SCIENCE & DATA SUBCOMMITTEE

Contributions to discussions about the Draft Climate Action Plan & Subcommittee Workplan

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Framework for data management, curation, governance and provenance

Use of a subset of fields in the Project Open Data Metadata Schema used by the Federal Government (and us to federate our data catalog with data.gov.) Populating the fields in the schema can answer questions around spatial extent/resolution / update cycle etc. and also help move towards common definitions (ie. 'regional'.) It can also help in identifying gaps or what is missing.

The scope of any data governance can be narrow or expansive if necessary – addressing how future data/science will play a role in updating any metrics/policies/etc. included in the action plan. It might also include policies around open data.

I apologize if anyone reading this is getting a headache from opening the link to a metadata schema. (And yes, it would not be an email from a Canadian if it didn't include two apologies.) Below is an example of fields from the schema that could be used to catalog data sources.

- title
- description
- theme
  - Main thematic category of the dataset.
- modified
  - Most recent date on which the dataset was changed, updated or modified.
- publisher
  - The publishing entity and optionally their parent organization(s).
- temporal
  - The range of temporal applicability of a dataset (i.e., a start and end date of applicability for the data).
- spatial
  - The range of spatial applicability of a dataset. Could include a spatial region like a bounding box or a named place.
- accrualPeriodicity
  - The frequency with which dataset is published. (You can change the name of this field to 'frequency'.)
- landingPage
  - This field is not intended for an agency's homepage (e.g. www.agency.gov), but rather if a dataset has a human-friendly hub or landing page that users can be directed to for all resources tied to the dataset.
- describedBy
  - URL to the data dictionary for the dataset.

About the Global Change Information System

The National Climate Assessment and Development Advisory Committee (NCADAC) recommended in 2013 that the NCA process "manage data to maximize utility and transparency." The report also highlighted the importance of "developing a comprehensive web-based sys manage global change information and present it in a way that can be used by and benefit scientists, the public, and decision-makers." To achieve these goals, the US Global Change Research Program (USGCRP) established the Global Change Information System (GCIS). integrates information about changes in the global environment and related societal effects, with a focus on Federal information products.

The GCIS, which continues to be managed and curated by USGCRP, is an open-source, web-based resource designed for use by scientists, decision makers, and the public. It links together a network of information, including organizations, datasets, and research, especiall maintained and disseminated by government agencies and organizations. GCIS serves as a key access point to assessments, reports, and tools produced by the USGCRP – and the native data underpinning all of them. In addition, the GCIS guides users to global change re 13 USGCRP member agencies.

Global Change

For the purposes of the GCIS, "global change" refers to changes in the global environment that may alter the capacity of the Earth to sustain life. Global change encompasses climate change, but it also includes other critical drivers of environmental change that may interac such as land use change, the alteration of the water cycle, changes in biogeochemical cycles, and biodiversity loss.

Global change information is structured using the GCIS data model; this data model represents relationships and entities such as reports, report chapters, figures, images, tables, bibliographic entries, organizations and people.

External Standards & Resources

Identifiers

GCIS makes use of external identifiers such as Digital Object Identifiers (DOIs), ORCIDs, ISBNs, ISSNs. ISBN resolution is handled through WorldCat. They may also utilize identifiers created for other aggregator systems, such as Data.gov identifiers. When GCIS identifier, it may utilize a Universally Unique Identifiers (UUIDs) when no human-readable identifier is reasonable.

Provenance

GCIS utilizes W3C provenance to represent some relationships inside of GCIS. In particular, GCIS utilizes PROV-O and CITO verbs.

Technology

GCIS is written in Perl using the Mojolicious web framework, the Rose::DB Database interface, and many other fine modules from the CPAN. It relies on PostgreSQL for data storage.

Map inserts are supported by OpenStreetMap data with MapBox tiles and implementation through LeafletJS.

