



COLORADO SWCS

CHAPTER NEWSLETTER

COLORADO SWCS

JANUARY 2011

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SHERRI BRANDT—
NEWSLETTER EDITOR

President's Message

By: Dawn Jackson



Hello, everyone! We are off to a new year. And to start it off, we would like to welcome some new members -- Jake Prather, Daniel Palic, Arthur Ariaz and Brett Jones. These lucky four were "free first year membership" winners in our drawing at the Annual Meeting and Technical Conference held in Colorado Springs. The Conference/Meeting was a 2-day event this year with great attendance. We would like to again extend our congratulations to all of the award recipients that you will meet in the following pages.

To start the new year as your Chapter President, I would like to issue a challenge to everyone to "Get Involved" with the Chapter and the larger SWCS community. There are so many ways to become involved...be a part of our tours and conferences by attending, organizing or facilitating; be a science fair judge; serve on a committee; or just participate in events. SWCS is a large organization that lets you get involved locally, nationally and internationally. Encourage a friend to join with you, and definitely be prepared to make friends!

Our Chapter website <http://colorado.swcs.org/> is a fantastic resource for keeping up on Chapter events and board discussions on upcoming activities. The website can help you connect to that national and international community with links to other Chapter websites and the SWCS organization. It also offers information on how to contact Chapter board members. We hope to hear from you, and look forward to the year to come!

HAPPY NEW YEAR FROM COLORADO SWCS!

CO SWCS New Officers for 2011

At the CO Chapter SWCS annual meeting in November 2010, the chapter welcomed Dawn Jackson as President for 2011, Michael “Storm” Casper as President-Elect for 2011, Anthony Arnold as East Slope Director and Cindy Crist for her second term as West Slope Director. You can learn more about our new chapter officers in their biographies below.

DAWN JACKSON — 2011 PRESIDENT



Dawn is currently employed as Assistant State Conservationist for Programs in Denver, and has been with NRCS for 22 years. She has worked as a conservationist in the Burlington, Fort Morgan and Yuma field offices, and a District Conservationist in Sterling.

Dawn is married and has a daughter that attends Merino High School. She and her husband have a small farm/ranch in Logan County. Dawn is also involved on the Merino School Board, Northeastern Junior College Agricultural Advisory Committee, and the Merino FFA Advisory Board.

Dawn has been active in the Colorado Chapter SWCS serving as Director-At-Large, and has served as a committee chair for the Northern Plains Technical Conference.

STORM CASPER— 2011 PRESIDENT-ELECT



Storm spent most of his formative years working on the family farm and ranch in Eastern Colorado. He completed his undergraduate education at Oklahoma Panhandle State University with a BBA in Business Administration and a minor in Earth Science. After attending college Storm lived and worked in Denver for five years before coming back home to own and operate his farm and ranch and be closer to his family and the land. In 1999 he began working for the Baca County Conservation District on a contract basis to develop a noxious weed map of Baca County. He became a WAE later on that year and worked for both NRCS and the Baca County Conservation District until 2006. In 2006 he accepted a position as a Soil Conservation Technician in the Springfield Field Office. Over the past few

years he has attended numerous trainings, workshops and conferences on soil, water, and rangeland management. His field office emphasis has been on soil erosion, upland wildlife including the Lesser Prairie Chicken, and Ogallala aquifer protection. Storm remains excited to be involved with organizations like SWCS that are helping promote sustainable agriculture for future generations. He also enjoys a healthy exchange of ideas with producers and coworkers who are promoting the conservation message. Storm has a wife Larae, and has a daughter Rylee 22 and son Garrett 14 and resides in Springfield Colorado.

TONY ARNOLD— EAST SLOPE DIRECTOR

Hi, I am currently employed as a District Conservationist in the Walsenburg FO. I have worked for SCS/NRCS for a little over 20 years. Prior to working in Walsenburg; I worked in the Trinidad FO as a Soil Conservationist where I started my career.

I have served the Colorado Chapter as President 2007, Director at Large 2004 and Membership Committee for several years. I have been involved in 1996 and 2006 International Meetings in Keystone, CO as Committee Chair or member. I have attended and presented Poster Presentations at several other International Meetings. I have attended and participated in several Northern Plains Leadership Meetings from

Montana to Colorado.

