National Cooperative Soil Survey Newsletter

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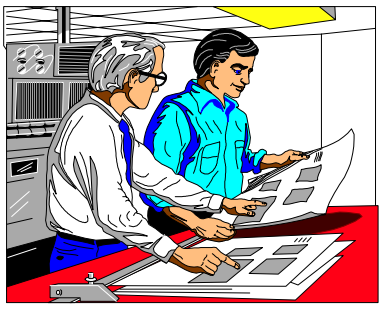
Issue 14

In This Issue—

Editor's Note

Issues of this newsletter are available on the World Wide Web (www.statlab.iastate.edu/soils/soildiv). Click on NCSS and then on the desired issue number of the NCSS Newsletter.

You are invited to submit stories for future issues of this newsletter to Stanley Anderson, National Soil Survey Center, Lincoln, Nebraska. Phone—402-437-5357; FAX—402-437-5336; email—stan.anderson@nssc.nrcs.usda.gov.



Retracing Charles Kellogg's Path in Ghana

By Henry R. Mount, Soil Scientist, Natural Resources Conservation Service, National Soil Survey Center, Lincoln, Nebraska

During August 2000, Berman Hudson and I were approved to participate in a science and technology mission to Ghana. Before leaving the United States, we discovered that Charles Kellogg had visited Ghana (formerly the Gold Coast) in August 1954—46 years earlier. Detailed notes in his "African Journal" provided day-by-day information for his 1-week excursion. Kellogg's mission in 1954 was to interact with the British to assess whether swollen shoot disease of the cocoa trees was soil borne. After our itinerary arrived from our hosts in Ghana, it became apparent we would be traveling much of the same path as Charles Kellogg did in 1954.

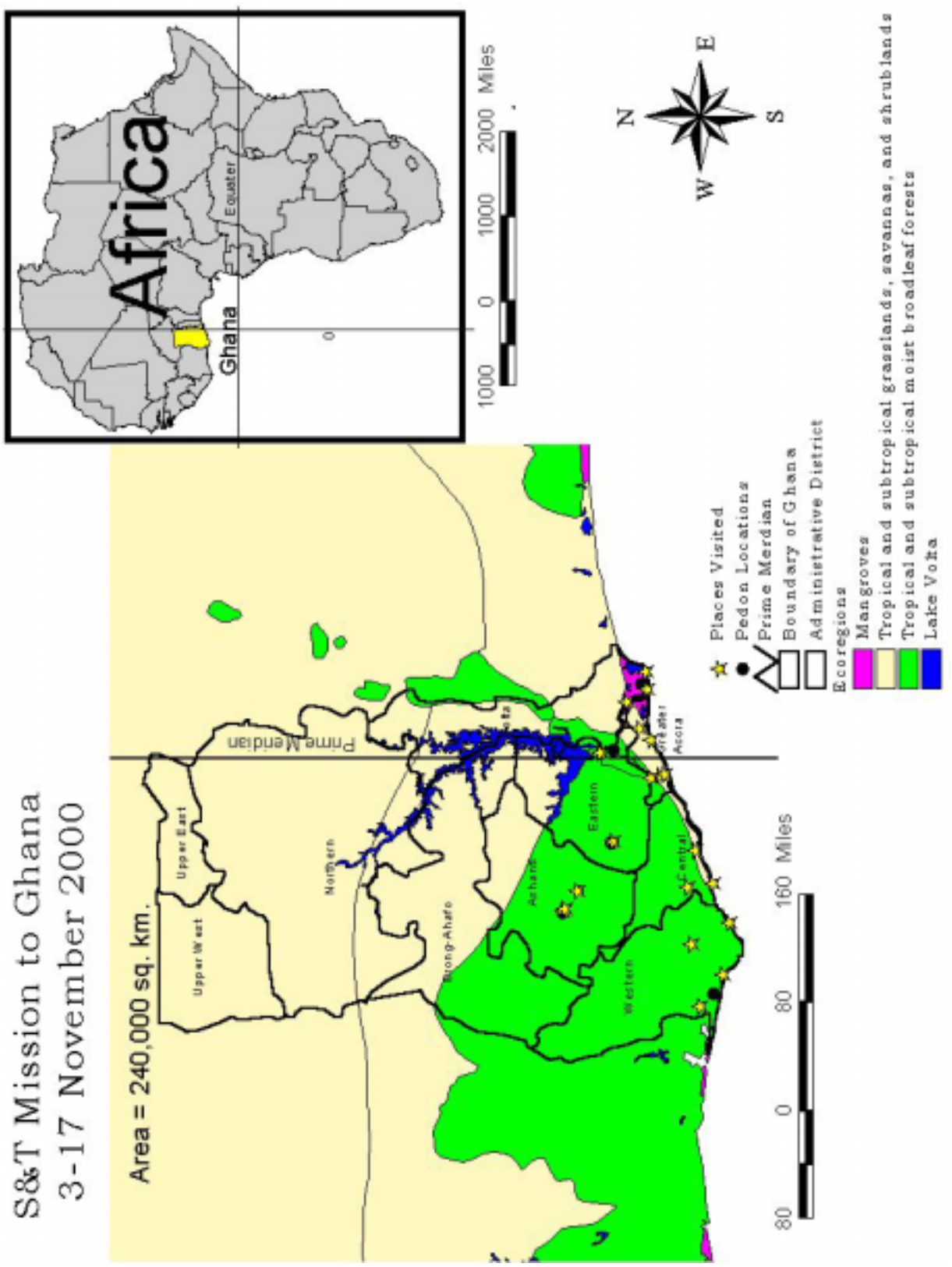
After arriving in Accra on November 5, 2000, we were introduced to our colleagues at the Ecological Research Laboratory at the University of Ghana in Legon. The international team consisted of Henrik Madsen and Mogens Greve from Denmark, Theodore Awadzi and Seth Danso from Ghana, and Berman and me from the NSSC in Lincoln, Nebraska. Our mission was to assess the Ghanaian soil survey program, sample soils at seven benchmark sites throughout the southern part of Ghana, and present two symposiums about the soil survey program in the United States.

