



INTERNATIONAL PROGRAMS DIVISION



IPD Newsletter
January-June 2019

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United Kingdom

*COVER PHOTO: Left to right, Janella Cruz (NRCS soil scientist), Anthony (field assistant), and Cesar Botero (CIAT) at a site in Magdalena, Colombia.
SEE ENTRY ON PAGE 2. Photo courtesy of Charles Lagoueyte.*

The IPD Newsletter is a biannual publication produced by the International Programs Division of the Natural Resources Conservation Service (NRCS).

The document provides a six-month overview of NRCS participation in international activities, which included providing technical assistance and exchanging scientific and technical information.

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COLUMBIA

Cacao for Peace Project

NRCS National Soil Survey Center **Soil Scientist Zamir Libohova**, NRCS Soil and Plant Science Division **Soil Scientists Janella Cruz** and **Charles A. Lagoueyte**, and NRCS West National Technology Support Center **Agronomist Giulio Ferruzzi** traveled to Columbia, South America, as part of the Cacao for Peace Project (CfP). The project is a collaboration sponsored by the U.S. Agency for International Development (USAID) through the U.S. Department of Agriculture's Foreign Agricultural Service (USDA-FAS) and implemented by USDA-NRCS, Pennsylvania State University, and the International Center for Tropical Agriculture (CIAT). Other partners include the U.S. Peace Corps, United Nations Office Against Drugs and Crimes, and relevant Colombian government agencies. The main purpose of the CfP is to provide alternative economic means to local farmers for growing cacao as a legal, high-value crop in place of the lucrative, but illegal and risky, coca, which provides the main ingredient for cocaine production. To achieve the overarching goal of optimized cacao production, major goals for CfP include mapping regional soil characteristics, water supply, and cacao genetics to promote a deeper understanding of spatial variability of soil characteristics and cadmium and to assess plant diversity. CfP seeks to define suitable areas and site-specific management zones for optimal and sustainable cacao production and to identify high-yielding and high-quality cacao varieties.

March 17 to 27, 2019, Libohova traveled to Santa Marta, Columbia, to support and guide the production of soil maps, provide training for local scientists, and coordinate soil-related work, including mapping and soil sampling design. NRCS is working in cooperation with the International

Center for Tropical Agriculture (CIAT), Pennsylvania State University, and the local cacao growers, association FedCacao for soil and genetic data analysis and delivery of the project results in various platforms. During the March visit, Libohova assessed site suitability for sampling purposes, such as access, soils, cacao plants, and permits; determined the locations for the sampling of pedons for full descriptions and sampling; collected specimens of soils, plants, and cacao pods; determined the feasibility of the sampling protocol and adjusted accordingly; trained the local soil scientists, botanists, and agronomists on sampling protocols; and briefed Janella Cruz, Charles Lagoueyte, and Giulio Ferruzzi on the progress and familiarized them with the project and the ongoing field soil and plant sampling, which they conducted in the following 2 weeks.

March 24 to April 5, 2019, Cruz, Ferruzzi, and Lagoueyte were in the Colombian Departments of Magdalena and La Guajira for CfP. During their visit, Cruz and Lagoueyte went daily to pre-selected active or prospective cacao farms, selected sites within the farms based on geomorphic position criteria, as well as assisted with digging soil pits, collecting soil samples for physical and chemical analyses, prepping and cleaning the soil pit faces, recording the locations with GPS, and taking photos. They met with CIAT Team Member Cesar Botero and Research Assistant Javier Martin to select sites that addressed the pre-set goals of sampling representative geomorphic positions.

Ferruzzi, who is also a native of Colombia, and other CIAT members were tasked with augering and sampling other locations on the same farm to attempt to corroborate the findings from the pit and to send back

the soil samples from each soil horizon for laboratory analyses. In cases where a soil description was not performed, their team would auger and sample three locations and take soil samples at each one. When time allowed, Ferruzzi also assisted in gathering additional surface soil samples, live leaf samples, and senescent, fallen leaves for cadmium analysis. Soil and leaf samples were collected, packaged, and labelled to be later transported to the CIAT headquarters for analyses.

