meet, inter-act, educate, learn, pass-it-on...it is our obligation to teach the leaders of tomorrow about the soil resource, to educate ourselves and others, to participate in community and professional life. Be a player!

Let us take up the torch of educating all generations of the importance of the soil resource that is the stuff of life.

In the article, Dr. Harpstead encouraged membership in a professional society and was particularly complimentary

of soil genesis and morphology field trips. In keeping with that, I hope to see you at the August tour. Bring your augers and sharpshooters! Have a great summer.



The Executive Committee meetings are public. Email Michael if you want to join in at president@mnsoilscientist.org! These are typically held via conference calls.

Congratulation to Peter Miller, PSS. He has been appointed by the Governor as the soil science member on the Board of AELSLAGID!



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Mark Your Calendars!

- August 6, 2010—MAPSS Summer Tour in Pine County, Minnesota (form attached)
- September 20, 2010—Deadline to register for the November 19, 2010 FSS and PSS exams.
- December 3, 2010—MAPSS Winter Technical event in St. Cloud, MN.
- More events on page 3!

NASIS 6.0 Release

Email sent on April 16, 2010, by Alan B. Price, Soil Scientist/Business Analyst, USDA, Natural Resources Conservation Service, Fort Collins, Colorado.

NCSS Federal cooperators,

We are pleased to announce the release of NASIS 6.0, the latest update of the NCSS software to store, query, edit, interpret, and certify soil survey data. Anyone who needs access to the NASIS database must use this new software. Older versions of NASIS are no longer available. NASIS 6.0 software and installation instructions can be freely downloaded from the NRCS Web site at:

<http://soils.usda.gov/technical/nasis/downloads/index.html#NASIS>

In addition to the NASIS 6.0 software, Microsoft's SQL Server 2005 Express Edition Service Pack 3 must be downloaded (free) and installed from: <http://www.microsoft.com/downloads/details.aspx?displaylang=en&FamilyID=3181842a-4090-4431-acdd-9a1c832e65a6>

Use the NASIS 6.0 installation instructions to install and create the NASIS instance of SQL Server Express. The NASIS 6.0 user guide, training materials, and other support documents can be viewed or downloaded from: <http://soils.usda.gov/technical/nasis/>

documents/documentation_6/index.html

Login to NASIS requires a Level 2 eAUTH account and a NASIS user account. The actual NASIS login and password are not used with NASIS 6.0. If you were a previous NASIS user, you should already have a NASIS user account. If you used Citrix to access NASIS, you also have the necessary eAUTH login. If you do not have either, or have problems getting into NASIS, please contact the Soils Hotline staff at: SoilsHotline@lin.usda.gov or by phone at 402-437-5379 or 5378.

Please share this information with others who may have a need to use NASIS 6.0.

Crisp: Be Good to Your Dirt

Written by Scripps Howard News Service columnist John M. Crisp Thanks to Jim Barott for passing it along.

Submitted by SHNS on Mon, 03/22/2010 - 13:33

I've been reading a dirty book lately, and I highly recommend it to you.

We can think of any number of exotic ways for our civilization to decline and expire: global warming, nuclear proliferation, the end of oil, over-population, under-population, collisions with asteroids, disease.

But, in fact, we may have a significant problem closer to home, underfoot, literally, which is the subject of "Dirt: The Erosion of Civilizations," by David R. Montgomery, a professor of earth and space sciences at the University of Washington.

Dirt isn't something that most of us spend much time thinking about. The fact is, we live on a very rocky globe. Fortunately, over very long periods of time, rock naturally breaks down under the elements and, in the best circumstances, it mixes

with organic matter and turns into dirt, the layers of topsoil of varying depths and qualities all over the globe, the humble dirt that makes life on earth possible.

Montgomery points out certain principles of dirt that should be more or less obvious, but which are easy to forget as we move further away from the land: for example, new dirt is always being created, but the process takes a very, very long time -- millennia, in fact.

Dirt flows downhill. Even minimally sloping land that is well protected by groundcover or forest undergoes very gradual erosion. Earthworms bring fresh dirt to the surface; rain and wind move it downhill. But the pace of this kind of erosion is so slow that often a natural equilibrium develops between soil loss and soil production.

Cultivation speeds up this process exponentially. When land is plowed and exposed to the elements, it blows and washes away much more quickly. Even gradually sloped land will lose dirt at a rate far beyond the ability of natural soil production processes to replace it.

Under the worst conditions -- drought,

storms, bad tilling practices -- farms have been known to blow away down to the bedrock, almost literally overnight.

Dirt is easy to wear out. Historically, whenever new land is readily available, farmers have found it cheaper and easier to exhaust their acreage and move on after several years rather than to practice agricultural techniques that preserve the growing capacities of the land.

Furthermore, the health of our dirt is closely related to the economic context in which crops are grown: large, single-crop plantations worked by slaves -- and these days, by expensive, high-tech machinery -- wear out the dirt much more quickly than smaller farms that produce a variety of crops.

We assume that as the population grows, we'll be able to use our dirt to produce the food required, either by clearing more land or developing better agricultural techniques. Historically, however, population growth has often been the result of better agricultural techniques: as mankind got better at farming, populations

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Upcoming Events

July 12-13, 2010

North Dakota Soil & Water Science Summit 2010

Carrington, ND

<http://www.soilsci.ndsu.nodak.edu/soilclassifiers/SoilSummitPoster2010.pdf>

July 16, 2010

MAPSS Red Till Soils Workshop

Designed for Subsurface Sewage Treatment Systems professionals.