With sampling equipment in hand, we left Legon and traveled the southern coastal region, where we described and sampled an Oxisol (Tikobo). Then we traveled to Kumasi, home of the Soil Research Institute, which Kellogg had visited in 1954. We found out that Drs. C.H. Charter, Brammer, and Ahn, British soil scientists in Ghana during the 1950's and colleagues of Charles Kellogg, were still held in high regard. They had introduced the soil series concept and set up 360 series based on 25 soil descriptions for each series. When Theodore Awadzi presented us a description of the Tikobo series, we found it to be a highly technical description matching many of our Official Series Descriptions in the United States. In fact, we in the United States rarely take the time to define a soil series on the basis of 25 descriptions.

In Kumasi, we tried to interpret the following Kellogg journal entry:

> The calcium-collecting tree called *Chlorophora excelsa*, one of the emergents. Locally, it is called "odum." This tree collects calcium, which oozes into old wounds and cuts, probably as calcium malate. This changes to a kind of limestone that runs 80 to 90 percent calcium carbonate. The soils under such trees become neutral to alkaline while soils under adjacent trees may be strongly acid.

While our colleagues in Ghana were familiar with this tree, it is now quite rare and the concretion that Kellogg observed in the Kumasi Soils Museum has now disappeared.


S&T Mission to Ghana
3-17 November 2000
Area = 240,000 sq. km.
Africa
Ghana
Equator
0
1000 0 1000 2000 Miles
N
E
S
W
Places Visited
Pedon Locations
Prime Meridian
Boundary of Ghana
Administrative District
Ecoregions
Mangroves
Tropical and subtropical grasslands, savannas, and shrublands
Tropical and subtropical moist broadleaf forests
Lake Volta
Prime Meridian
Upper East
Upper West
Northern
Brong-Ahafo
Ashanti
Eastern
Central
Western
Greater Accra
80 0 80 160 Miles

After our symposium in Kumasi, we sampled two soils rich in plinthite (Plinthustults)—the Kobeda series in a teak plantation and the Dominase series in a bush fallow field. We also visited the soil correlation room where, through examination of soil correlation trays, new soil scientists of Ghana are expected to memorize the soils of the area they are to map. The series concepts in Ghana are fixed. The soil scientists in this relatively small country hold to the tradition of their 360 series being a totality. There is no provision to add any new series in Ghana. Consequently, the series concepts are often transferred down to local farmers and do not migrate or shift with time. Changes in the FAO classification scheme do not split series either. The system appears to be rather rigid and fixed in some ways, but it allows new scientists to be more easily trained in the series concepts.