During the 3-week field campaign, approximately 28 farms were visited and sampled and 10 pedons were described and sampled, resulting in 414 soil samples and leaf and cacao pods samples from 193 cacao trees for genetic study and cadmium analysis. The analyses of the samples will be used to finalize the soil maps for regional planning and small farm management and develop interpretations and suitability ratings for cacao production. Work continues on a web-based platform for delivering data, training the local soil scientists, and publishing the findings.

Austria

April 7 to 12, 2019, **David Lindbo, Soil and Plant Science Division Director** (SPSD) attended the European Geosciences Union (EGU) General Assembly (GA), the largest geosciences meeting in Europe. The 2019 EGU GA brought together 16,273 scientists from 113 countries, covering all disciplines of the Earth, planetary, and space sciences. The meeting's 5,531 oral, 9,432 poster, and 1,287 PICO (Presenting Interactive Content) presentations were also covered by a strong media presence and shared via web streams and the EGU blog GeoLog.

Lindbo was invited to present for the short course "Mapping and Modelling the Environment at Different Scales." The course brought in experts to discuss the topic with other scientists,

so that they may apply the topic's concepts to their own work. Lindbo presented "Pedons to Pixels: Adapting to Technological Advances," which described how soil maps have been made in the United States for over 120 years, how NRCS continues to adapt the latest technologies, and where the agency is going in the next 10+ years. He talked about how the U.S. is progressing from a soil survey that presents static properties through Web Soil Survey and Soil Data Mart to a future raster or digital approach with a 10- to 30-meter resolution. The raster approach would continue to include the standard static physical and chemical properties but would expand to include dynamic soil properties (DSPs) related to land use and conservation effects and changes in soil health parameters.

The short course included presentations on comprehensive soil mapping in the European Union (EU) and methods for mapping ecosystem services at multiple scales. The EU soil map was the culmination of 10 years of work by EU member countries to develop a model and map, the results of which are similar in breadth to the U.S. data set. Like the U.S., the EU's map had detectable political boundaries, an issue NRCS is addressing to create a seamless U.S. data set. Likewise, the ecosystem services presented parallel NRCS development of ecological site descriptions for the U.S.; the noted differences are the use of unmanned aerial vehicles (UAVs) in collecting LiDAR and vegetation data in tidal areas and the use of remote sensed data to a higher degree than NRCS. The mapping and modeling short course was very well attended. A hundred participants attended the standing-room only presentation with overflow into the hallway.

Lindbo also attended several other sessions during the EGU GA regarding the use of remote sensed data, a major theme of the assembly.

Many of these sessions dealt with the traditional use of satellite and fixed wing data collection and techniques for combining, filtering, and modeling data to answer specific questions. One session presented the use of drones to measure snow pack. The author detailed the difficulties and the overall success of the approach, which could have implications for the NRCS SNOTEL program.

Other sessions during the EGU GA focused on the relationships between soil aggregation, organic carbon, and microbiology—central aspects of soil health and dynamic soil properties. A session that Lindbo attended looked at the microbiology involved in the formation of soil aggregates and ways to improve aggregation. Improved aggregation is thought to increase water infiltration and water-holding capacity, thereby decreasing the erodibility of the soil while enhancing the dynamic soil properties and improving overall soil health. To some extent the data confirmed this; however, process and results are not simple nor predicable. Soil properties, such as clay content and iron oxide content, are as important as organic matter and microbiology. Additionally, land management plays a role, which illustrates the complexity of the relationships. Measures that assess dynamic soil properties and soil health, organic matter, and aggregation must be interpreted in the context of the local field conditions, other soil properties, and history of use.

There were numerous sessions related to hydrology and water movement. Given the direction of the PSD in including hydrologic conditions in its dynamic soil survey, these were of interest. Many presented information on adapting fine-scale models to problems or proving how models worked. One talk from authors in New Zealand, however, looked at landscape-scale modeling of available water capacity (AWC). The presentation



demonstrated how AWC could be modeled using existing soil physical properties. This was intriguing as the SPSPD plans to use a similar approach in its dynamic soil survey. Contact with the author was made, and a dialog has begun.

Lindbo made international contacts with researchers and practitioners with common interests and goals. The presence of the SPSPD and presentation of their programs served to solidify and enhance the international standing of NRCS and the SPSPD.

