

Soil Health Database - data policy template

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This is the Soil Health Database Data Policy Template for the HiCSC project.

Any content changes made to this document should be done within the metadata of the Soil Health Database (point of contact Tai McClellan Maaz tai.mc.maaz@hawaii.edu).

1 Data collection purpose

Data in this database were collected to assess soil health, aid research to maintain or improve the soils of Hawai'i through management practices, and provide a platform for co-learning with land managers.

For the Hawai'i Climate Smart Commodities (HiCSC) project, data were collected as part of the monitoring, modeling, reporting, and validation for the 2023-2028 USDA Climate Smart Commodities grant NR233A750004G050k and will be disclosed to the USDA as detailed in this document.

2 Data governance

We acknowledge that Western academic and legal concepts around data ownership and intellectual property regimes may fundamentally violate some Indigenous worldviews. Both researchers and the community commit to an ethical responsibility to protect Indigenous and local knowledge and data from misuse and exploitation as part of this plan (Paoakalani Declaration and CARE Principles for Indigenous Data Governance), recognizing the special protections afforded to Indigenous knowledge under the Hawai'i state constitution (Haw. const. art. XII, §7) and international law (UN Declaration on the Rights of Indigenous Peoples, Article 31).

The data in the Soil Health Database is held by the University of Hawai'i S(HEE)R Lab, in trust for the contributing land managers and with a commitment to co-design and establish agreements about plans for publications, credit, authorship, and intellectual property.

As part of the HiCSC project, data governance decisions will be made via consent of a governing circle including representatives from: producer engagement organizations, the Native Hawaiian and Hawaii-based community including underserved peoples, the S(HEE)R Lab at the University of Hawaii, and academic researchers. At the conclusion of the project, data providers will be given an opportunity to remove their data entirely, transition parts or all of their data to a public data set, or leave this data to be governed after this project by the University of Hawai'i S(HEE)R Lab.

Participation in the HiCSC incentives program does require that data be housed with the Soil Health Database as part of the Measurement, Monitoring, and Verification Plan (see Partner Resources section of <https://www.usda.gov/climate-solutions/climate-smart-commodities> ; Access 28 July 2023), however any research outputs must be consistent with Section 7 Data Reuse.

Feedback on this data policy is always welcome. Please contact hisoil@hawaii.com if you have any questions or would like to request a modification.

3 Data guidance

As part of the HiCSC project, we plan to release aggregated reports and guidance documents to help producers and practitioners place their data in relevant context. This work is still pending. Please check back later for more details.

A technical guide to the Hawaiian Soil Health Database including metadata annotations is currently pending.

Questions about the database should be directed to hisoil@hawaii.edu.

This data policy builds on best practice guidance for place-based research, and we are grateful for past work done in this space. This data policy will be reviewed at least annually to incorporate new guidance as it becomes available. The data policy for specific data will not be changed without approval of the data provider. Commitments made under prior data policies will be tracked and honored barring opt-in changes by data provider.

4 Data accuracy

The University of Hawai'i S(HEE)R Lab is responsible for ensuring accurate data. Corrections should be submitted to hisoil@hawaii.edu.

5 Data impact

We recognize that healthy soils are a valuable cultural, community, environmental, and economic resource. Specific locations of soil data may affect land valuation and thus could have cultural, socioecological, and economic impacts. We acknowledge that this is held in tension with research priorities which leverage geolocation to link soils with local climate and geological information. While releasing specific geolocation information increases the research value of the data, this will not be done without explicit permission of the data provider.