After our stay in Kumasi, we followed Kellogg's path back to Accra. We saw upland rice similar to what Kellogg documented in 1954. We also saw the same rusted cannons at Elmina Castle he mentioned. In contrast to Kellogg's writings, we noted accelerated erosion in and around villages. On August 6, 1954, Kellogg stated, "All the accelerated erosion I saw in over 200 miles could be found on one small Georgia farm." We doubt that Kellogg saw the aftermath of a rainstorm similar to what we saw in Kumasi, where rivulets of red water were flowing on top of plinthite in the villages and in the gutters throughout the streets. In addition, we later saw clear evidence of 50 to 75 centimeters of erosion near a Danish plantation ruin in Sesemi.

One mystery of Kellogg's writings involves anthropic thickets. On August 6, 1954, Kellogg wrote, "Within 13 miles of the sea, we pass into anthropic thicket. Only 15 to 20 feet high, these thickets are almost impenetrable." The local scientists had not heard of this term, and we saw no evidence of what he might have been referring to. It is possible he might have been referring to the bush fallow areas, but these are by no means impenetrable.

We visited the same Kpong Experiment Station that Kellogg had visited in 1954. On August 7, 1954, he wrote:

> We start for Kpong with Mr. Brammer, Mr. MacKinnen, and Mr. Linton at 12:30 p.m. At 2:40 p.m., we have arrived at the site for the new irrigation experimental station and have a short time with Mr. Keyser, the European manager. The soils in this area formed in weathered granite containing hornblende gneiss at 40 to 48 inches. The underlying rock is rich in soda-lime feldspar and deficient in potassium. We return to the Hogensborg Castle about 5:20 p.m., just in time to change and go with the Governor and his lady to the Prime Minister's cocktail party. I mingle with the people an hour or so and then Mr. Hamilton gets me and we return to the Castle for dinner at 8 p.m. I was impressed with the alertness of Dr. Kwame Nkrumah. He seemed especially interested in following up on my suggestions.

Though we did not meet with the current Prime Minister of Ghana during our excursion, we did describe and sample a Vertisol (Akuse) formed in hornblende gneiss at the Kpong Experiment Station. This Akuse soil mirrored what Kellogg mentioned in his notes 46 years earlier.

Our excursion to Anloga was similar to Kellogg's trip to Ada. On August 8, 1954, Kellogg wrote:

> We start for the field at 7 o'clock with Brammer, Loxton, and Rose-Innes. We travel east along the coast on the main road from Accra to Ada. As we go along the Accra Plain, I see red soils with red termite mounds on the higher swells. We continue east through Dawhwenya and stop at about milepost 28 to look at the Tropical Black Clay in a very gently undulating landscape. We then drive on into the Accra Plain and pass on to some more soils from acidic gneiss with sandy surfaces and heavy clay B horizons. The grasses here grow in tussocks and these give the surface a fine micro-relief. At milepost 55, we stop to take a quick look at a friable red soil (2.5YR 4/4) of sandy loam to loam texture from Tertiary sand. Then we drive out toward the sea over some nearly pure white sandy soils derived from these Tertiary sands, and out onto an old lagoon on where the soil is only a little above the sea. Finally, we turn back and return to Accra about 2:15 p.m.

Perhaps by accident or by fate, milepost 28 still remains in Ghana, and we observed many of the same things that Kellogg did on August 8, 1954.

What started as an incidental objective to our mission became a daily experience of déjà vu. Traveling down the same path that Charles Kellogg had traveled and verifying similarities and differences from the distant past became more important as our trip unfolded. Before leaving Ghana, we informed our colleagues that as part of the follow-up process, we would present a paper at the 2002 ASA meetings in Indianapolis about retracing Kellogg's path in Ghana. ■

The Soil Scientist

In the beginning, God made the heavens and earth,
He designed them for us, for He knew our worth;
All was perfect and all was okay,
Till Adam and Eve fell that day.

Since that time, it has been upon man,
To steward the earth, to work the land;
But the land got tired and needed a rest,
So man got wise and devised a test.