I am married to my wife Lorri and have a daughter Tonya attending CSU Pueblo in her Senior year of Pre Pharmacy and a son Todd that is a Sophomore in high school. We own a small farm and raise a few Gelbvieh cattle. I have been involved in several organizations over the years including Valley Metropolitan Recreation District, President, El Moro-Hoehne Pipeline Assn.; Director, Hoehne FFA Advisory Committee, American Youth Soccer Organization (AYSO) Trinidad and 4-H Leader for over 15 years.

I would like to serve this chapter once again to help continue the excellence of our membership. This chapter has a history of striving to continue with great leadership with excellent and worthwhile workshops and programs to assist in educating the Membership and other interested parties in the field of Natural Resources. I will work hard for this chapter and the Membership.

CINDY CRIST— WEST SLOPE DIRECTOR

Cindy is a 1984 graduate of Colorado State University with a Bachelor of Science degree in Agronomy - Soil Resources and Conservation concentration. She was a Range Ecology major for 2 years prior to changing to Agronomy and served as Secretary of the Range Science Club.

From 1993 to 1998 she worked as a Water Quality Specialist for the Southern Ute Indian Tribe, establishing water quality standards and a non-point source water pollution control program for surface waters on the reservation. From 1998 to 2001 Cindy worked as the Environmental Programs Director for the Ute Mountain Ute Tribe, Establishing programs that addressed, water quality, air quality and the management of

solid and hazardous waste on the reservation.

In 2001, Cindy was hired as a Soil Conservation Technician for the Natural Resources Conservation Service - Salinity Control Program, Cortez, CO. She also worked in the Cortez NRCS Field Office as a Soil Conservationist from 2002 to 2005.

In 2005 Cindy was hired as the District Conservationist for the Natural Resources Conservation Service in the Monte Vista Field Office.

Cindy is a recent graduate of the Colorado Agriculture and Rural Leadership program sponsored by Colorado State University. She has also assisted with the family ranch in Cortez, CO.

CO SWCS Chapter Awards

Two presidential citations and seven commendation awards were presented to Colorado Chapter SWCS members at the Annual Business meeting. The awards are presented to chapter members that provided outstanding assistance, to the chapter, during the year.

Charles Pannebaker, CO Chapter President SWCS awarded Presidential Citations to Ardell Halvorson and Lorenz Sutherland.



The citation for Ardell read: "Thank you, Ardell, for your help and advice to me as President-Elect and President you helped make my job easier. Thank you for your dedicated service to the Colorado Chapter of the Soil and Water Conservation Society and your service as President of the Chapter at two different times."

The citation for Lorenz said: "This is a big thank you for helping me as President-Elect and as President. For listening and providing help and being a sounding board and providing good advice. Thank you for your many years of service to the Colorado Chapter of the Soil and Water Conservation Society. I am grateful for you service as Director at Large."

The 2010 Commendation Awards were presented to Sherri Brandt, Cindy Crist, Beth Fortman, Kristi Gay, Dawn Jackson, Renee Koch and Travis McKay by Charles Pannebaker, CO Chapter President SWCS.



The commendation for Sherri Brandt, Chapter Newsletter Editor read "Thank you so much for keeping all the newsletter contributors on schedule and all the work you did in producing three excellent quality newsletters in 2010 for the Colorado Chapter of the Soil and Water Conservation Society."

Cindy Crist is the West Slope Director and her commendation said "Thank you for your service to the Colorado Chapter of the Soil and Water Conservation Society as West Slope Director. Thank you for volunteering to do many tasks for the Chapter and making my job easier."



Beth Fortman served the chapter both as the East Slope Director and Awards Committee Chair her certificate said "Thank you for the two jobs that you did for the Colorado Chapter of the Soil and Water Conservation Society in 2010. Beth served as both the East Slope Director and as Awards and Scholarship Committee Chairperson your continued dedicated service to the Chapter is deeply appreciated."



Kristi Gay also has two jobs for the chapter Membership Committee Chair and the Webmaster her commendation award said "Thank you, Kristi, for your genuine interest in the Colorado Chapter of the Soil and Water Conservation Society and your good advice to me while I have been President. I am grateful for your service as the Webmaster and Membership Committee Chairperson."



The President-elect for the CO Chapter SWCS for 2010 was Dawn Jackson. Dawn was responsible for the Annual Technical Conference and she took over as Chapter President during the Annual Business Meeting. Her Commendation Award said "Thank you Dawn for serving as President-Elect and for putting together an excellent technical conference. May your year as President of the Colorado Chapter of the Soil and Water Conservation Society be greatly successful."



