



# Dashboards & Data Management

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Synthesis

NSERC ResNet  
Annual General Meeting  
2021-5-7

# Agenda

- Retrospective
- Storymap
- Dashboard
- Data Portal
- Upcoming Work
- Data Essentials

# Retrospective - 1<sup>st</sup> AGM (May 2020)

- Dashboard should:
  - Democratize decision-making by providing an interactive portal to data, information, and sometimes interpretation to answer a variety of questions about the status and trends of selected ES and natural capital in working landscapes in Canada
    - identify, compare, and learn about *types* of SES (social-ecological systems) in Canadian working landscapes
    - Information at a variety of scales & resolutions, on a variety of services, with different boundaries (watersheds, political boundaries, etc.)
  - Reflect the reciprocal relationships between ecosystems, ES, and people, visualizing and exploring multiple values around nature. Reflect our ES framework (natural capital, co-production, ES, benefits to people, demands, management)
- We might have multiple users, so should consider multiple dashboards
  - Must have a clear user in mind to develop a clear dashboard
- Can include data collected by other sources, including StatsCan, NRCan, ECCC, citizen science, traditional knowledge, etc.

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# Retrospective - SAC & Monthly Meeting (Spring 2021)

- Who is the ResNet dashboard user?
  - Landscape: Watershed-scale planner, tribal elder, anyone wanting to increase their role in local planning
  - National: researcher visualizing trends in time and space, Federal employee using dashboard for communication,
- What does she use the dashboard for?
  - Landscape: someone doing multiple jobs with limited capacity, access to data and tech, trying to predict and mitigate trade-offs among users with multiple sources of information (local knowledge and academic research)
  - National (research): someone trying to understand state and trends of environment across Canada with limited computational infrastructure, frustrated by dispersed data and incomplete standardization across previous projects and programs
  - National (Fed employee): someone trying to understand the ecological ramifications of policy decisions, trade agreements.

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# Retrospective - SAC & Monthly Meeting (Spring 2021)

*ResNet dashboards are used because they are a recognized, authoritative source of synthesized information that is accurate, timely, integrated, coherent, complete, easily accessible, reproducible, sourced, consistent, and interpretable.*

- Enable coordination and conversation
- Support spatial planning around trade-offs (prediction, mitigation, conversation)
  - Allow visualization of the outcomes of different decisions
- Support use of knowledge from multiple sources, including traditional and local knowledge
- Provide accurate, reliable data, somewhat pre-digested, but also allowing investigation of problems we didn't anticipate
  - One pre-digestion might be state of progress towards international targets such as SDGs
- Make visible information about links between people and nature (even if not self-identified as a need)
- Be multi-scalar

# Data Apps Overview

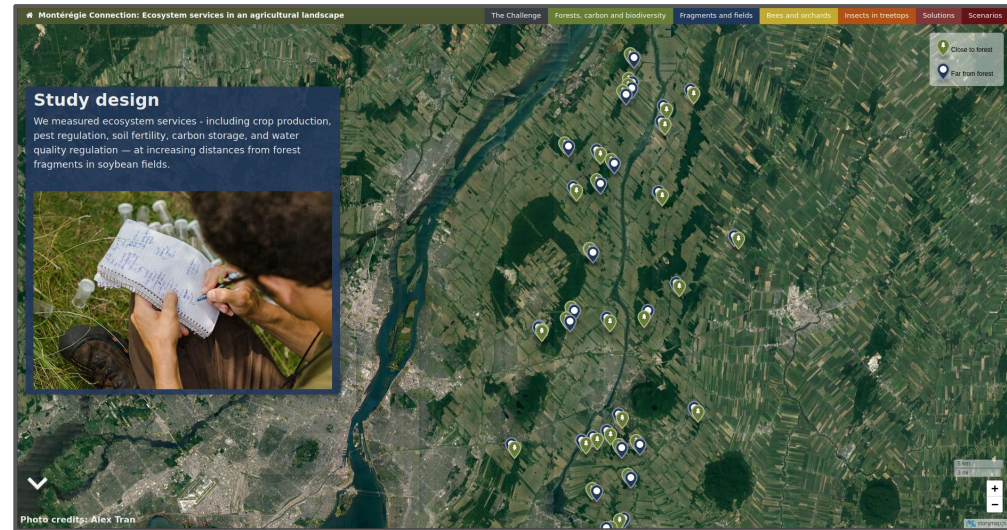
	<u>Story Map</u>	<u>Dashboard</u>	<u>Data Portal</u>
Description	Medium for communicating research activities	Tool for summarizing research results	Platform for documenting and disseminating datasets
Driver	Narrative	Need	Curation
Audience	General public	Decision makers	Researchers
Objective	Engaging	Reporting	Collaborating