Duluth, Minnesota (info on page 11)

August 6, 2010

MAPSS Summer Tour

Pine County, Minnesota (registration form attached)

www.mnsoilscientst.org

October 13 –14, 2010

Illinois Soil Classifiers Association

Joint meeting with Iowa and Missouri

Quincy, Illinois area

www.illinoissoils.org

October 31-November 4, 2010

ASA-CSSA-SSSA International Annual Meeting “Green Green Revolution 2.0: Food + Energy and Environmental Security”

Long Beach, California

www.acsmeetings.org

December 3, 2010

MAPSS Winter Technical Event

St. Cloud, Minnesota

www.mnsoilscientst.org

Do you know that the MPCA released its Best Management Practices for the Off-Site Reuse of Excess Fill from Development Sites?

You can find it at: http://assets.mnbrownfields.org/FillReuseBMPs_Jan2010MPCA.pdf

Soil Verification for SSTS Permits

**Mary West, PSS and
Gretchen Sabel, MPCA**

Welcome Spring! Despite the May snow, April-that-seems-like-May weather has ushered in one of the earliest starts to the SSTS construction season that many can remember.

One much-discussed feature of the 2008 SSTS rule is the new requirement that an infield verification of soils is conducted for new or replacement systems. This is to ensure that new systems start out with their soil separation confirmed. Specifically, the rule (7082.0500 Subpart 3 A) states that verification must take place prior to issuing the final Certificate of Compliance (COC) on the system. It is a local decision at what point in the permitting and construction process to do the verification.

Some local governments have a long history of verifying soils prior to issuing the construction permit; this practice helps ensure the proper system has been designed for the site. However with less

available resources, local governments are looking for ways to meet this requirement without having to make multiple trips to the construction site. In some areas, the permitting authority requires that a second contractor be retained to do this work. This adds cost for the system owner, though, and there are alternatives that some other local governments use.

So, how does a local unit of government meet the soil verification requirement in the Chapter 7082? Here are some suggestions shared with us by LGUs.

#1 – Verify during rough-up inspection

If the ordinance requires a rough-up inspection before mound and at-grade systems are constructed, you can still verify the soils at an early stage of the SSTS construction. Any necessary changes to the design can still be made before the system is completed.

#2 – Verify during other construction inspections

As the inspector is at the site at some point during the construction of the SSTS, the soils can be verified at the tank installation, the drainfield installation, or at the final inspection.

#3 – Group verifications

The local inspector can group verifications on a regionalized basis within their jurisdiction to avoid driving from one end of the county to another in the same day.

#4 – Verify between construction inspections

Verify the soils on new sites in between construction inspections in the area.

#5 – Combine soil verification with other field duties

Many local officials wear multiple hats in their job. If this is the case, the official can combine soil verifications with a feedlot inspection, weed inspection, or a complaint investigation in the area.

Part 1: A Soil Scientist from Minnesota in the United Kingdom 2010

Terence H. Cooper
U of M, Department of Soil, Water and Climate

Introduction

The purpose of my semester leave was to learn about soils and land use in various parts of the United Kingdom (England, Wales, and Scotland). I wanted to look at soil profiles, talk to farmers and visit with scientists who are concerned about the future of their soil. I wanted to learn more about a land that has had human impacts for over 4000 years. I succeeded in accomplishing what I set out to do and also acquired a number of new friends and colleagues along the way. Every soil has a history and the history of soil in the United Kingdom is complex, yet by looking at the soil today we can infer the past and speculate about the future. It is the future of England's soil where I started my investigations.

Government Policy and Soil

I met with Sean Crawford, Policy Advisor, Defra Soils Team. Defra is the Department for Environment, Food and Rural Affairs. Their purpose is to "secure a healthy environment in which we and future generations can prosper. Their priorities are to: 1) Secure a healthy natural environment for us all and deal with environmental risks, 2) promote a sustainable, low-carbon and resource-efficient economy, and 3) ensure a thriving farming sector and sustainable, healthy and secure food supply.

The Soils Team that Sean was a part of developed a 'Soil Strategy for England'. The strategy sets out a framework for action and focuses on four priority areas:

Sustainable use of agricultural soils

Role of soils in mitigating and adapting to climate change

Protecting soil functions during construction and development

Preventing pollution and dealing with historic contamination of land and soils.

They have established an ambitious vision for the next 20 years (to 2030) - Safe-guarding Our Soils; A strategy for England. "Our vision: By 2030 all England's soils will be managed sustainably and degradation threats tackled successfully. This will improve the quality of England's soils and safeguard their ability to provide essential services for future generations."

They state that England's soils have degraded over the last 200 years due to intensive agricultural production and industrial pollution. The threats to agricultural soils include; soil erosion by wind and water, compaction, and organic matter decline. They have recently implemented a "Soil Protection Review" (SPR) requirement for farmers who receive payments under the EU Common Agricultural Policy. This will strengthen their soil protection on farmlands.

Farmers are required to file their SPR as part of their Cross Compliance requirements to receive payments. The payments are based on farm size and land use, payments each year are currently: 24 to 28 £/ha (<140ha); 15 to 18 £/ha (140 to 640 ha); 7 to 8 £/ha (>640 ha)

The SPR 2010 asks farmers and land managers to:

identify and record current and potential problems with your soil;

assess and record soil types and degradation risks on your land;

select and take appropriate measures to prevent and/or remediate any problems and risks

review these risks and measures each year and reconsider as appropriate.