Alas, he found not all soil was the same,
But what can we do to figure this game;
All through the years, we've hit and missed,
So the Lord provided the soil scientist.

He came on the scene a century ago,
Mapping soils anywhere the four winds blow;
Not knowing what he'd find over the next hill,
But blazing forward always ready to drill.

He's a lone wolf but rarely lonely,
Sharpshooter in hand, his one and only;
Discovering creation one layer at a time,
Daily facing dust, sweat, boredom, and grime.

Pushing forward, at times not sure why,
Then thinking of goals, he begins to cry;
It seems as though he'll never get done,
One day at a time, he follows the sun.

But then he realizes, as he tops a knoll,
Acres are important, but not the main goal;
He follows a calling that few understand,
To discover for man the treasures of land.

Most will never see the hours of toil,
That he invests into mapping our soil;
The fruit of his labor he may never see,
Lives are being helped; his purpose and destiny.

So much is changing with computers and NASIS,
Even publication is beyond the speed of molasses;
PEDON, SSURGO, and of course digitizing,
Help to make our future more energizing.

But there lies one certainty amongst all this change,
You'll find him in field, forest, swamp, and range;
He'll be needed forever, though sometimes ignored,
Till a conservation team member needs a hole bored.

As our second century gets underway,
Of one thing for sure he is proud to say;
I've been part of a winning team,
Even Hugh Hammond Bennett would give us a gleam.

When his time on earth is finished and done,
His reflection of life's race that he ran and won;
Will likely include a request to roam,
For a visit to the soil on his way home.

—Jeff Olson
Soil Scientist
NRCS
Mena, Arkansas

Soil Horizon Designations

By Warren Lynn, Research Soil Scientist, USDA, Natural Resources Conservation Service, Lincoln, Nebraska.

Master horizons							Subscripts						
1951	1962	1975	1987	1992	1993	1998	1951	1962	1975	1987	1992	1993	1998
Aoo	O1	O1	O	O	O	O				a	a	a	a
Ao	O2	O2					b	b	b	b	b	b	b
	A	A	A	A	A	A				c	c	c	c
A1	A1	A1								d	d	d	d
A2	A2	A2	E	E	E	E				e	e	e	e
			EB	EB	EB	EB, E/B	f	f	f	f	f	f	f
					E&Bt (lamellae)								ff
A3	A3	A3	AB	AB	AB	AB	g	g	g	g	g	g	g
	AB	AB					h	h	h	h	h	h	h
	A&B	A&B	A/B	A/B	A/B	A/B				i	i	i	i
	AC	AC											j
B1	B1	B1											jj
			B/E	B/E	B/E	B/E	ca	ca	ca	k	k	k	k
	B&A	B&A					m	m	m	m	m	m	m
B2	B2	B2	B	B	B	B				n	n	n	n
G										o	o	o	o
B3	B3	B3	BC, B/C	BC, B/C	BC, B/C	BC, B/C	p	p	p	p	p	p	p
			CB, C/B	CB, C/B	CB, C/B	CB, C/B		si	si	q	q	q	q
C	C	C	C	C	C	C				r	r	r	r
	R	R	R	R	R	R	ir	ir	ir	s	s	s	s
						W					ss	ss	ss
D							t	t	t	t	t	t	t
							u						
Repeated designations:							cn	cn	cn	v	v	v	v
	A´			A´	A´	A´				w	w	w	w
				E´	E´	E´		x	x	x	x	x	x
	B´			B´	B´	B´	cs	cs	cs	y	y	y	y
	C´			C´	C´	C´	sa	sa	sa	z	z	z	z
Discontinuities:													
	I			1	1	1							
	II			2	2	2							
	III			3	3	3							
	IV			4	4	4							
	etc.			etc.	etc.	etc.							

1951—*Soil Survey Manual*, U.S. Department of Agriculture Handbook 18, pp. 173-183.
1962—Supplement to *Soil Survey Manual*, USDA Handbook 18, pp. 173-188 (replacing pp. 173-183).
1975—*Soil Taxonomy*, U.S. Department of Agriculture Handbook 436.
1987—*Keys to Soil Taxonomy*, SMSS Technical Monograph 6.
1992—*Keys to Soil Taxonomy*, 5th edition.
1993—*Soil Survey Manual*, U.S. Department of Agriculture Handbook 18, pp. 117-130.
1998—*Keys to Soil Taxonomy*, 8th edition.