# Storymap

- Multimedia presentation ('scrollytelling')
- Engage broad audience
- Showcase ResNet work
- Tells the story we decide to tell, not the story the user wants to discover
- Interactions:
  - Expose greater detail
  - Provide context
  - Link to technical resources

Montréal Prototype!

<https://apps.nsercresnet.ca/story/monteregie/>



Developed by Dr. Guillaume Larocque, QCBS

# Thoughts, Insights, Questions

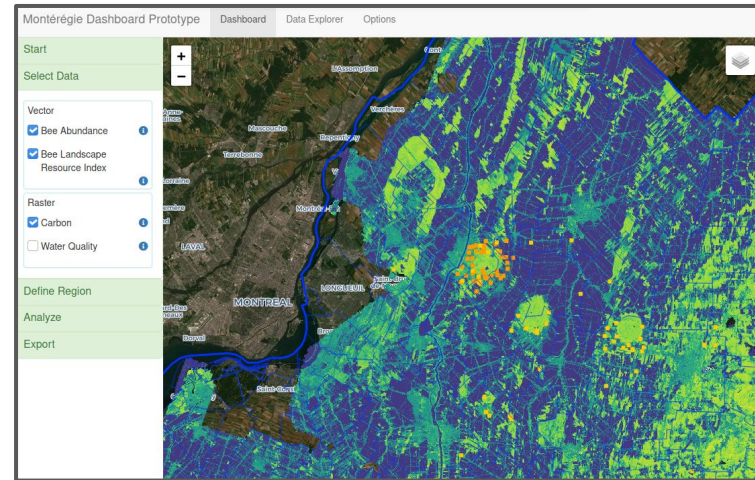
Would this be useful in your landscape? Why or why not?

What research would you need to do to put together a storymap? Are there plans to do this type of work?



# Dashboard

- Addresses specific user need:
  - Authoritative reporting
    - Synthesize multiple datasets
    - Summarize state of affairs
  - Model exploration
    - Visualize outcomes of scenarios / decisions
  - ...
- Interactions:
  - Define area of interest
  - Filter underlying data
  - Adjust model parameters



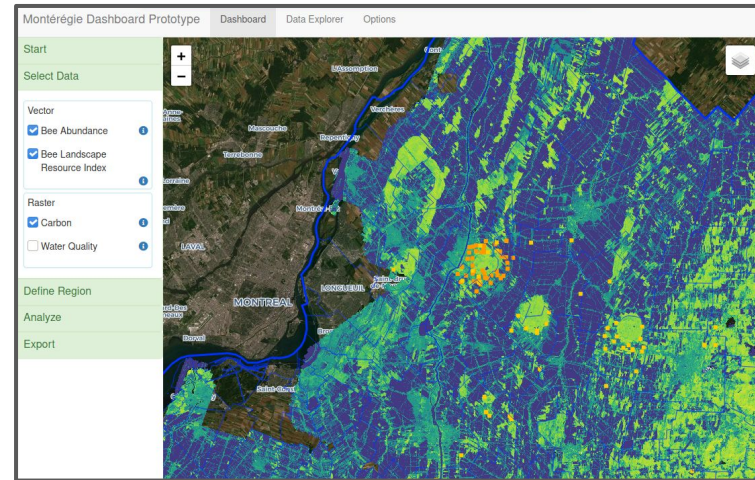
# Dashboard

## Key needs:

- Accessibility
- Clear interface
- Support diverse use cases
- Integrate many data types
- Query data directly
- Easy access to metadata
- Download results