They are also asked to:

record access to water logged land and actions taken to remediate the damage when required;

select and take appropriate post harvest

measures;

adhere to crop residue burning regulations;

encouraged to complete optional section on buffer strips for water protection.

They are also concerned about building resilience of soils to a changing climate. They expect hotter dryer summers, warmer wetter winters, increased frequency of extreme weather events, and rises in sea level. The strategy commits them to further research into the impacts of climate change on soil, soil functions and soil threats. They are also looking into the impact of climate change on peat soils and habitats.

The United Kingdom is on a small island (273 km² or 105,000 mi² or 1.3 x Minnesota) with 60 million people impacting the soils and land use. Defra is also concerned with effectively protecting soils during and after construction. They plan to publish a booklet for planners to help them take account of soil functions in the planning process. They recently published a "Construction Code of Practice for the Sustainable Use of Soils on Construction Sites." This booklet covers the protection of soils through:

Effective pre-construction planning

Soil management during construction

Landscape, habitat and garden creation.

Concern over soil pollution also is in their strategy. They are committed to review current thresholds for metals entering soil and investigating the potential for reducing pollutants contained in materials being recycled to land.

Following referendums in Scotland and Wales in 1997 the UK Parliament transferred a range of powers to national parliaments or assemblies (devolved). The Scottish Parliament debates topical issues and passes laws on devolved matters

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Part 1: Soil Scientist from MN in the UK –continued

affecting Scotland. It also scrutinizes the work and policies of the Scottish Government. The Scottish Government is the devolved government for Scotland. It develops and implements policy, and is accountable to the Scottish Parliament. It is responsible for many issues, including health, education, justice, rural affairs and transport. Agriculture is an important sector of the Scottish economy. The vast majority of land in Scotland is under agricultural production and the sector is responsible for much of Scotland's food exports. The Scottish Government is working towards a Greener Scotland by improving the natural and built environment and protecting it for present and future generations.

The Welsh Assembly Government is the devolved government for Wales. It develops and implements policy, and is answerable to the National Assembly. Led by the First Minister, it is responsible for many issues, including health, education, economic development, culture, the environment and transport. This includes their vision for Welsh farming which they say is at the heart of a sustainable countryside and profitable rural economy.

Because of devolution the programs related to soils are not the same in Wales and Scotland when compared to England. Where England has "Safeguarding our Soil"; Scotland has "The Scottish Soil Framework". This program was developed with advice from a wide range of stakeholders. It is aimed at Scottish Government policy leads, delivery partners, environmental and business NGOs, research organizations and other key stakeholders with an interest in soils. It describes key pressures on soils, particularly climate change, relevant policies to combat those threats, and identifies the future focus for soil protection, key soil outcomes, and actions across a range of sectors.

The Strategy for England includes eight key actions, none of which refers to the natural environment. According to John Conway, Principal Lecturer in Soil Science at the Royal Agricultural College, Cirencester,

The Strategy is largely a definitive re-statement of the many concerns held about threats to agricultural soils. The goal is to strengthen the cross compliance obligation (EU program) to keep land in 'good agricultural and environmental condition'. The SPR requires farmers to identify if any specific soil management issues arise on the farm; the onus being on the farmer to identify and undertake actions to address specific problems. Defra's strategy, therefore, is focused on agricultural soils and only makes passing reference to the natural environment.

The Scottish Government with "The Scottish Soil Framework" is an altogether different approach that recognizes soil as one of the nation's greatest natural assets. The Scottish Soil Framework sets out the vision for soil protection in Scotland, and formally acknowledges the important services soils provide to society. The Framework identifies a wide range of activities that will contribute to 13 soil outcomes:

SO1 - Soil organic matter stock protected and enhanced where appropriate

SO2 - Soil erosion reduced and where possible remediated

SO3 - Soil structure maintained

SO4 - Greenhouse gas emission from soils reduced to optimum balance

SO5 - Soil biodiversity, as well as above ground biodiversity, protected

SO6 - Soils making a positive contribution to sustainable flood management

SO7 - Water quality enhanced through improved soil management

SO8 - Soil's productive capacity to produce food, timber and other biomass maintained and enhanced

SO9 - Soil contamination reduced

SO10 - Reduced pressure on soils by using brownfield sites in preference to greenfield

SO11 - Soils with significant historical and cultural features protected

SO12 - Knowledge and understanding of soils enhanced, evidence base for policy review and development strengthened

SO13 - Effective coordination of all stakeholders roles, responsibilities and actions

The Scottish Soil Framework thus recognizes that soil provides for habitats and biodiversity; and that protecting soils with significant historical and cultural features is also important.

The Welsh Assembly Government (WAG) produced a consultation report in June 2008 which suggests that WAG:

will scrutinize development plans to check that the impact on the national soil resource is properly taken into account,

will liaise to increase awareness of soil in the environment; and

will consider intensive monitoring of a sample of designated sites of different habitat types, soils being integral to this.

WAG recognizes that the environment is important to visitors (a visitor survey in 1999 showed the environment was the main reason for over half of the holiday trips made by UK residents into Wales) and feels education about soils is important.