Data Export Formats

GCIS offers a multitude of human- and machine-readable data export formats, defaulting with the HTML pages. Publication pages can be downloaded as JSON and YAML data, the semantic formats Turtle, N-Triples, JSON Triples, RDF+XML, and RDF+JSON representations in Graphviz, and SVG of the semantic mapping. Additionally, the data Array(s) behind Table Publications may be downloaded as CSV. List pages can be downloaded as JSON, YAML, or CSV formatted data.

https://data.globalchange.gov/about

State of Vermont portals

1. Climate change in Vermont <https://climatechange.vermont.gov/our-changing-climate/what-it-means>
2. Flood-ready <https://floodready.vermont.gov/get_help/resources>
3. VGCI <https://vcgi.vermont.gov/>

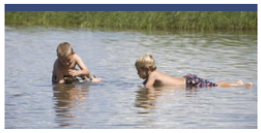
Climate Change in Vermont

THE EFFECTS

Changes in Vermont's climate create many serious challenges, and a few opportunities, for Vermont's communities, economy and ecosystems. Learn more about what is at stake.

HEALTH

FLOODING



WATER QUALITY

FARMS & FORESTS

TOURISM & RECREATION

PLANTS AND ANIMALS

VERMONT

VERMONT .gov
official state website

Search

Flood Ready

State of Vermont

- Home
- Rising Danger - Flood Costs
- Community Risk Assessment
- River Corridors
- Update Your Plans
- Use Natural Flood Protection
- Improve Infrastructure
- Find Funding
- Making It Happen
- Get Help
- Resources
- Training and Events

Map Your Community

FLOOD READY

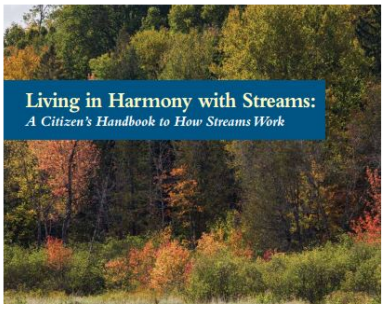
Resources

Becoming a flood resilient community and state will require considerable action on the part of all of us. Your community needs to set the direction and the priorities well beyond the requirements of the municipal plan, the incentives for ERAF and the suggestions here. Below you will find a number of resources that may open new opportunities for your work ahead.

If you become aware of something new – please post it to the Flood Resilience Listserve or let us know so more people can learn from it!

Links to sections below:

- Vermont Reports and Video Presentations
- Climate Change
- Disaster History and Tropical Storm Irene
- Watershed and Resource Information
- River Science and Policy
- Lakes and Shore Lands
- Dam Safety
- Resilience as a Framework
- Planning Resources
- Law and Policy
- Model Bylaws, Floodplain and River Corridor Regulations
- Storm Water and Natural Flood Protection
- Roads and Infrastructure
- Flood Emergency Response



VERMONT OFFICIAL STATE WEBSITE

VERMONT

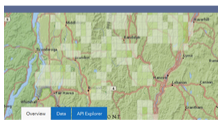
AGENCY OF DIGITAL SERVICES

Vermont Center for Geographic Information

SEARCH

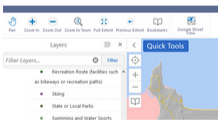
CONTACT

- Data and Programs
- Resources
- Maps
- Partners
- About VCGI



Use the Vermont Open Geodata portal to find free spatial data, services, and applications

FIND MAP DATA



Use map applications to create maps in your browser with data from multiple agencies

USE MAP DATA

Learn about events, activities, and resources for advancing your GIS mapping knowledge and skills

MAPPING RESOURCES

Tweets by @VCGI

HUMAN DIMESIONS & HEALTH

Task 5: Human Dimensions and Health
(*What is the specific goal of this task of the workplan?)*