## Development approach:

- Initial prototype and proof of concept
  - Not driven by research question
- Modular framework
- Extensible interface
- Expose complexity through interaction



# Dashboard: Status

## Implemented:

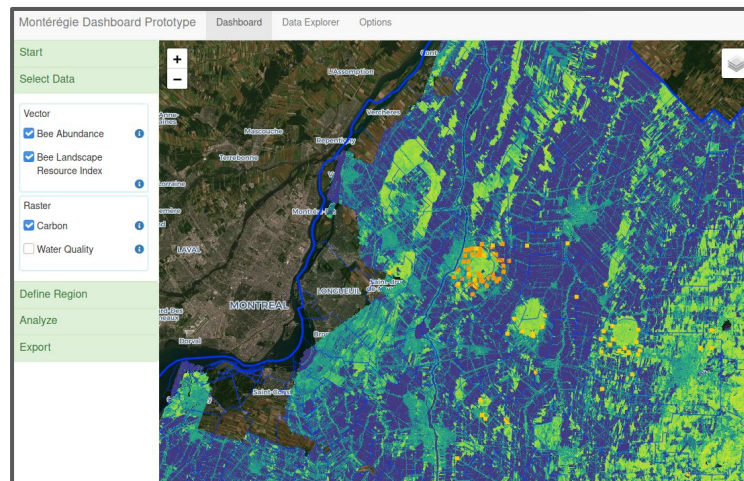
- Info panels for layer descriptions
- Pull data from ResNet Data Portal
- Query attributes
- Browse attribute tables
- Filter data by drawing polygon

## In Progress:

- Dynamic plots/figures
- Export reports and data

## Planned:

- Tutorial, help prompts
- More methods for filtering data
- Analysis widgets
- Dynamic styling



# Thoughts, Insights, Questions

- Additional features?
  - Core functionality missing
  - Tools specific to your work
- Are you interested in using a template to create your own custom dashboard?

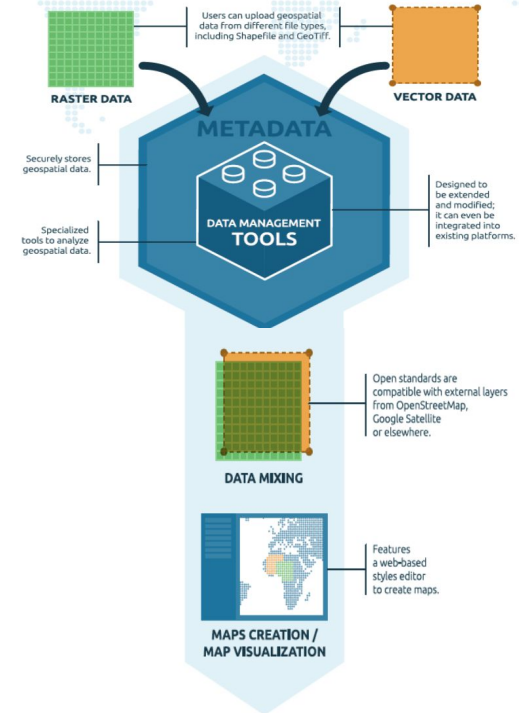
# Data Portal

Platform for sharing and publishing internal data

- Open source
- Self-service submission/management
- Metadata catalogue and standards
- View, style, combine layers
- Query attributes
- Share interactive maps
- Download datasets for further analysis



## MANAGEMENT AND PUBLICATION OF GEOSPATIAL DATA



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# Data Portal: Status

- GeoNode 3.2 released early May
  - Cool new features!
  - Fixed existing issues!
  - Introduced new issues!
- Development ongoing
  - Read-only mode
- Once stable
  - Announcement email
  - User registration instructions

The screenshot shows the ResNet Data Portal homepage. At the top, there is a navigation bar with the ResNet logo, menu items for Data, Maps, Apps, and About, a search bar, and a user profile for John Clark. The main heading reads "Welcome to the ResNet Data Portal" with a subtext explaining the site uses GeoNode. A "View User Guide" button is present. Below this is a "Search for Data." section with a search input field and a link to "Advanced Search". The main content area features four statistics: "14 Layers" (with a diamond icon and a link to "Add layers"), "2 Maps" (with a location pin icon and a link to "Create maps"), "No Documents" (with a document icon), and "3 Users" (with a person icon). A footer contains a privacy and cookies policy link.