Welsh Regionally Important Geodiversity Sites (RIGS) groups have also adopted soils as a key part of their geoconservation work. Geoconservation is the range of activities concerned with conserving a geological heritage. It includes the conservation and protection of sites as well as activities concerned with promoting the sustainable use of geological resources for education and enjoyment. Regionally Important Geodiversity (Geodiversity is the variety of rocks, fossils, minerals, landforms and soils, along with the natural processes that shape the

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Part 1: Soil Scientist from MN in the UK –continued

landscape.) Sites (RIGS) are specially chosen sites of local and regional geological importance. The registration of RIGS with local authorities helps to acknowledge the importance of earth science and landscape features and helps to protect them for future generations to study and enjoy. The sites are identified by locally based RIGS Groups, and are the most important places for geology, geomorphology and soils outside the nationally recognized network of Sites of Special Scientific Interest (SSSI).

Natural England is the English Government's advisor on the natural environment. They provide practical advice, grounded in science, on how best to safeguard England's natural wealth for the benefit of everyone. They have the responsibility to ensure sustainable stewardship of the land and sea so that people and nature can thrive and to see that England's rich natural environment can adapt and survive intact for future generations to enjoy. They work with farmers and land managers; business and industry; planners and developers; national, regional and local government; interest groups and local communities to help them improve their local environment.

Natural England believes that:

Soil should be valued as a finite multi-functional resource which underpins our well being and prosperity. Decisions about the natural environment should take full account of the impact on soils, their intrinsic character and the sustainability of the many ecosystem services they deliver.

Soil is a key component of most landscapes and a significant component in understanding the links between landscape and the historic environment.

The role of soil in maintaining carbon stores and regulating greenhouse gases needs to be better appreciated, understood and embedded in habitat and land management practices in order that its potential to mitigate against the effects of climate change is realized.

Links between soil biota and their ecology and the capacity of soil to deliver vital ecosystem services, including biodiversity, are critical; more research is needed to inform better ecological management of soil.

Good soil management is a critical component of more sustainable land management practice – not only in agriculture, but also in forestry, woodland and recreational management, in construction, mineral working and restoration, waste disposal, in habitat restoration and re-creation and in urban design, green infrastructure and the creation of other greenspace.

When considering land use change we need to consider the permanency of the impact on soils and take particular care over planned changes to the most potentially productive soil (for the ecosystem services it supports and for its role in agriculture and food production) but we must also allow for necessary change, including for example the creation of habitats and coastal change in response to climate change.

Natural England states that soil is a key component of most landscapes, and that decisions about the natural environment should take full account of their impact on soils.

The way people have lived on the land and harnessed its soil resources over centuries can be seen from archaeological remains, changing forestry and agricultural land use, and from the pattern human use of the land. A degraded soil results in a reduction of its ability to perform its vital functions and in turn a despoiled landscape and loss of aesthetic appeal and cultural heritage. An important function of soil is to store elements of our geological and archaeological heritage, by holding important clues for interpreting the past such as features of the soil themselves including the structure or distinctive horizons (layers) or pollen records, or layers, artifacts or other remains related to human use of the environment.

Conway (2009) states that both the 'Scottish Framework on Soil' and Natural England's draft policy on soil focus on the diversity of soils, or that the variety of soil types is the link between geodiversity and biodiversity, and preserving the natural variation of soil will preserve the character of the landscape.

The importance for better understanding how soils underpin our civilization is described by Haygarth and Ritz (2009). They note the role of soil is fundamental to the provision of food and water, along with a wide range of ecosystem goods and services. Soils are arguably the most complex systems on Earth, and are intimately linked to human security and the integrity of the wider environment. Soils are extremely heterogeneous and not all soils can fulfill the full spectrum of services required for the future. There are concerns that anthropogenically induced changes in land use or management will result in soils not being utilized to provide the functions to which they are best suited. There is a growing need to maintain the past investment in soils education, including communication of the value of soils and land as natural capital; to manage soil resources so that multi-functionality prevails and critical tipping points are avoided that reduce the soil's ability to handle critical soil functions.

The US Government like the UK Governments is also interested in promoting soil sustainability, clean water and ample wildlife habitat. The Environmental Quality Incentives Program (EQIP) administered by NRCS aids in this effort. EQUIP a voluntary program provides cost-share incentive payments for farmers who institute conservation practices that promote agricultural production, forest management and environmental quality as compatible goals and to optimize environmental benefits. It does not however, promote the protection of the "natural soil" as a needed component of a landscape to aid in providing the connec-

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Part 1: Soil Scientist from MN in the UK –continued

tion between geodiversity and biodiversity. It is the diversity of soils which will aid in providing the ecosystem services needed to aid our planets environment.

Human activity and Soil

The history of the impact of man on the British Isles and the soils therein is difficult to comprehend, yet it is often the human or 6th soil forming factor (time, parent material, topography, climate, biota and humans) that determines what the soil characteristics are today. In his chapter on ‘The Impact of Man’, Eyre notes that humans have been an element in the fauna of the British Isles throughout the whole of post-glacial times. From 8,000 B.C. to 2000 B.C., the hunter and food collector did minimal modification to the vegetation and soils.

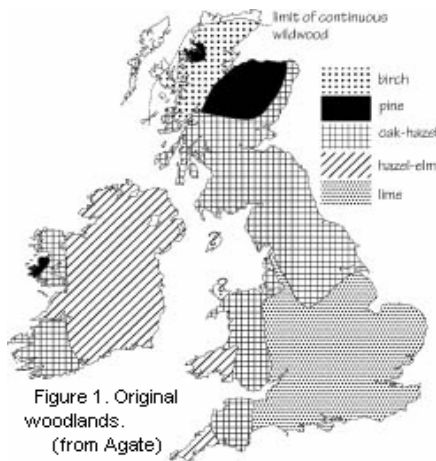


Figure 1. Original woodlands. (from Agate)

At the end of the last glaciation (12,000 BC) most of Britain would have been bare of trees. Birch and willow scrub possibly persisted along the lower margins of the ice in southern England, with pine in places. Relicts of pre-glacial flora may have survived in sheltered bays along the western coasts of Great Britain and Ireland, but elsewhere as far as the south of England, ice swept the land clean (from: E. Agate).