Travis McKay is the Science Fair Committee Chair and his commendation read "It is always great to have people volunteer to do a job. Thank you, Travis, for volunteering to be the Science Fair Chairman and doing an excellent job of managing all aspects of the Science Fair for the Colorado Chapter of the Soil and Water Conservation Society in 2010."



Renee Koch is the Secretary/Treasure and her commendation read "Renee has done an excellent job in handling another year as Secretary/Treasure for the Colorado Chapter of the Soil and Water Conservation Society in 2010. Thank you so much, your work in GREATLY APPRECIATED!"

I greatly appreciate the help all of these individuals. It takes a team of interested and dedicated people to maintain the activities of a voluntary organization like the Colorado Chapter of the Soil and Water Conservation Society.

Student Scholarship Available From CO SWCS

As part of our mission, the SWCS Colorado Chapter has created an Undergraduate Student Scholarship Program that offers two \$500 scholarships to juniors or seniors attending a four year Colorado college or university studying natural resource related fields. This scholarship was created to recognize student leadership, consistent academic achievement, and civil contribution related to natural resources, especially soil and water conservation.

Each scholarship consists of a certificate and \$500 honorarium. The \$500 scholarship is intended to assist the student in completing his or her degree. Scholarship recipients will be

Continued on Page 10

CO SWCS Conservationist Awards

At the CACD annual meeting in November 2010, the Colorado Chapter of SWCS presented awards to the SWCS Conservationist of the Year and the SWCS Junior Conservationist of the Year. You can read more about the award winners below.

CONSERVATIONIST OF THE YEAR— MORRIS AND VERA VERVERS, LIX RANCH



Morris and Verna Ververs of the LIX Ranch of Simla, CO were the recipients of our Outstanding Conservationist of the Year award for their dedication and work towards conserving and improving the natural resources on their ranch. They purchased the ranch from his father's estate (Edgar Ververs) in 1993. Edgar purchased the ranch in 1961.

Morris and Verna have worked closely with the NRCS, DOW, Colorado State Land Board and the Colorado Cattlemen's Association throughout the years to install cross fencing, stock water systems, windbreaks, solar pumps, prescribed grazing, critical area plantings and a Big Gun sprinkler.

Morris is and has been very active in his community. He was a teacher, principal and Superintendent in several school districts. He is a member of the Colorado Cattlemen's Association, Colorado Association of School Boards, Colorado Farm Bureau and Chairman of the Upper Big Sandy Ground Water Management District, among others.

They have been conscientious stewards their entire lives. Their overall goal is to maintain the sustainable resources and the unique and historical characteristics of the LIX Ranch.

JR. CONSERVATIONIST OF THE YEAR— NAKAYLA LESTINA



Nakayla Lestina is the SWCS Jr. Conservationist of the Year award recipient. She has been working with the Cortez NRCS Field Office in the Student Temporary Employment Program (STEP) since last spring. She has proven to be a very conscientious hard worker.

She is very involved in FFA, Future Business Leaders of America, on the cheerleading squad at Dove Creek High School, Dove Creek HS basketball team and many other involvements. She won 2 SWCS society awards for her science fair projects in

2010. She attended Camp Rocky this past summer participating in the Soil & Water Conservation group.

2010 Technical Conference

By: Mike Collins

This was my first CO Chapter SWCS Technical Conference which was held last November in Colorado Springs and I was impressed with a number of items. First off, I liked the combination of the meeting and the CACD conference, it seems to be a great avenue and an effective partnership which could bring new people into the society. It's also good advertising. It also ties in existing travel that folks are already on which makes good sense and ends up being easier to approve from a state level. We are under scrutiny as an agency (NRCS-wide that is) with our travel funds. And, as you've noticed recently the federal government is under a plan to reduce spending so, I'm sure we'll be using more of these tactics to attract members in all upcoming meetings.