Flood Recovery Assistance in Honduras

By Henry R. Mount, Soil Scientist, Natural Resources Conservation Service, National Soil Survey Center, Lincoln, Nebraska

I was part of an NRCS interdisciplinary team assisting in flood recovery work in Honduras during the period August 6 to 23, 2000. This team consisted of an agronomist from Vermont, an irrigation engineer from Texas, and myself as the participating soil scientist. We were part of a USAID initiative to provide flood recovery assistance to limited resource farmers along the Choluteca River in southern Honduras. This part of the country was ravaged by the effects of Hurricane Mitch during October and November of 1998 (fig. 1). Sixteen months later, the entire country was still trying to rebound.

After traveling to the USAID mission office in Tegucigalpa, we received photo ID's and were driven by our personal bodyguard to the city of Choluteca. After checking into the hotel in Choluteca, we met Giovanny Molina, our field technician. We worked with Giovanny closely during the next 2 weeks. We worked with nine clients along the Choluteca River, gathering information about soils and crops for use in flood recovery plans. After we secured GPS coordinates for fields, we used ArcView software to generate maps (fig. 2).

Southern Honduras is dry. The soil moisture regime ranges from ustic in and around the city of Choluteca to aridic near La Zabila (fig. 3). The soils near Choluteca have high bases and are Haplustolls with very good physical characteristics for growing corn and melons.

Soil temperature is warm throughout the year in southern Honduras. A 1-day

Figure 1.—A bridge that was in use for only 6 months before Hurricane Mitch swept part of it away.

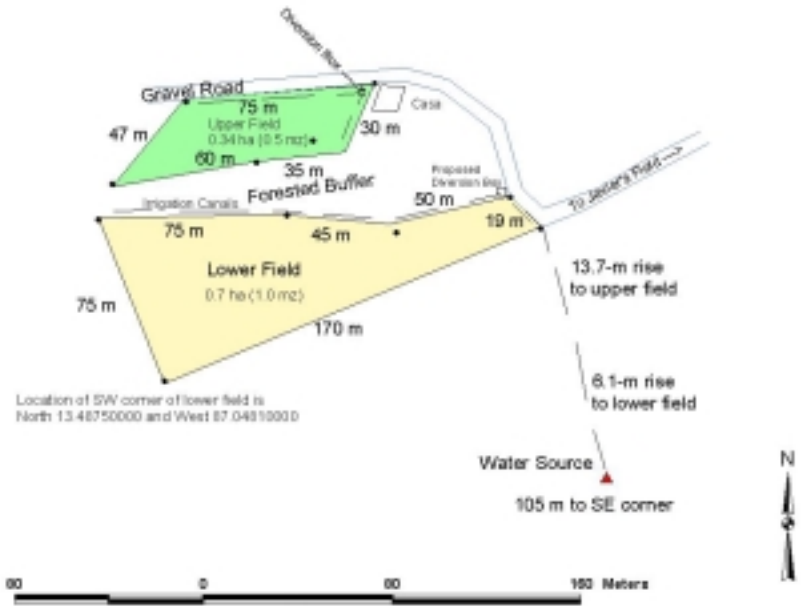


Figure 2.—ArcView representation of the fields belonging to Filomena Gomez near La Zabila.

Figure 3.—A Torriorthent on the flood plain along the Choluteca River.

study at Javier Baca's upper field near La Zabila showed that a sandy soil has a much higher maximum temperature than a loamy soil only a few feet away (fig. 4 and table 1). The daily range in temperature also is much higher in the sandy soil.

Table 1.—Soil Temperature Data from Javier Baca's Upper Field

Temperature (°F)	Loamy	Sandy
Mean	83.4	84.3
Maximum	88.9	98.3
Minimum	78.8	76.6
Max.-Min.	10.1	21.7

Every soil scientist should consider a TDY assignment to a foreign country. The opportunity to meet new people and experience different cultures will test your ability to adjust to new and different circumstances. ■

Figure 4.—Javier Baca at the break between his upper field and his lower field.

Geophysical Tools Utilized by NSSC to Help States

By Jim Doolittle, Soil Scientist, National Soil Survey Center, USDA, Natural Resources Conservation Service.