Gradually the forest of post glacial Britain took hold on the land moving from south to north. 7,000 years ago, England was largely covered by wildwood. Pollen analysis shows that the commonest tree, throughout central and southern England

was the lime (*Tilia Europoea*). Only a few areas were open prairie.

Since Roman times there has been a sharp distinction between wooded and non-wooded areas of Britain. The Domesday Book (1086) is evidence that every wood (forest) in England belonged to some person or some community, and had an economic value. Many woods were 'exclaves' owned by communities some miles away. The fact that it was worth transporting the woodland produce over some distance indicates their value, and that ownership had been established long previously.

In 1086 only about 15% of England was woodland or wood-pasture, 35% was arable, 30% pasture, 1% hay meadow and the remaining 20% was mountain, moor, heath, fen or urban land. The Domesday landscape was more like modern day France than the untamed woodland of folklore. Nearly all woods were highly managed, as coppices or wood-pastures. See Appendix B for more information on Britain's vegetation.

At the end of the Mesolithic era there is evidence of the beginnings of agriculture. The sudden decline of elm around 4,000 BC, which occurred throughout Europe, is thought to be not due to clearance, but to elm disease. Some scientists have speculated from pollen studies that the quantity of original forest was much less than originally thought in the UK. The woods were not a deep impenetrable forest as was the case in the areas of the Eastern U.S. As agriculture increased there was an increase in agricultural weeds, such as plantain and stinging nettle, together with archaeological evidence of Neolithic settlement. In some areas, such as East Anglia, the chalklands and the Somerset Levels, population increased dramatically, and virtually all the wildwood was cleared. Removal of woodlands increased during the Bronze Age (2400-750BC) to its probable height in the early Iron Age. Oliver Rackham estimates that about half of England had ceased to be wildwood by 500BC.

Sometime around 4000 BC the ideas and technology of farming, and perhaps some of the first livestock, crossed the Channel and arrived in England. Fire and the axe were used to clear scrub and forest in order to use the land for growing crops; a great deal more forest was prevented from regenerating by the grazing of flocks and herds. These early Britain's or Celtic settlers lived on the easily drained soils of the upland hills and on the coastal plains, avoiding the thickly wooded valley bottoms. This meant that the areas of heaviest settlement were the chalk hills of the south and west, where many of their remains can be seen today.

Evidence of plowing (<2800 B.C.) has been noted by ard-marks in the bedrock below a probably cultivated soil. The marks were sealed by an old ground surface of grass and buried by the mound of a long barrow at Avebury (Green). Plowing of land for farming was very wide spread as evidenced by the ancient fields on even poor soils, so for sure the good soils were also cultivated. The plow used was one similar to one found in Donneruplund Sweden, called the Donneruplund Ard or Celtic plow. It is a pointed stick, a heart shaped undershare fitted with spigots which hold the main share in position, a curve handle or stilt, all of which pass through a mortise joint cut in the foot of the main beam and locked into place with wedges. When pulled through the soil by a team of two oxen it does a

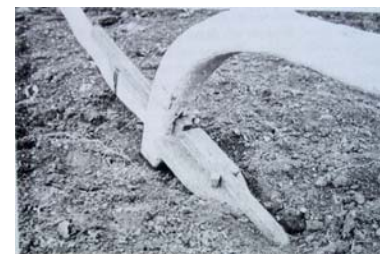


Fig. 2. An early plow-replica of the Donneruplund plow. (P. Reynolds)

reasonable job of stirring the soil. In practice it is efficient (as tested by a replica copy). They also had an iron socks or sheaths designed to protect the end of

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Part 1: Soil Scientist from MN in the UK –continued

the main share for excessive wear. It was able to cope with a wide range of soils from heavy to light. Undoubtedly the whole landscape was under intensive and necessarily diverse use. Because these Iron Age fields can still be seen today on poor soils implies that during the Iron Age pressure on cultivable ground was greater than at any other time until the 20th century.

The plowed fields tended to be square rather than rectangular in shape and were probably cross-ploughed as well. Some have speculated that the uplands were the first plowed as the woodlands were more sparse than in the river valleys that were very thick with trees and brush making it difficult to even move through these areas. Evidence from a rock carving in Sweden shows a double team of cattle pulling an ard. Speculation was this was required for areas that were put into grass and then needed to be cultivated for row crops. Probably every type of landscape was ploughed during this period. The damage to the soil from erosion was most likely significant. Manure and a period of fallow were most likely used to improve the nutrient status of the soil. Yields of 1.7 tons/hectare would have been attainable and 3.5 tons with manure for grain crops. Types of grain were similar to those used today (Eyre, 1963).

These Celtic people may have moved to new areas when their fields no longer would support crops due to loss of fertility or erosion. Each group, probably no larger than an extended family, seems to have moved around a fairly small region in this way; packing up when the land would no longer produce. In a few generations they could have returned to the original settlement after the land had lain fallow long enough to regenerate if it had not been re-occupied by others.

