**Position title:** Soil Health CE Specialist

**Position description:** Statewide research and extension leadership is needed to diagnose and prescribe practices that define and promote soil health. Farmers and ranchers will benefit through the evaluation of management practices focused on improving crop and range production that address soil health. The position will strengthen growing education programs in collaboration with ANR Specialists and Advisors, AES faculty and NRCS scientists emphasizing soil health, a key trait of sustainable crop and range production systems. A Ph.D. in soil science, agronomy, soil-water-plant relations, agroecology or closely related discipline and experience in irrigated as well as rain-fed agriculture with a strong emphasis on interdisciplinary research is desirable. The Specialist will collaborate directly with growers, ranchers, a wide range of ANR and UC academics, state and federal agency staff, and with UC special programs such as the Agricultural Sustainability Institute, Small Farms Center and Institute for Water Resources.

**Justification:** The health of agricultural and rangeland soils sits at a critical nexus between the environment and society. California is the nation’s leading state in cash farm receipts and over 10 percent of the U.S. total agricultural production. Soil management decisions made in coming years will strongly influence the resilience of soils to remain productive as production systems intensify and yield/quality expectations rise. The concept of soil health as a critical component of food security is widely recognized. USDA-NRCS is promoting a nationwide soil health program in response. Governor Brown highlighted the importance of soil health in his 2015-16 budget, calling for the California Department of Food and Agriculture to coordinate a Healthy Soils Initiative. This is an ideal opportunity to match federal and state policy development with ANR and AES growth via a CE Specialist in Soil Health.

Advancements in fertilizer technology and soil amendments are increasing at a staggering rate, however, assessing soil health is currently not the primary objective in nutrient management planning or practiced based restoration activities. This effort will involve evaluation of soil microbiome, chemical and physical indices, and value of soil amendments (e.g. recycled wastes and soil probiotics) through research and education efforts to define healthy soils and practices to improve soil health. Additionally, a key role will be to increase government and industrial efficiencies by ensuring coordination and collaboration with these entities and ANR and AES to address soil health.

Assuring soil health will provide positive outcomes for water quality and air quality protection, both issues confronting California agriculture. Soil health management challenges include protecting groundwater to address the Sustainable Ground Water Management Act, reducing greenhouse gases and other air pollutants such as NOx to conform with the California Global Warming Solutions Act and state, regional and national air quality targets. The Specialist is expected to provide leadership in integrating soil health into cropping systems including organic production and perennial crops. By responding to these challenges this Specialist would address core concerns of the *Sustainable Food Systems* and *Water Quality, Quantity and Security* ANR strategic initiatives.

**Extension:** The specialist will provide leadership and coordination among UC faculty, CE Specialists and Farm Advisors on soil health assessment. Most important will be contributions to current outreach structures (e.g., UC Research and Information Centers, UCCE workgroups, Commodity Research Boards, UCCE Capitol Corridor and Livestock & Natural Resources), and through deliberate cooperation with the USDA, NRCS, Resource Conservation Districts, and state resource agencies (California Department of Food and Agriculture, Air Resources Board, CALRECYCLE) to expand outreach functions and educational programs that engage producers, distributors and consumers. The educational programming aspects of soil health represents an expanding knowledge area with national and international momentum using extension bulletins, scientific publications in agronomy, soil science and environmental science journals and industry trade magazines, and electronic and interactive web platforms.

**Research:** Research will focus on defining and evaluating soil health through assessing soil properties such as the microbial communities, chemical and physical indices, biological based soil tests, soil probiotic amendments, and recycled solid waste and waste water. The effort will identify indices to describe soil health and link it with management practices that increase productivity and reduce impact on water and air quality. Collaboration with recent positions in soil quality and traditional ANR positions in nutrient and crop management will include incorporating the fundamentals of soil health into existing decision support and information platforms. Non-commodity specific systems-oriented research combined with holistic assessment of management practices will be implemented to promote strategies to increase resource use efficiency that stimulate resilience and promote productivity of cropping and range systems.

**ANR network: Collaboration among UC and ANR academics is essential when considering the diversity of crops, systems, soils and climate in California.** ANR and AES scientists are involved in various aspects of management in agricultural and range production systems including nutrient management, irrigation, erosion protection, environmental protection, plant breeding, plant physiology, post-harvest, engineering. The Soil Health Specialist provides integrative expertise to build multi-disciplinary teams to address complex agronomic and environmental problems associated with nutrient and irrigation management and environmental stewardship. In particular this position is expected to collaborate with and provide leadership for two new UCCE soil health advisor positions.

**Network external to ANR:** Soil health is an emerging concept to ensure resilient and productive cropping and range systems. This Specialist would inform regulatory agencies (i.e., statewide or regional Water Quality Control Boards, California Department of Food and Agriculture, CalRecycle, CA Air Resources Board, US EPA), and to interact with California State Universities, other universities and USDA-NRCS. Additionally, a number of groups (Resource Conservation Districts, Water Quality Coalitions, environmental organizations) are actively engaged in soil health, but need expertise and research based information. This Specialist will be a key resource for these groups.

**Support:** The Department of Land, Air and Water Resources at UC Davis will provide office, laboratory, field and greenhouse facilities, administrative support, and information technology services. Financial support would include a startup package and an annual CAES allocation for CE Specialists. Most funding for research and outreach activities will come from external sources.

**Other support:** Numerous sources of financial and logistical support for this position and program include commodity research Boards (e.g., leafy greens, processing tomato, potato, pepper, melon, carrot) and state support from the CDFA Fertilizer Research and Education Program, statewide or regional Water Quality Control Boards, the Air Resources Board and CDFA Healthy Soils Initiative. Federal grant programs for Specialty Crops, Sustainable Agriculture, Organic and Watershed areas are also available. Projects demonstrating improved nutrient management practices at the farm scale may also be attractive to NRCS conservation programs.

**Location:** The Department of Land, Air and Water Resources at UC Davis is uniquely positioned to host a CE specialist in Soil Health to complement faculty and CE specialists in crop production, nutrient management, irrigation and soil resources. Other UCD faculty and specialists on campus have similar interests in plant, animal, and environmental health. UCD provides a range of specialized laboratory services, opportunities for training of graduate students, and access to state policy makers in Sacramento.

**Developed and proposed by:** This position was developed by the Department Land, Air and Water Resources through consultation with external stakeholder groups including the soil testing industry (Dellavalle Laboratory, Inc.). NRCS State Soil Scientist, County directors of the two new soil health advisors and grower groups provided input. Morgan Doran, UCCE Capitol Corridor Director and Livestock & Natural Resources Advisor supports this position to address an emerging and critical need in crop and rangeland soil management and sustainability. NRCS is a key stakeholder with UC ANR in leadership for promotion of soil health in California and is a partner on an MOU signed on May 5th, 2017 with other key stakeholders including the California Department of Food and Agriculture, California Association of Resource Conservation Districts, UC Davis and the California Farm Bureau. The MOU was signed to support a unified effort to further the adoption of soil health management practices on California’s private working lands. The statewide CE Specialist in Soil Health shows an active commitment by UC ANR to support the stakeholder’s core mission to address the critical need of increasing the adoption of soil health practices statewide to make California a world leader in agriculture and land stewardship. Additionally, the Specialist in Soil Health position specifically targets several key needs identified by our MOU steering committee through multiple information gathering meetings from a wide-range of partners including CDFA. The key needs identified include: promoting soil health statewide to increase farmer and rancher awareness to increase adoption, develop localized soil health assessment protocols and building networks with internal and external partners.