As for the meeting, I liked the talk Dr. Ron Follett gave on general nutrient management, although basic in nature, I liked the handout and all of the review with the micro-nutrients. Mike Petersen is always entertaining and now working for a strip tillage company he's quite the sound agronomist. Dr. Raj Khosla did a great job with precision application and the current techniques with fertilizers which gives some foresight in the future in using GPS technology. The second day was a concentration on Organics and was great timing. The Certification process was a bit hit, it gave me a insight on the process in Colorado and was very thorough from Mitch Yergert from the CO Dept of Ag. And, lastly the producer talk, when you hear from an actual farmer or rancher all of a sudden the economics and reality set in and you hear an actual case in study, nice job! Plenty of CEU's were available which helps in maintaining the conservation planning and the CCA continuing education credits which is always a good thing, not to mention professional development in the technical sense!



Dr. Ron Follett smiling for the camera during his nutrient management presentation.

Don't Forget to Vote

The 2011 SWCS Board of Directors' election ballot is now on line. One of the most important benefits of membership in the Soil and Water Conservation Society is the responsibility to select members of the Board of Directors to lead your Society in the years ahead.

The voting process should only take one or two minutes. You must vote by March 15, 2011 for your vote to be counted. Go to <http://www.swcs.org/election> to view the biographical information and platform statements of the candidates and to submit your vote.

Contact Sue Ann Lynes at sueann.lynes@swcs.org if you need assistance.

CO SWCS & NRCS Hold Soil Health Workshops

By: Mike Collins

The Colorado Chapter of the Soil and Water Conservation Society (SWCS) and Colorado Natural Resources Conservation Service (NRCS) sponsored two “Soil Health for Grazing lands and Croplands” workshops on November 2-3, 2010. They were held in Monte Vista and Byers, Colo., and broadcast via ustream.tv.

More than 110 individuals from all over the state attended the two sessions that featured Jay Fuhrer, Bismarck, N.D., NRCS district conservationist, and Kenny Miller, Burleigh County, N.D., Soil Conservation District Grazing Specialist. Fuhrer and Miller are local experts that have built a team of conservationists to test, promote, and demonstrate the importance of diversity in cropping rotations, the benefits of multi-specie cover crops (called cover crop cocktail) in addition to the “how to” in reviving a farm that has been under conventional tillage. The main theme was how to make soils feed themselves and make the land sustainable. They also covered adjusting C:N ratios with different types of cover crops, the benefits of cropping diversity and sequences. The luncheon presentation concentrated on how to build your team, the soil conservation district and NRCS partnership, and what to do with the team in building soil health.

Interested individuals can still listen to what Fuhrer, Miller, and their team have been doing with soil health for ten years at the webinar site---<http://www.ustream.tv/channel/soil-health>. Further information is also available at www.bcsd.com.

Monte Vista Soil Health Workshop

By: Cindy Crist

On November 2, 2010 more than 70 local farmers/ranchers, NRCS and Conservation District employees attended a Soil Health Workshop at the Monte Vista COOP in Monte Vista, CO. The workshop was coordinated by the Colorado Chapter of the Soil and Water Conservation Society, Colorado and North Dakota NRCS Leadership Teams and Center Conservation District. The workshop was presented by Jay Fuhrer, NRCS District Conservationist in Bismarck, ND and Ken Miller, Burleigh County, ND Conservation District Grazing Specialist/Technician.

Through his many years of experience with applying various conservation measures to

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Soil Health continued from Page 9

prevent soil erosion and improve soil tilth, Mr. Fuhrer has developed no-till farming practices, cover crop and grazing systems that restore soil function naturally. He uses cover crop “cocktails” that mimic native rangeland and adjusts their composition based on the nutrient and biological needs of the soil. The cover crop cocktail is planted into no-till stubble in late summer or in the spring. Fields with cover crops are split into very small pastures using electric fence as a visual rather than physical barrier. The small pastures are then “mob” grazed to remove about half of the biomass and the remainder is trampled into the soil to provide armor. Cattle grazed on cover crop cocktails can gain as much as 2-1/2 pounds/day.



Jay Fuhrer speaking to the group at the Monte Vista Soil Health Workshop.

Ken Miller, a 20 year no-till farmer, presented a case study of how he has utilized cover crop cocktails on his own farm/ranch. He planted his first cover crop into winter triticale residue in August of 2007 and grazed it that fall. The following spring he planted barley. After the barley was harvested he planted a cover crop in late July and grazed it that fall. In the spring of 2009 he planted silage corn; left the fields fallow over the winter and planted a cool season cover crop in the spring of 2010. Results of his case study were near elimination of commercial fertilizer applications, equal or better yields of crops grown following the cover crops, improved soil structure and biology, increased soil organic matter and nutrient cycling, and improved water holding capacity.