The Romans were forced to try to increase food production in order to support the increased population brought by the conquest in 40 A.D. This included continuing to clear forest land and to move to the less productive soils and more difficult soils.

Eventually heavy and poorly drained soils were also tilled. These heavy or poorly drained soils were plowed by the practice of throwing land into ridge and furrow. The soil was piled into tall ridge to provide for better drainage. The building up of a ridge was called *filling* or *gathering*. This ridge and furrow plowing persisted until the start of installing tile drainage in the 19th century. The cores of the old ridges were also very infertile due to the soil being buried for a very long period. This was the first use of 'ridge tillage' that is used today in much of Minnesota for soil conservation as a minimum tillage operation.

A lynchet is a bank of earth that builds up on the downslope of a field ploughed over a long period of time. The disturbed soil slips down the hillside to create a positive lynchet while the area reduced in level becomes a negative lynchet. They are a feature of ancient field systems as found in Britain. It is not clear if they were passively formed under the long-term action of gravity and weathering on the loosened soil of a ploughed slope, or intentionally formed, to prevent erosion and slippage of the ploughed slope.

The shortage of winter fodder was one of the main problems of the medieval farmer (Eyre, 1963). The extremely high value of stinted (a numerical limit placed on the size of a pasture right) meadow land as compared with that of arable land is evidenced in many medieval surveys and proves how precious were supplies of hay. Because of the shortage of fodder, the medieval plow oxen must have been extremely weak when they left the stall at the end of the winter. In the nineteenth century this time of year was still known as "the lifting" in some parts of Britain, and it is thought that this term arose because the oxen had actually to be lifted from their stalls and dragged out on to the pastures. Only a week or so after this operation these same oxen had to begin the spring plowing. It is small wonder that a large team was required for the task.

Effects on the soil of the rapid forest clear-

ance in the 12 and 13 centuries had to be significant. Soil scientists in Wales in the 1960s noted that the typical brown soils (Inceptisols) were very high in clay throughout and speculated that the present day soil is only a remnant of the lower horizon of a previously formed Alfisol that had clay accumulation in the subsoil (Eyre, 1987). The upper horizons were removed by erosion after forest clearance. At the same time of the rapid forest clearance ancient seaports on estuaries in the south and wets of Britain were made useless for navigation because of rapid silting.

Accelerated soil erosion is also evident on smaller fields that have been separated by hedge-banks or other dry stone rock walls (dry-stone dyke). Where the boundary runs across the slope it is common to see a difference in several feet between the bottom of the higher field and the top of the lower field. The soil at the top is thinner to bedrock and droughty while the lower part of the field has had the original topsoil has been buried under several feet of the soil from the upper slope. The condition today is continued to accelerate as it is easier to plow up and down the slope after removal of the old field boundaries.

With the removal of the forest the farmers must have begun to realize the potential of the climate for grasslands. Full realization took several centuries as the need for cropland to grow the increasing need for grains took precedence. Most early meadows were along streams where natural flooding added bases to the base poor soils. Most meadows were overgrazed and neglected but some must have benefited from manuring by animals and the original forest soil was slowly transformed to a prairie like soil. As the soil allowed better grasses to grow and more animals were pastured, more manure was added and the soil fertility increased.

Another impact on the soil as the forest
(Continued on page 9)

Part 1: Soil Scientist from MN in the UK –continued

was removed was in lowering soil pH. Oak woodlands would have added bases to the surface and transpired considerable water to the atmosphere. After removal the uplands became waterlogged and more acidic, the perfect environment for peat formation and development of Spodosols. With continued removal of new trees via grazing, the peat remains. If a forest were allowed to return, the improved drainage would soon allow for peat decomposition.

From Roman times onward attempts were made to lower the water table in the fen and wet woodlands of the lowlands of East central England. In the 17th century as capital accumulated and the drainage engineer knowledge increased, the drainage of this area began. By the 19th century the whole of the Lincolnshire Fens were drained and brought under cultivation. However, as the land dried out the peat decomposed and the land became lower and more drainage was needed. In the 16th century the land was six feet above the silty marshlands and today it is ten feet below that level and is below sea level by 10 feet.

The main watercourses now flow above the general level of the cultivated land and a complicated system of locks and sluices keep the sea back at high tide and permit outward drainage at low tide.

Humans are a reasoning animal, yet through a lack of understanding of ecological phenomena, often over exploit the natural assets upon which they depend for survival. The soil is often one of the main resources that is first affected by human intervention.

Part 2 – Soil Investigations (next time)

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Executive Director Update

Board of AELSLAGID

PSS licenses are up for renewal by **June 30, 2010**. The cost is \$132.00. Online renewals began on April 15, 2010. Please note, make sure you have your CEUs before renewing and that you keep supporting information for those CEUs. If you check the box and don't have your CEUs, then you are committing fraud. If you have questions about your CEUs, please read Minnesota Statutes 326.107 (https://www.revisor.mn.gov/bin/getpub.php?pub-type=STAT_CHAP&year=current&chapter=326#stat.326.107.0).

Everything you need to know is there.

The next fundamentals and professional soil science exam is slated for November

19, 2010 (application deadline is September 20, 2010).

The Board continues to review the model law for geoscientists to determine if any changes are needed. Geoscientists do not have a provision for "work under direct supervision." The board meetings for 2010 are: July 22 (section and full board meetings), August 23 (full board only), October 22 (section and full board meetings) and December 13 (full board only).