Canada

March 14, 2019, NRCS North Dakota **Soil Health Specialist Jay Fuhrer** was at Mans Organics near Coaldale, Alberta, Canada, for the Digging Deep into Regen Ag Workshop. The annual event attracted more than 80 farmers. Fuhrer presented, completed soil demonstrations, and exchanged information regarding the integration of cover crops and livestock in cropping systems, monitoring the soil food web, and carbon impacts.

June 16 to 19, 2019, **Dan Baumert, State Conservation Engineer**, Bangor, Maine, and **Robert Thompson, State Conservation**

Engineer, Colchester, Vermont, traveled to Quebec City, Canada, for the Northeast Agricultural and Biological Engineering Conference (NABEC). NABEC is a geographically based community of the American Society of Agricultural and Biological Engineers (ASABE). NABEC members range from the northeast United States to the eastern Canadian provinces. The event was attended by nearly 80 participants from government, academia, and private industry representing approximately 12 different universities. Baumert and Thompson presented and had the opportunity to network and exchange ideas with other engineers from academia, government, and the private sector from all over the northeast United States and eastern Canada, as well as accrue professional development hours (PDHs).

Thompson gave a presentation on waste storage facilities in Vermont, titled “Bedded Pack Facilities,” and another on proper parliamentary procedure. Baumert also gave two presentations: “China Lake Alewife Restoration Initiative” and “My Continued Career in Utilizing Science and Engineering Principles in Sports Talk Radio.” Baumert and Thompson

Attendees of the Northeast Agricultural and Biological Engineering Conference. Photo courtesy of Cristina Ratti, PhD of the Université Laval, Quebec, Canada.

have shared what they learned during the conference with the other engineers in their respective States and look forward to attending future conferences and encouraging other engineers to attend.

Chile

NRCS Montana **Soil Scientist–GIS Specialist Suzann Kienast-Brown** attended the 2019 Joint Workshop on Digital Soil Mapping and Global Soil Map at the University of Chile, Santiago, Chile, March 10 to 17, 2019. The joint workshop brought together an international community of scientists to share and discuss recent developments in the GlobalSoilMap.net project and the field of digital soil mapping. The workshop began with technical training on the application of R software and Google Earth Engine for data processing and analyses required to complete a digital soil mapping workflow. The remainder of the workshop was filled with informative and stimulating presentations and discussion on the

advances of GlobalSoilMap.net and digital soil mapping, what challenges exist, and what key areas of research are needed to address these challenges. The work plans for both the GlobalSoilMap.net and Digital Soil Mapping working groups of the International Union of Soil Scientists were also discussed. The final day was a field trip to the University of Chile, German Greve Silva Experimental Station, located just outside Santiago in the Rinconada De Maipo region. The field trip provided background and information regarding soil development and land use in the area.

The members of the USA-based team, Suzanne Kienast-Brown, Dr. Jim Thompson (West Virginia University), and Dr. Colby Brungard (New Mexico State University), were active participants in the GlobalSoilMap.net portion of the workshop. Their participation will allow for future collaboration with international colleagues to advance the effort to provide global coverage of soil property information to land managers and decision makers. Kienast-Brown noted the importance of USDA-NRCS as a leader with a strong history in soil survey and soil information products in the GlobalSoilMap.net project and that the NRCS Soil and Plant Science Division shares common challenges with similar programs in France, the Netherlands, and Australia in trying to adopt new methods and soil information products.

The team from the National Cooperative Soil Survey, including Kienast-Brown and Thompson, received the award for “Best Oral Presentation” for their presentation “Soils2026 and Digital Soil Mapping—Foundation for the Future of Soils Information in the United States.”



At the 2019 Joint Workshop on Digital Soil Mapping and Global Soil Map, the team from the National Cooperative Soil Survey, including Suzann Kienast-Brown (2nd from left), NRCS soil scientist—GIS specialist, Bozeman, Montana, and Dr. Jim Thompson (2nd from right), West Virginia University, receive the award for best oral presentation, with Monica Antilen (left) and Osvaldo Salazar, PhD (right), both of the University of Chile. Photo courtesy of Suzann Kienast-Brown.