Both men emphasized that the work they have accomplished toward improving soil health within the Burleigh Conservation District boundaries has required the common vision of its members. The first step was to educate producers about the benefits and profitability of improving soil health through Conservation District sponsored field trials, on farm demonstration projects and field tours. In Burleigh County, improving soil health has become a cooperative effort between federal and local governments and the community.

2011 SWCS Scholarships

Would you like to continue your education or update your skills in conservation? Have you been a member of SWCS for one or more years? In 2011, SWCS is offering the following Scholarships to its members:

- **Donald A. Williams Soil Conservation Scholarship**
- **Kenneth E. Grant Research Scholarship**
- **Melville H. Cohee Student Leader Conservation Scholarship**

Deadline for application submission is Feb. 12, 2011. Visit <http://www.swcs.org/scholarships> for more details and application instructions.

Soil Conservation Research Award 2010

Dr. Raj Khosla is a recognized authority in the field of Precision Agriculture. He is responsible for the Precision Agricultural Research, Extension, and Teaching Program at Colorado State University. He is the Colorado State University (CSU) Distinguished Monfort Professor and an Adjunct Scientist and Visiting Professor at the National Engineering Research Center for Information Technology in Agriculture (NERCITA), in Beijing, China, as well as Precision Agriculture Research Chair Visiting Professor at King Saud University, Riyadh. In addition, he has developed and is the director of a unique undergraduate degree program called "*Applied Information Technology in Agriculture*".



Dr. Raj Khosla

The main focus of Dr. Khosla's research has been on "Management of in-field soil and crop spatial variability using innovative technologies (such as GPS, GIS, and remote-sensing) for variable rate precision nutrient management". He has generated many discoveries in precision agriculture, most widely recognized among them is the innovative technique of quantifying variability of spatially diverse soils using satellite based remote-sensing to create management zones, which is currently being used by farmers in Colorado, across US and in other countries around the world. His research has been pivotal in reducing nitrogen loadings into soil without impairing grain yield productivity.

Dr. Khosla continues to make novel contributions in the area of soil and water conservation using innovative geo-spatial technologies. Thus, we recognize Dr. Raj Khosla as the 2010 recipient of the Society's Conservation Research Award. The Colorado Chapter of the Soil and Water Conservation Society would like to congratulate Dr. Khosla on this award.

Scholarship continued from Page 4

invited to attend the SWCS CO Chapter Annual Fall Workshop where they will be recognized for their achievements. Their registration fees for this workshop will be waived.

Application packages must include a completed SWCS Colorado Chapter Undergraduate Student Scholarship Program application form (available on our website www.swcs.org/en/colorado_chapter click on awards) and supporting information. Email completed applications and supporting documents to Beth Fortman, Elizabeth.fortman@co.usda.gov, Chairperson of the Undergraduate Student Scholarship Committee no later than March 31, 2011. The committee will make selections by July 31, 2011 and the award check will be mailed to the scholarship winners after they provide proof of enrollment for the fall semester of their junior or senior year.

Any Colorado resident enrolled in a four-year Colorado college or university pursuing a degree in a natural resources related program is eligible. Student must be entering their junior or senior year in fall of 2010.

Students Tour Local Farms

By: Dori Seamans, Burlington Conservation District Technician

Sixth grade students from Stratton, Burlington and Bethune visited area farms to discover ways that farmers protect highly erodible soil and create healthy environments in their farming communities. The Burlington Conservation District and the Natural Resources Conservation Service sponsored the field trips to demonstrate how local farmers use conservation practices such as minimum tillage, terraces and grassed waterways to reduce soil erosion and conserve water. Students also saw how Global Positioning System (GPS) technology can be used to apply fertilizer in bands to reduce the amount of fertilizer required and protect groundwater. Students then became Game Scene Investigators, to solve the Case of the Missing Pheasant and learn to evaluate wildlife habitat. They also learned about how windbreaks benefit people, livestock and wildlife, and why insects are important pollinators of some Colorado crops.

The farm tour was designed to give the sixth graders ideas for creating posters with a conservation theme. The Sixth Grade Poster Contest is open to all sixth graders in Colorado and is sponsored by the Colorado Association of Conservation Districts and the Burlington Conservation District. Lunch for the students was provided by a grant from the Soil and Water Conservation Society.