There are 90 professional soil scientists licensed in the State of Minnesota in June, 2009. Other professions licensed by the Board of AELSLAGID consist of: architects (3,352), professional engineers (11,721), professional land surveyors (586), landscape architects (412), profes-

sional geologists (560) and certified interior designers (758).

Legislature—2010 Session

The Minnesota State legislative session began February 2, 2010 and is finished. The website for the state legislature is: www.leg.state.mn.us.

Joint Professional Committee

Do you know that the JPC, which is made of up people representing the groups that make up the Board of AELSLAGID, has been around for over 35 years? The next JPC meeting is in August, 2010 at the AIA offices in the International Market Square building in Minneapolis.

Don't forget to nominate someone for Soil Scientist of the Year (2010) and consider running for either MAPSS president or MAPSS secretary for 2011!

Register for the next fundamental or professional soil science exams by September 20, 2010 (for the November 19 exam)!

Keep an eye on these for 2010!

<https://www.soils.org/awards/award/>

Articles for the Autumn issue of the Auger will be accepted through

September 15, 2010

mapss@mnsoilscientist.org

Crisp: Be Good to Your Dirt — continued

(Continued from page 2)

flourished until the dirt was worn out or eroded beyond repair. And then civilizations collapsed.

Currently our dirt is perhaps the most productive it's ever been; fewer farmers produce more crops than at any time in history. But our agricultural success depends heavily on the use of pesticides and fossil fuel-based fertilizers. In a sense dirt has become a semi-sterile medium that supports seeds while they're

nourished by artificial fertilizers derived from oil.

The sustainability of this system is uncertain: fossil fuels aren't inexhaustible or renewable, and the run-off from the fertilizers made from them is detrimental to the environment. The so-called "dead zones" -- vast oxygen-deprived pools in the Gulf of Mexico and elsewhere, where nothing can live -- are partially the result of agricultural residue washed down to the sea in rivers.

Are we abusing our dirt? I don't have the expertise to make such an assertion. Let's just say that, historically, it's clear that we've always abused our dirt, and one result has been that great civilizations have been brought down. This thin and fragile film that makes life possible deserves better stewardship.

(John M. Crisp teaches in the English Department at Del Mar College in Corpus Christi, Texas. E-mail him at jcrisp@delmar.edu For more news and information, visit www.scrippsnews.com.)

MAPSS Red Till Soils Workshop: for Subsurface Sewage Treatment System Professionals

July 16, 2010

Duluth, Minnesota

Real Soils Training by Real Soil Scientists

Training brochure and registration forms will be available April 15, 2010. For more information contact MAPSS, James C. Balogh, Ph.D. PSS, Adv. Designer / Adv. Inspector @ 218-525-5322 or spectrumsoils@aol.com



Measuring and Estimating Infiltration Rate With the MPD Infiltrometer

Reprinted with permission from UPDATES, a quarterly email newsletter distributed by St. Anthony Falls Laboratory, University of Minnesota <http://stormwater.safl.umn.edu/>.

Contributed by Farzana Ahmed

Funded by Minnesota Pollution Control Agency

Infiltration is an essential process of many stormwater best management practices (BMPs). However, infiltration rates have great spatial variation, making quantification of infiltration rates challenging. In addition, accumulation of fine particles at the surface can limit the infiltration rate of these practices. Therefore, measurements of the infiltration rate are

needed to determine performance, schedule maintenance, and meet regulatory requirements.

The Modified Philip Dunne (MPD) Infiltrometer has been developed as a fast, simple, and inexpensive device to measure the infiltration rate of water into the soil at a number of locations in rain gardens, infiltration basins and trenches, swales, and filter strips. A person with minimal training can obtain the saturated hydraulic conductivity at a number of locations in an infiltration practice, and ultimately calculate the infiltration rates for a variety of storms. The MPD Infiltrometer is a falling head device. This infiltrometer is made of a hollow open ended cylinder that is pounded two inches deep into the soil. Next, the device is filled with water to a predetermined height; a stopwatch is

started when the water level starts to drop, and the water level is recorded over time. An MPD spreadsheet, developed for application in EXCEL, is then used to determine the saturated hydraulic conductivity (K_{sat}) and soil suction (C) based on the water level vs. time data, dimensions of the MPD, and the initial and final moisture conditions.

The spreadsheet minimizes the root mean square (RMS) of the difference between the observed and predicted time increment (Δt), as well as the observed and predicted head increment (ΔH), by adjusting the saturated hydraulic conductivity (K_{sat}) and soil suction (C). The MPD spreadsheet and a set of MPD infiltrometers will be available for purchase from St. Anthony Falls Laboratory in the summer of 2010.



affiliated

Minnesota Association of Professional Soil Scientists

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MAPSS promotes the understanding and wise use of Minnesota's soil resources.

www.mnsoilscientist.org

The Auger is the newsletter of the Minnesota Association of Professional Soil Scientists. It is composed of articles submitted by the MAPSS membership and is published three times each year (February/March, June and October). The Auger is available in PDF format on our website at www.mnsoilscientist.org.

If you want to contribute articles or announcements contact the editor, Suzanne D'Souza, at 612-741-1365 or newsletter@mnsoilscientist.org.