The National Soil Survey Center is using ground-penetrating radar (GPR) and electromagnetic (EMI) methods to help States document soil survey activities, evaluate potential environmental hazards, and preserve cultural resources. GPR and EMI are noninvasive geophysical tools that offer the advantages of portability, speed of operation, flexibility of observation depths, and moderate resolution of subsurface features.

Last fall, assistance was provided to soil scientists in Maine, New York, and California to help determine the depth to bedrock and the thickness of organic

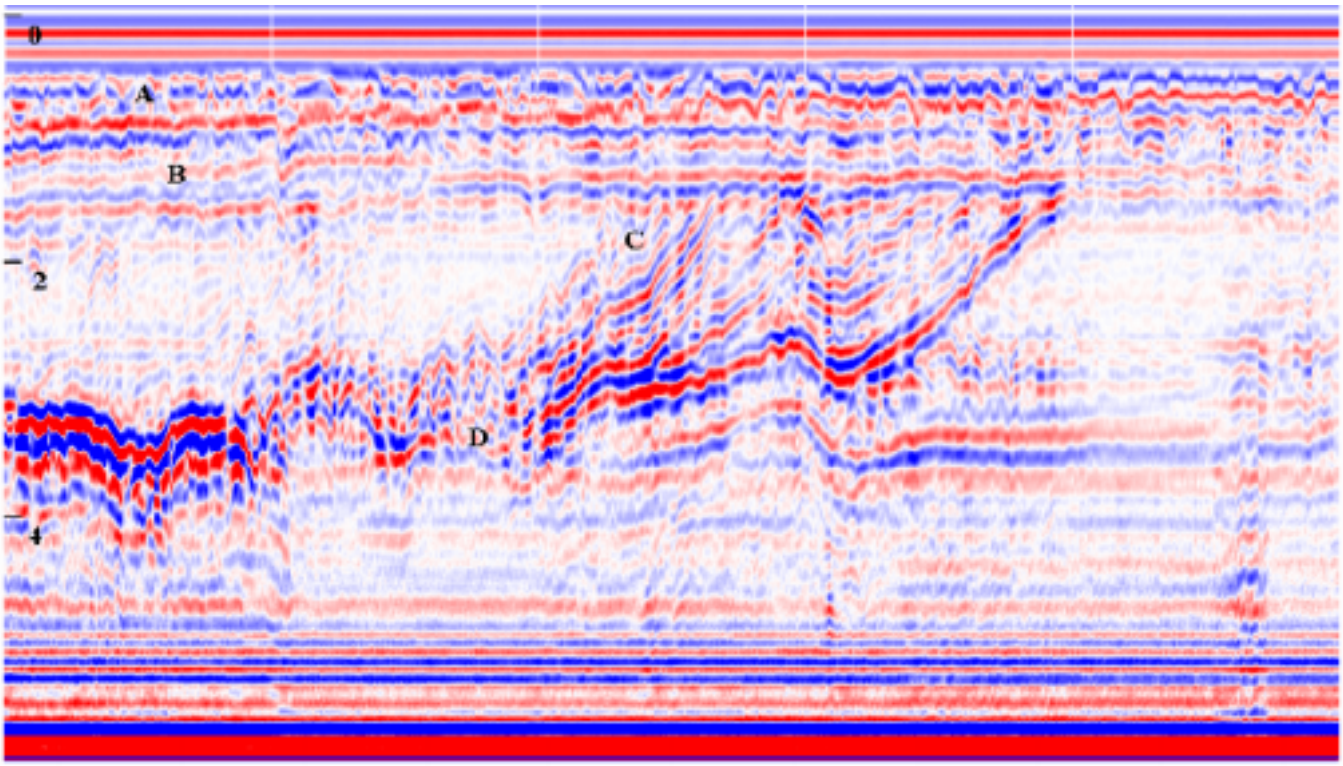


Figure 1.—A radar profile from a soil-geomorphic study conducted in a Carolina Bay near Lumberton, North Carolina. Depth is marked in meters. The white vertical lines at the top of the profile are spaced at an interval of about 30 meters. The vertical scale is exaggerated about 14 times the horizontal scale. The letters A, B, C, and D indicate soil or stratigraphic units.

deposits in several soils. These data help soil scientists design more accurate map units and in turn make more accurate interpretations for construction of roads, septic tank absorption fields, buildings, and other structures. GPR was used by soil scientists in North Carolina to help document the presence, depth, and extent of impermeable layers across a Carolina Bay (fig. 1). It was used to help engineers detect voids under a concrete spillway in South Carolina and was used to help foresters map tree roots and access biomass under loblolly pines in Georgia.