Fiji

July 12, 2019, A delegation from Fiji met with Acting USDA Deputy Under Secretary for Natural Resources and Environment Dan Jiron and other USDA representatives who have technical expertise in forestry. The Fijian delegation included Hon Osea Naiqamu (Minister for Forestry), Mr. Garisau Penesio N. Baleinabuli (Permanent Secretary for Forestry), Mr. Semi V. Dranibaka (Executive Director of Research and Development—Ministry of Forestry), Mr. Viliame Rabici (REDD+ National Coordinator—Ministry of Forestry), Ms. Susana Lomani Waqainabete (Country Manager—Conservation International (CI) Fiji), and Mr. Solomone Nata (Deputy General Manager of Operation, Research, and

Development—ITaukei Land Trust Board). In addition to the USDA Forest Service representatives, Lillian Woods Shawver (International Programs Division Director, USDA-NRCS), Eunice Padley (National Forester, USDA-NRCS), Stephanie Goglia (Program Analyst Detailee, USDA-NRCS), and Sheila Scott-Boykin (Natural Resource Specialist-Economist, USDA-NRCS) participated in the meeting with the Fijian delegation, which discussed the opportunities for increased information exchange and collaboration particularly, but not exclusively, related to forestry and agriculture.

Iraq

June 27, 2019, a delegation of Iraqis in the Department of State’s International Visitors Leadership Program “Water Resource Management” were hosted by USDA. They were given presentations by Otto Gonzalez, PhD, Director, Center for International Programs, and Ali Mohamed, PhD, Director, Division of Environmental Science (both in USDA’s National Institute of Food and Agriculture); John Carter, Program Manager for the Farmable Wetlands Program (FWP) and the Source Water Protection Program (SWPP), USDA Farm Service Agency; and Teferi Tsegayne, PhD, National Program Leader—Water Resources, USDA Agricultural Research Service. FWP and SWPP are programs on which FSA and NRCS collaborate and assist. **Lillian Woods Shawver, NRCS International Programs Division (IPD) Director and Stephanie Goglia, NRCS IPD Acting Program Analyst**, participated in the meeting and used the opportunity to speak with delegates from within the Iraqi Ministry of Water regarding NRCS’s upcoming collaboration regarding water and irrigation efficiency with the Iraqis through an agreement with the U.S. Department of Interior’s Bureau of Reclamation.



Iraqi delegation from U.S. Department of State's International Visitors Leadership Program, together with USDA representatives, stands in front of the National Institute of Food and Agriculture in Washington, D.C. P

Photo courtesy of Lillian Woods Shawver, USDA-NRCS.

Papua New Guinea

July 11, 2019, **Lillian Woods Shawver, International Programs Division Director, USDA-NRCS; Eunice Padley, National Forester, USDA-NRCS; Stephanie Goglia, Program Analyst Detailee, USDA-NRCS;** and a representative from the USDA Forest Service met with a delegation from Papua New Guinea (PNG) on "Democracy and Governance in the United States, Papua New Guinea." The delegation requested a meeting to discuss USDA work and coordination in the Pacific Islands region, the goal being to provide a briefing that can highlight USDA work and commitment in this region. This group included PNG's Minister of Forestry, Minister of Agriculture, and Deputy Prime Minister. The delegation expressed interest in working with USDA to build capacity in PNG in order to move from an extractive economy to one based on agriculture and fisheries. PNG is also interested in educating

their indigenous population about sustainable forestry practices, since 91 percent of the country's forested land is owned by the indigenous population. It is economically important for landowners to understand the significance of the forest land. As part of capacity building, the PNG delegation is interested in having PNG students visit the United States to learn about sustainable forestry. Woods-Shawver recommended they work with Otto Gonzalez from the USDA National Institute of Food and Agriculture, which has a working relationship with many universities across the United States.

South Africa

January 21 to 24, 2019, NRCS North Dakota **Soil Health Specialist Jay Fuhrer** traveled to Nottingham Road, South Africa, for the Danone Farmer Soil Health Workshop. The workshop, themed "Dairy Farming for Soil Health," included local dairy farmers who partner with Danone. The workshop, which was held Monday, January 21, was followed by 3 days of farm visits. During the site visits, Fuhrer provided technical assistance by demonstrating slaking and infiltration rates and discussing grazing readiness, recovery time, soil

temperature, and other soil health principles. The workshop provided Fuhrer with an opportunity to exchange information regarding the carbon cycle, soil health principles, and grazing and cropping systems.