MAPSS Officers – 2010

President Michael Whited
President Elect David Bauer, PSS
Past President Barb McCarthy, PSS
Secretary Peter Hartman, PSS
Treasurer Larissa Schmitt, PSS
Exec. Secretary Suzanne D'Souza, PSS (ex officio)

MAPSS Representation – 2010

Board of AELSLAGID and the Joint Professional Committee – Suzanne D'Souza, PSS

Soil Science Board Member on the Board of AELSLAGID – Peter Miller, PSS

Advertise in the Auger

Classified - first 40 words \$5.00, then \$0.20/additional word. Position (free to MAPSS members) – same as a classified ad. Ad copy MS Word ready format is \$15.00/column or non-standard \$25.00.

Your advertisement will also be added to the MAPSS website for the duration of one issue of the Auger. Contact the editor: mapss@mnsoilscientist.org

MAPSS Committees

Award Committee – in 2010
Jorja DuFresne, PSS

Education Committee
Doug Miller, PSS – Chair
Peter Hartman, PSS
Howard Hobbs, PG
Thomas Jackson, PSS
Al Gienke, PSS
Mark Perry
Steve Lawler, PSS
Dennis Rodacker, PSS

Election Committee – in 2010
yet to be announced

SSTS Committee
Laurie Brown, PSS - (on leave)
Norm Kuhlman, PSS
Peter Miller, PSS
Mike Rutten, PSS
Kim Steffan, PSS
Mark Wespetal, PSS

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Dennis Fuchs, PSS
Charles Saari, PSS

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Peter Miller, PSS – Chair
Kelley Bopray, PSS
Gary Elsner, PSS
Tom Fait, PSS

Scholarship & Funding Committee
Roger Berggren, PSS – Chair
Terry Cooper, PSS
Suzanne D'Souza, PSS

Many thanks to Barb McCarthy for reviewing this issue of the Auger.

The Minnesota Association of Professional Soil Scientists (MAPSS) and the Wisconsin Society of Professional Soil Scientists (WSPSS) present the 2010 Summer Tour & the MAPSS Business Meeting:

Sediment, Soils & Glacial Landscapes in the St. Croix River Valley

**Friday, August 6, 2010
8:00am (sharp!) – 5:00pm**

**Franconia Sculpture Park (meeting point)
Franconia (near Taylors Falls), Minnesota**

This tour takes us to east-central Minnesota and northwest Wisconsin to explore the St. Croix River Valley. Once one of the largest rivers in the world, the St. Croix River Valley has very unique soil characteristics. It is being further investigated even today with the realization that an entire suite of new soil series exists related to Glacial Lake Lind. We will explore these soils along with Grantsburg Lobe Tills and outwash. We will also observe a successful stream restoration project.

We will be on a bus tour for most of the day. The bus will leave promptly at 8am, so please give yourself plenty of driving time. There is road construction **EVERYWHERE!** Please plan accordingly. Registration will begin at 7:30am. Why not come early? We might even have coffee and pastries for you!

Continuing Education Credits: 6.0

Agenda

**Stream Restoration, Sedimentation, Soil Observations -
Big Rock Creek in St. Croix Falls, Wisconsin**

Keith Zygowicz
NRCS District Conservationist

**New Soil Series being Correlated for Glacial Lake Lind
Sediments - Trade River area, Wisconsin**

Scott Eversoll
NRCS MLRA Leader

**Set of pits on St Croix outwash and Grantsburg Lobe
glacial till - Southern Pine County, Minnesota**

Clayton Johnson and NRCS Crew

Bonus Mystery Stop, if time allows

Michael Whited

MAPSS Business Meeting

A MAPSS business meeting will be held during the tour. All MAPSS members are expected to attend this session.

Don't forget to dress for the weather and bugs.

Registration Form – complete and mail this form

Please register by **July 5, 2010** to avoid a late registration fee and to help us plan for space and food at the event. Thank you!

Name _____

Address _____

City _____

State _____

Zip code _____

Telephone or e-mail _____

MAPSS/WSPSS Members \$50.00 _____

Non-MAPSS/WSPSS Members \$60.00 _____

Student Members \$20.00 _____

Late Registration (after July 5, 2010)

MAPSS/WSPSS Members \$60.00 _____

Non-MAPSS/WSPSS Members \$70.00 _____

Optional CEU Fee \$10.00 _____

See explanation of this optional fee on the following page

Total Amount Enclosed _____

Make checks payable to MAPSS and send it, along with this portion of the registration form, to:

MAPSS 2010 Summer Tour
Ms. Larissa Schmitt
813 East 8th Street
Duluth, MN 55805





The Franconia Sculpture Garden is located southwest of the intersection of Highway 8 (Lake Blvd) and Highway 95 (St. Croix Trail N) at 29836 St. Croix Trail in Franconia, Minnesota (651.257.6668). We can park there from dawn to dusk, and you have the option of touring the sculpture garden when we return!

Carpool

Tired of paying for gas? Do you want to save the world? Or are you just tired and want to sleep during the journey to Pine County, MN? Why not carpool! Contact Suzanne, the unofficial carpool organizer, at either 612-741-1365 or mapss@mnsoilscientist.org.

Accommodations

Camping is available at:

- Interstate State Park (Taylors Falls, MN)
- Interstate State Park (St. Croix Falls, WI)
- Numerous other state forests and scenic areas

There are also hotels and bed and breakfasts in Taylors Falls, MN and St. Croix, WI.

Optional CEU Fee

CEU are obtained without paying the \$10 CEU fee. However, your attendance at the conference will be certified by MAPSS *only* by paying this fee. MAPSS will certify and maintain a record of your attendance, which will be provided to licensing boards upon your request. All other attendees must maintain their own records. **MAPSS will not certify your attendance without paying this fee.**