During the same period, EMI was used to determine whether detectable patterns of seepage had developed in an animal waste holding facility in New York and an earthen dam in Wisconsin, to characterize soils on mine benches in Virginia, to characterize soil-landscape patterns in North Carolina, and to determine depth to bedrock in Iowa.

GPR and EMI are helpful tools in improving soil surveys as well as assessing environmental issues. ■

NCSS Soil Scientist Achievement Award

By Horace Smith, Director, Soil Survey Division, Natural Resources Conservation Service, Washington, D.C.

William (Bill) E. Dollarhide, Reno, Nevada, is the recipient of the National Cooperative Soil Survey (NCSS) Soil Scientist Achievement Award for the year 2000. This award

William E. Dollarhide

recognizes exceptional achievement by individuals working in production soil survey under the auspices of the NCSS. Bill Dollarhide is being honored for his cumulative impact and exceptional management of all phases of the soil survey program, including mapping, classification, correlation, investigations, interpretations, map compilation and map finishing, publications, and database management. You name a job and Bill has done it for the NCSS throughout his 35-year career with the USDA, Natural Resources Conservation Service (NRCS), in California, Utah, and Nevada.

In particular, the NCSS would like to highlight Bill's remarkable years in a leadership role in Nevada. Some of his accomplishments to date have been:

• Under his leadership, 21 soil surveys have been published in Nevada and 56.5 million acres has been mapped.
• Interagency agreements with the Bureau of Land Management that lasted 15 years resulted in soil mapping to NCSS standards on 49 million acres of public land .
• Bill developed interagency agreements with the United States Forest Service, the National Park Service, the Bureau of Indian Affairs, and the Department of Defense. To Bill's credit, all Indian land in Nevada has a soil survey and has been digitized and most of this land has been SSURGO certified.
• As an Assistant State Soil Scientist and State Soil Scientist, Bill provided quality control for more than 13 million acres of soil survey. He prepared numerous final correlation documents, processed more than 300 new soil series, reviewed or supervised the review of more than 2,000 Soil Survey Interpretations Records (Form SCS-SOI-5), and did technical edits on nine soil survey manuscripts covering about 15 million acres.
• Under Bill's leadership, 33 soil surveys in Nevada and 15 soil surveys in other States of the MLRA Survey Region have been certified, covering about 50 million acres.
• Before the reorganization of NRCS in 1995 and the creation of the MLRA concept for production soil survey, Bill served as State Soil Scientist for both Nevada and Utah together, covering an area of 135 million acres. In his current position, he serves as NRCS State Soil Scientist for Nevada and MLRA Leader for Region 3, which covers parts of five States—Nevada, Utah, California, Idaho, and Oregon.
• Bill implemented a process within the MLRA concept to publish six or seven manuscripts each year and plans to finish the backlog of soil surveys in all of MLRA Region 3 in 2001 and have all published soil surveys in digital format for that MLRA region by 2002.
• Digital map finishing was completed for three surveys in Nevada before Reno was named one of the seven digital map finishing sites for the country. Since September 1999, the digital map finishing site at Reno has completed six surveys, which are from Nevada, Utah, and Arizona. Digital map finishing has been completed on a total of 800 quad sheets.

Other accomplishments for the NRCS Soil Survey Program have been:

• Cochair of the West Region Soil Consortium
• Soil Survey Reorganization Team Member
• Expanded Soil Survey Division Steering Team Member
• West Region Technical Strategic Planning Team Member
• West Liaison with NRCS National Headquarters and National Soil Survey Center
• Chair of the Quality Improvement Team for Digital Map Finishing

The award is granted annually in the form of a plaque. ■

Language Matters

By Stanley Anderson, Editor, USDA, Natural Resources Conservation Service, National Soil Survey Center.

Following is a sentence about the implications for NRCS of a United Nations initiative to combat desertification: "We have an opportunity to contribute to land degradation and desertification." The author says exactly the opposite of what he means. ■