6 Data attribution

Data should be cited as “The Hawaii Soil Health Database. University of Hawaii at Mānoa. Access date YYYY-MM-DD. <https://soilhealthhawaii.org/>

[[Optional:]] Please include the following statement for credit of **specific data provider statement of attribution**

7 Data reuse

Select one of the following:

- This data is free for unrestricted reuse inclusive of geolocation.
- **Default** The non-geolocated data is free for reuse.
- This data may be released as part of an anonymized aggregated data (for example: mean values across multiple sites) for reuse without georeference.
- The non-geolocated data may be reused for research only, no commercial use by third parties
- Reuses of this data will be considered on a case-by-case basis. Please contact **a specific data provider** for permission. If contact can not be made **specify what happens here**

If data is released, geolocations may be cross-referenced internally at University of Hawai'i S(HEE)R Lab to extract contextual climate or other variables. Data analysis of specific place-based practices will require the

analysis-specific approval of contributing land managers. See Section Data Access for definition of geolocation and place-based practice data.

Metadata/annotations about the database including table names, control vocabularies, column names, descriptions, units, and methods are free for reuse. Excluding any identifying information about data providers (for example, specific names) found in the data policy.

8 Data access

Land managers and data providers may access their own contributed data on request (point of contact is the administrator of hisoil@hawaii.edu)

Technicians and staff at the University of Hawai'i Soil Health Environment and Ecosystem Resilience [S(HEE)R] Lab may access all data to maintain, update, and ensure data accuracy.

As part of the HiCSC project, USDA requires quarterly reporting. See the “Partnerships for Climate-Smart Commodities Project Reporting Work book” under “Partner Resources” here <https://www.usda.gov/climate-solutions/climate-smart-commodities> (access 2023-07-23) for the reporting details. Please note that geolocation information is required to be shared with the USDA. However, the USDA may not release to the public any geolocation data or personally-identifiable information (PII) under the Food, Conservation, and Energy Act of 2008 (Section 1619), codified at 7 U.S.C. 8791.

The Hawai'i Soil Health Database will not release the geolocation data or personally-identifiable information publicly without explicit permission. This includes latitude-longitude locations, towns, names, contact information, acreage, and geospatial information. See Data Definition for specific variable definitions that are in this database.

9 Data definition

Table 1: Geolocated data specifically applies to the following:

Variable	Description
latitude	Latitude associated with sample location
longitude	Longitude associated with sample location
ownership	The relationship between the land manager and land tenure or ownership
plot name	Field or plot location nested within a site location from which the sample was taken with demarcated plot boundaries
project name	Typically who funds the project, but there are exceptions; samples can be associated with more than one project
sample id long	The 15 digit unique identifier for each soil sample including the project, site, year, and sample identifications
site area	Number of acres associated with the site location
site name	Site location typically associated with a specific entity managing the land from which the soil sample was collected

Table 2: Place based practice data includes:

Variable	Description
amendment	Type of amendments that the land manager has added to the soil including fertilizers, soil conditioners, and biostimulants
amendment rate	The quantity of amendments added per acre per year
herbicide use	Whether or not commercial herbicides via chemical weed management
irrigation	Type of irrigation system implemented to deliver water to plants for production purposes
land use	Designation of how the land is either used and managed as part of working lands or maintained as part of natural lands
land use duration	Range of years associated with the current designation for land use
management	Explanation of the system by which land operators managed their land or the natural system from which the soil sample was collected
past land use	Designation of how the land was previously used and managed as part of working lands or maintained as part of natural lands prior to its current designation
past land use interval	Range of years associated with the previous designation for land use
pesticide use	Whether or not commercial pesticides via chemical pest and disease management
plot area	Number of acres associated with the field or plot boundaries
previous land use	Designation of how the land was most previously used and managed as part of working lands or maintained as part of natural lands prior to its current designation
previous land use interval	Range of years associated with the most recent previous designation for land use
previous plant cover	Explanation of what plants, if any, the manager has grown in the soil previously or what plants naturally grew within the past year , and typically associated with the system that the land operator has previously managed or the natural system
previously intensive agricultural lands	Whether or not the soil sample was collected from land previously under intensive agricultural lands including former pineapple and sugarcane plantations
soil cover	An explanation of the type of soil cover directly on top of the soil sample that must be either cleared or removed for sampling
tillage	Type of tillage that the land manager has implemented, if any
tillage frequency	How often tillage activities took place within a year