From top left, Steve Kramer, landowner, Kyle Franz, NRCS Soil Conservationist, Kraig Paulson, Farm Bill Wildlife Biologist, and Fred Wedel, NRCS District Conservationist, talk about soil health, native grasses and wildlife habitat.



The following are a couple of the new publications available from the SWCS Online Store (www.store.swcs.org).

- Advances in Nitrogen Management for Water Quality
- The Sciences and Art of Adaptive Management

March 10-12, 2011

Mandan, ND

Lena Bohm: (701) 240-6397

www.ndswcs.org



“Soil Critters & Waste?”

Northern Plains Regional SWCS Meeting



Thursday — ND Heritage Center

5:30 pm — “ND Geology” by Jeff Person, NDHC Paleontologist with tour to follow.

Friday — USDA-ARS Northern Great Plains Research Laboratory

8:00 — Welcome and Introductions

8:15 — The Science behind the Soil Critters, Jon Stika, NRCS

9:00 — Salinity Cover Crop Field Experiments, Brent Gustafson, NRCS

10:00 — Break

10:30 — Compost Teas, Jay Fuhrer, NRCS

11:15 — Overview of Septic Repair/Replacement in Richland County, Jennifer Klostreich, Richland SCD

12:00 — Lunch, served by NDSWCS Board (Cal's Steakpitt)

1:00 — Tour USDA-ARS Northern Great Plains Research Lab, Cal Thorson, ARS

2:30 — Tour of Menoken Farm, Burleigh County SCD

Return about 5:00 pm to hotel.

5:30 — Social — Mandan Seven Seas Conference Center

6:30 — Dinner

7:00 — Bakken Black Gold — Kathleen Neset, Neset Consulting Service

Saturday — Mandan Seven Seas Conference Center

8:00 — Business Meeting



**VISIT www.ndswcs.org TO REGISTER
REGISTRATION DUE FEB 24, 2011**

NATURAL RESOURCE WORKSHOP FUNDING AVAILABLE

Do you have a natural resource related workshop that you need additional funding to make happen? As part of our mission to promote the wise use of soil, water and other natural resources through scientific, educational, and service-oriented functions, the SWCS Colorado Chapter created a grant program to sponsor individuals and groups organizing or participating in activities related to this mission. The award program offers up to \$200 per sponsorship to an individual or group. The purpose of this grant program is to help support workshops, training programs or other activities that contribute to the spread of knowledge toward natural resource conservation.

This grant is available on a continuing basis. To apply, please complete the easy application form (available at www.swcs.org/en/colorado_chapter, click on Awards) and email it to Dawn Jackson, Chairperson, CO SWCS Grant Program at merinodj@gmail.com.



EVENTS TO WATCH FOR



☺ **NORTHERN PLAINS REGIONAL SWCS MEETING**
MARCH 10-12, 2011 MANDAN, ND

☺ **MODELING SUMMIT: ADVANCING THE SCIENCE OF MODELING**
MARCH 29-31, 2011 DENVER, CO

☺ **CONSERVATION BUFFERS**
APRIL 10-20, 2011 PORTLAND, OR

☺ **NORTH AMERICAN INVASIVE PLANT ECOLOGY & MANAGEMENT SHORT COURSE**
JULY 6-8, 2011 NORTH PLATTE, NE

☺ **SWCS INTERNATIONAL ANNUAL CONFERENCE**
JULY 17-20, 2011 WASHINGTON D.C.



USDA Natural Resources Conservation Service



Soil Quality Indicators

Physical, Chemical and Biological Indicators for Soil Quality Assessment and Management

A series of information sheets for physical, chemical and biological indicators is available to help conservationists and soil scientists with soil quality assessment. Use this guide to learn more about selecting appropriate soil quality indicators to assess specific soil functions. Visit <http://soils.usda.gov/sqi/assessment/assessment.html> for more information and to download copies of the information sheets.

What is soil quality?

Concise definitions for soil quality include “fitness for use” and “the capacity of a soil to function.” Combining these, soil quality is the ability of a soil to perform the functions necessary for its intended use.

Soil functions include:

- sustaining biological Diversity, activity, and productivity
- regulating Water and solute flow
- Filtering, buffering, degrading organic and inorganic materials
- storing and cycling Nutrients and carbon
- providing physical Stability and support

soil forming factors: climate, topography, parent material, biota and time. Examples of inherent properties are soil texture, type of clay, depth to bedrock, and drainage class.