- Specific issues for discussion:
    - Inventory the known/expected impacts of climate change on humans
        - Health: air quality, vector borne/water borne disease, heat-related, mental health, well-being
            - *Other?*
        - What is our current understanding of these impacts in Vermont? How does this vary by community/geography/sector/etc?
        - What data are required to monitor and assess these impacts?
    - Human/social ability and/or capacity to adapt
        - Collaborate with the other subcommittees to regarding how to understand/quantify this potential for change.
            - What are the individual/social/cultural/organization/political/technical determinants?
                - What frameworks or tools currently exist/do we already use to understand these determinants? What data/metrics do they require?
                - Do we currently have access to this data? If not, what resources/community outreach is required to develop it (and maintain the datasets going forward).
        - *Note: Could be considered across various scales (ex. individual/organization, community, cultural). One question might be what is the appropriate scale(s) of assessment?*
- General items for consideration:
    - How do different disciplines /perspectives inform our understanding of these issues? What are the different types of data they require? What methods are required to develop this data?
        - How can different perspectives/data types be integrated?
    - How do/will the impacts of climate change on humans (ex. health, well-being) influence the capacity to adapt? How do we measure/monitor/assess that?

The items listed under Task 5, for human dimensions and health, are:

- Air quality
- Vectorborne and water borne disease
- Heat-related impacts
- Mental health
- Ability and/or capacity to adapt to climate change

This is a good list to start from.

At this high level, I believe that an important missing threat is mass human migration, with attendant health risks and social disruption. We can expect more pressure for admission to our country by climate refugees, and either letting them in in large quantities, or excluding them by force, carries social risks for the country at a whole.

But more importantly, there are tens of millions of Americans who are at risk from coastal flooding --- at first just after storms like hurricanes, then at unusually high tides, then daily at high tide, then permanently. Vermont won't be directly impacted by coastal flooding, but we could become involuntary hosts to tens or even hundreds of thousands of internal climate refugees. At first they will be like the ~1000 households who have bought houses and moved to Vermont to escape the worst effects of the pandemic, and plan to stay and work remotely. This is the kind of in-migration that VT state government has been hoping for and would encourage. But the mix is likely to change to include people who come to Vermont basically with their shirts on their backs – maybe with a camper or RV to sleep in, not much more. Some may be ethnically diverse, but most will be ordinary non-immigrant Americans who are suddenly homeless and want to get away from the coast. If we are lucky it won't happen overnight, and we will be able to see the shape of the problem as it evolves.

If large influx of destitute or near-destitute climate refugees materializes, we will have a lot of sketchy living situations, with challenges in providing safe drinking water, safe waste disposal, safe food, adequate preventive and curative health care, and secure places for people to sleep. Although the details are hard to predict, we can anticipate an increase in infectious diseases related to crowding – respiratory and gastrointestinal infections (influenza, meningococcal disease, shigellosis, salmonellosis, Norwalk virus infections, etc), parasitic infestations like head lice and scabies, and sexually-transmitted diseases. These effects are independent of any effect of changes in temperature or rainfall regimen – but we may also see more injury and death related to exposure (to extremes of heat and cold) as local effects of climate change, if exacerbated by a refugee situation.

Vermont probably won't get the worst of this, because of our cold winters – I expect the worst refugee impacts to be in places like Orlando, Ocala, Gainesville FL, and Tallahassee, and inland Georgia and the rest of the non-coastal South. On the other hand if Vermont tries to maintain a helping hand for newcomers, we may attract more refugees. (And if we don't, we will have to reckon with what kind of people we are.)

<https://www.msn.com/en-us/money/realestate/i-left-a-life-i-loved-in-nyc-and-moved-to-a-tiny-town-in-rural-vermont-during-the-pandemic-i-miss-takeout-and-trash-pickup-but-overall-im-thrilled-with-the-decision/ar-BB1g2aIf?li=BBnb7Kz>

BUSINESS INSIDER

I left a life I loved in NYC and moved to a tiny town in rural Vermont during the pandemic. I miss takeout and trash pickup, but overall I'm thrilled with the decision.

insider@insider.com (Jessica Frisco) · 3 days ago

(article from 25 April 2021)

https://nca2018.globalchange.gov/chapter/18/

Northeast - Fourth National Climate Assessment

This report is an authoritative assessment of the science of climate change, with a focus on the United States. It represents the second of two volumes of the Fourth National Climate Assessment, mandated by the Global Change Research Act of 1990.

nca2018.globalchange.gov

The Human Health chapter is number 14
https://nca2018.globalchange.gov/chapter/14/