Table 3: Other data held by the Soil Health Database includes that is not geolocation nor land management/use:

Variable	Description
ammonium end	Final ammonium concentration of fresh soil samples at the end of the 7-day anaerobic incubation for measuring soil N supply
ammonium start	Initial ammonium concentration of fresh soil samples at the start of the 7-day anaerobic incubation for measuring soil N supply
beta glucosaminidase	Proximate microbial metabolism of amino-containing substrate
beta glucosidase	Proximate microbial metabolism of cellulose-containing substrate; a reliable predictor of organic matter decomposition
bulk density	The mass per unit volume of soil which influences the infiltration, porosity, and rooting environment
carbon dioxide burst	Soil respiration in response to readily available substrate
hot water extracted carbon organic	Readily available metabolic carbon substrate in a hot water extract
hot water extracted nitrogen	Readily available metabolic nitrogen substrate in a hot water extract
pH	A measure of active acidity based on the H ⁺ concentration in the soil solution, which a master soil variable that influences biological activity and nutrient availability
soil water content air	Soil moisture content of the air dried sample after a period of up to one week under dehumidifying conditions
soil water content fresh	Soil moisture content of the fresh sample upon intake to the laboratory
total nitrogen	Total concentration of elemental nitrogen in the soil
total organic carbon	As the backbone of soil organic matter, a proxy measurement of the amount of soil organic matter
water extracted carbon organic	Dissolved organic carbon concentration in a cold water extract passed through a 45µm filter
water extracted nitrogen	Dissolved total nitrogen concentration in a cold water extract passed through a 45µm filter
water extracted nitrogen inorganic	Dissolved ammonium and nitrate concentrations in a cold water extract passed through a 45µm filter
water extracted nitrogen organic	Difference between total dissolved nitrogen and dissolved inorganic nitrogen
water stable aggregate mega	The water stability of mega-aggregates, which influences water infiltration, porosity, aeration

Table 4: Data to log updates to the database itself include:

Variable	Description
change log what	What was changed in the database
change log when	When the database was changed
change log who	Tech who changes the database

Table 5: Data provided from field sampler includes:

Variable	Description
date sampled	Date that the soil sample was collected
island	Island from which the sample was collected
layer bottom	The ending depth increment of the sample
layer top	The starting depth increment of the sample
plant cover	Explanation of what plants, if any, the manager is currently growing in the soil or the plants naturally growing, and typically associated with the system that the land operator is managing or the natural system
sample id	The 8 digit truncated unique identifier for each soil sample including the year and sample identifications

Table 6: Data that is location inferred from maps includes:

Variable	Description
minerals	The soil mineralogical classification of the sample
soil order	One of the 12 global soil orders according to the USDA NRCS soil taxonomic classification
soil series	Official series name established by USDA-NRCS based on soil profile descriptions and taxonomic classification

Table 7: Measures that are calculated from other data includes:

Variable	Description
assessment	Written commentary from the lab for a soil sample
organic carbon to nitrogen	The ratio of total organic carbon to total nitrogen in the soil
potential nitrogen	Potential N supply from the soil calculated by subtracting the final ammonium concentration after a 7-day anaerobic incubation from its initial ammonium concentration
soil health score	Overall soil health score based on the Hawaii suite of soil health indicators and adjusted for soil mineral type and history of previously intensive agricultural land use
soil health score factor 1	First order soil health subscore loaded by co2_burst, pmn, hwec, and whc, which relates to the availability of biological substrates
soil health score factor 2	First order soil health subscore loaded by ph, toc, and wsa_mega, which relates to soil master variables
soil health score factor 3	First order soil health subscore loaded by beta_glucosidase and beta_glucosaminidase which relates to biological activity
water extracted organic carbon to nitrogen	Integrated indicator of the balance of organic carbon and organic nitrogen pools