Dynamic, or management dependent, soil properties are affected by human management and natural disturbances over the human time scale, i.e. decades to centuries. Significant changes in dynamic soil properties can occur in a single year or growing season. There are many dynamic soil properties, several of which are the subjects of this information sheet series.

Soil indicators are often divided into **Physical**, **Chemical** and **Biological** categories depending on how they affect soil function. However, these categories are not always clearly defined since a soil property or indicator can affect multiple soil functions or categories.

TIP: The **Function** icon at the top right corner of each information sheet uses **D, W, F, N or S** to show the function(s) that is most affected by the subject indicator.

TIP: The **Indicator** icon at the top right corner of each information sheet uses **P, C or B** to show the category in which the indicator best fits.

How is soil quality measured?

The quality of a soil, or its capacity to function, is evaluated using **inherent** and **dynamic** soil properties. These properties serve as **indicators** of soil function because it is difficult to measure function directly and observations may be subjective.

Inherent, or use-invariant, soil properties change very little or not at all with management. Inherent soil properties form over thousands of years and result primarily from the

Depending on the indicator and the method used to evaluate it, properties are assessed in the **Field**, **Laboratory** or even an **Office** when no special equipment is required.

TIP: The **Test** icon at the top right corner of each information sheet uses **F, L or O** to show where indicator assessment takes place for the method highlighted on the information sheet.

Helping People Help the Land...

Selecting soil quality indicators

A soil function – indicator matrix (fig. 1) can be used to select appropriate indicators for assessing a particular soil function. Additionally, if an indicator is already being measured, the matrix reveals the indicator's relationship to other soil functions, thus maximizing the usefulness of the collected data.

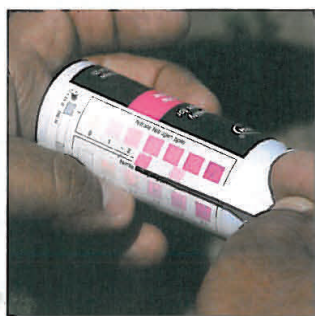
Each indicator listed in the matrix below is linked to its accompanying information sheet. The information sheets:

- define and describe the indicator
- relate the indicator to soil function
- discuss inherent and dynamic factors influencing it
- suggest management practices to improve soil function
- provide a reference for an assessment method

Figure 1. Soil function – indicator matrix: when a direct relationship exists between the function and indicator, increasing reliability and ease of use of the associated assessment method is shown with increasing stars

Soil Function Soil Quality Indicator	Sustain biological diversity, activity, and productivity "D"	Regulate and partition water and solute flow "W"	Filter, buffer, degrade, detoxify... organic and inorganic materials "F"	Store and cycle nutrients and carbon "N"	Physical stability and support for plants and... structures associated with human habitation... "S"
Aggregate Stability ^{a,c,f}	☆☆	☆☆	—	☆☆	☆☆☆
Available Water Capacity ^{a,g}	☆☆☆☆	☆☆☆☆	—	☆☆	—
Bulk density ^{a,h}	☆☆☆☆	☆☆☆☆	—	☆	☆☆☆☆
Infiltration ^{b,i,j}	—	☆☆	☆	—	—
Respiration ^b	☆☆☆☆	—	☆	☆☆☆☆	☆☆
Slaking ^{b,e,j}	☆	☆☆☆☆	—	—	—
Soil Crusts ^{b,d}	—	☆☆☆☆	—	—	—
Soil Structure and Macropores ^{b,d}	☆☆	☆☆	☆	☆	☆☆

^alaboratory/office method
^bfield method
^ctime consuming
^dsimple visual observation
^evariability requires large sample number
^fperhaps the most informative physical indicator
^gimportant for drought prone areas
^himportant for weight to volume conversions, small sampling errors result in significant interpretation problems
ⁱeffective educational method
^jqualitative



L to R: Soil slaking, nitrate and respiration are examples of physical, chemical and biological indicators of soil quality, respectively.

2010 COLORADO CHAPTER LEADERS



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MISSION STATEMENT

The mission of the Colorado Chapter of SWCS is to promote the wise use of soil, water and related resources through scientific, educational and service oriented functions. The members promote a stewardship ethic that recognizes the interdependence of people and natural resources.