Human Health - Fourth National Climate Assessment

This report is an authoritative assessment of the science of climate change, with a focus on the United States. It represents the second of two volumes of the Fourth National Climate Assessment, mandated by the Global Change Research Act of 1990.

nca2018.globalchange.gov

and Air quality is number 13
https://nca2018.globalchange.gov/chapter/13/

Air Quality - Fourth National Climate Assessment

This report is an authoritative assessment of the science of climate change, with a focus on the United States. It represents the second of two volumes of the Fourth National Climate Assessment, mandated by the Global Change Research Act of 1990.

nca2018.globalchange.gov

IDEA FLIP

Science and Data

Climate projections of how Vermont's weather and climate will change at different times in the future

urrent projections of temps, SLR, precipitation, etc

HDD, CDD projections

Energy needs thru 2050 (inc. growth and efficiency)

All the natural hazards that will be affected by climate change, including severe weather, droughts, flooding, temperature extremes

The VCC needs to be able to defend the decisions that are made in inventorying GHG releases.

Housing data (tenure, fuel type, etc.)

Impacts on biodiversity of climate actions - from chat

Clean energy jobs (current and projected)

Climigration projections - from chat

We should try to compile data on the precursors or determinants of GHG releases -- for example, transit ridership or EV sales.

Forests, segmentation (fragmentation?),

Landuse change (more broadly)

Infrastructure - including the electrical grid, roads and highways, water supplies, critical infrasturcture

Energy burden analysis

Progress tracking re: adoption of emissions reducing measures

Human he ncluding air q y impacts, vectorborne disease, waterborne disease, heat-related

Estimates of VT's energy lifecycle GHG emissions (as opposed to site/burner tip emissions, as currently counte

Doing a lifecycle GHG analysis should be tied to programmatic activities

Emissions baseline

Support substate analyses wherever possible.

Town & county level labor & energy usage

EJ Community identification and impact analysis

The sectoral pathways and technical measures to reach VT's GHG reduction requirements

Don't collect data you are not going to use.

We, on behalf of the VCC, need to be sure that we have properly accounted for all the emissions needed to produce and distribute electricity and natural gas -- including from hydroelectric installations and gas extraction.

How can/should we address embodied carbon?

Sources

NOAA & Northeast Regional Climate Center

Satellite imagery, air photos

VCGI

Town Energy Plans

VHFA annual Housing Needs Assessme

EAN Emissions Reduction Pathways nalysis Model

Electric Utilities Tax Dept PSD Fuel Dealers

VSCO

ANR emissions inventory

LEAP modeling (Comprehensive Energy Plan)

(for lifecycle emissions): EPA, GREET, CARB, EcoInvent DB

Energy Information Administration (energy data and forecasts)

EAN Annual Progress Report for VT

Population-based surveys of beliefs, knowledge, intentions

Clean Energy Industry Report (conducted annually by CEDF/PSD)

PSD Comprehensive Energy Plan

EAN Equity Research (re: energy burden by income) and Efficiency VT Energy Burden Report (re: energy burden by geography)

VT Energy Dashboard (currently hosted by EAN)

Annual Energy Report, Transportaiton Energy Profile

Federal Highway Administration (FHWA)

Vermont Climate Assessment (UVM, Gund)

UVM, Gund Institute

VEIC (weatherization data)

DMV (motor vehicle registration, fuel import data)

Stakeholders

Local gov't and regional planners

Electric Utilities

Efficiency Utilities

Agencies for Work force development

Infrastructure professionals making planning decisions 10-50 years in the future (e.g. VTrans)

Public and private landowners

Fleet owners

Equity community members

Healthcare workers

Municipalities

Companies that sell fossil fuels.

Regional Planning Commissions

Educators and public awareness professionals

Water managers

Individual consumers

Energy Committees

Vermont-based businesses

Resource economists, Gund

Industry - e.g. Renewable, manufacturing, etc

Community Action Agencies and other organizations serving lower-income VTers

Renewable energy industry - form chat

Students/Youth

Youth - from the chat