Attendees of the Danone Farmer Soil Health Workshop in Nottingham Road, South Africa. Photo courtesy of Jay

South Korea

June 19 to 25, 2019, NRCS Major Land Resource Area **Soil Scientist Randy Riddle** was in Seoul, South Korea, for the 10th International Congress for Soils of the Urban, Industrial, Transportation, Military and Mining Areas (SUITMA 10). The conference attracts international researchers and scientists to share the latest research, techniques, and management practices for soils of urban, industrial, military, and mining areas. Riddle had the opportunity to share the recent efforts of the NRCS Soil and Plant Science Division (SPSD) Urban Soils Focus Team (USFT) to improve the utility of soil survey data (SSURGO) in urban areas and share analyses from published soil surveys of New York City and Los Angeles. The conference also provided NRCS an opportunity to receive feedback, stay apprised of the technological advances and interpretations of urban soil systems, and build potential collaborations with professionals from

build potential collaborations with professionals from the international community.

Mr. Riddle, which is the co-chair for SPSP USFT, gave two presentations on the team's activities, including the data recently published as part of the soil surveys of New York City and Los Angeles and the latest plans for members of the SUITMA community. The USFT approach was discussed with several attendees, resulting in verbal support and interest in future collaboration. The international community agrees that there is a need for a new soil order in U.S. Soil Taxonomy that represents soils formed in human-altered and human-transported materials. The new order has been a key target of the USFT.



Profile of a soil that formed in coal mine refuse in South Korea. Photo courtesy of Randy Riddle, USDA-NRCS.

Spain

June 30 to July 8, 2019, **NRCS Soil Survey Region 12 Director Luis A. Hernandez** traveled to Catalonia, Spain, to deliver informational sessions on soil classification and taxonomy, soil climate monitoring, soil survey, and NRCS conservation efforts. While in Spain, Hernandez visited the Geological and Cartographic Institute of Catalonia and established contact with the Government of Catalonia's Department of Agriculture, Food and Rural Action. Hernandez also met with Jorge Mataix Solera, President of the Spanish Society of Soil Science, and participated in Spain's Soil Judging Contest.

Hernandez delivered technical information on soil survey, soil classification and taxonomy, soil climate monitoring, and soil conservation and explored and discussed collaborative opportunities for bilateral technical exchanges between NRCS and the Geological and Cartographic Institute of Catalonia in these topic areas. Hernandez noted that soil formation factors in Catalonia are like those in portions of the western United States. For this reason, Hernandez is looking into initiating a collaborative effort to catalog soil series developed in other countries. Incorporating this information into the NRCS Soil Series Database would enrich the U.S. soil classification system.

During his visit, Hernandez identified multiple opportunities, such as: exploring technology transfer of the NRCS Soil Climate Analysis Network (SCAN) and Snow Telemetry (SNOTEL) to assist farmers with drought forecast, water irrigation best management practices, and implementation of natural resource conservation activities; collaborating on research and sharing of soil climate data, which could be accomplished by incorporating Catalonia's climate station data into

the NRCS SCAN/SNOTEL network; bilaterally exchanging digital soil mapping techniques and soil inference models to expedite soil mapping of remote areas of Catalonia; and exchanging technical information on soil survey quality assurance and quality control and other technologies through distance and onsite training.



Luis Hernandez provides training on the U.S. soil classification system (Soil Taxonomy) to a group of local scientists in Catalonia, Spain. Photo courtesy of Luis Hernandez, USDA-NRCS.

United Kingdom

June 26 and 27, 2019, NRCS North Dakota **Soil Health Specialist Jay Fuhrer** traveled to Hertfordshire, United Kingdom, for the Groundswell No-Till Show and Conference 2019. The theme was “Conservation Agriculture: Practical Ideas on How to Farm in the New Environmental and Political Climate While Regenerating Your Core Asset–The Soil.” Fuhrer presented “Rebuilding and Maintaining Life in the Soil; Carbon, Crops and Covers” and provided a rainfall simulation demonstration. The conference had over 80 speakers, providing an opportunity for information exchange regarding the carbon cycle, soil health principles, grazing systems, and cropping systems. A list of the speakers is available at www.groundswellag.com.