# Data Portal

## Guided Tour:

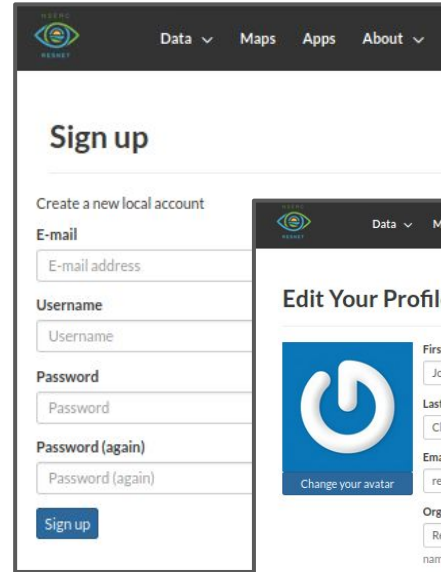
- User registration
- Adding layers
- Manage metadata
- Browse layers
- View/Manage layers
- Create maps
- Additional features

The screenshot displays the Data Portal interface. At the top, there is a navigation bar with 'Data', 'Maps', 'Apps', and 'About' menus, a search bar, and a user profile for 'John Clark'. The main content area is titled '12 Layers found' and features a 'Selection' panel on the left with options for 'TEXT', 'KEYWORDS', and 'TYPE'. Below this are various filter categories like 'Raster Layer', 'Vector Layer', and 'Vector Temporal Serie'. The right side shows a list of layers, each with a thumbnail map and a description. The first layer is 'Montérégie Ecosystem Services 1971-2006', which includes a detailed text description about the Canadian Census of Agriculture and the methodology used to create the data. Other visible layers include 'Southern Quebec Maple Production 2005-2018 (Economic Regions)' and 'Southern Quebec Economic Regions'. Each layer entry includes a thumbnail map, a title, a description, and a 'Create a Map' button.

# Data Portal: Tour

## User Registration & Management

- Linked to email
- Organize users by group
- Social features
- Shared login with other platforms



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Data ▾ Maps ▾ Apps ▾ About ▾

## Sign up

Create a new local account

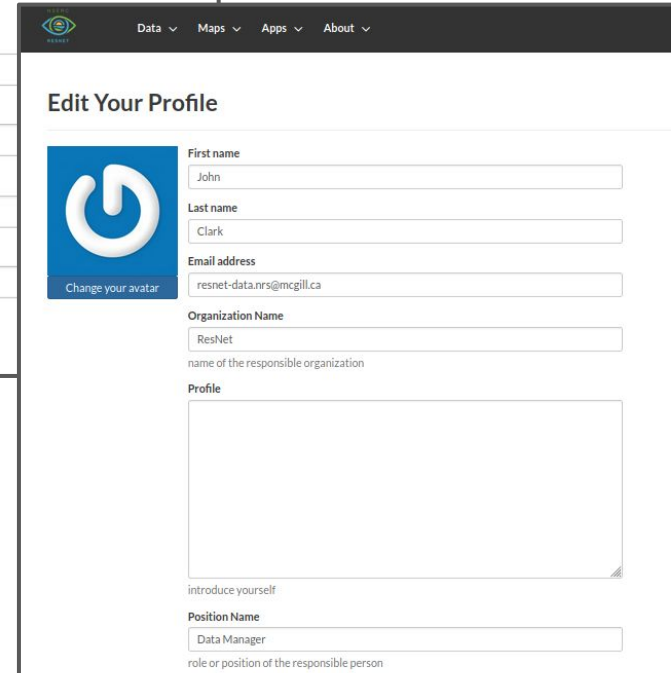
**E-mail**

**Username**

**Password**

**Password (again)**


[Sign up](#)



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## Edit Your Profile



[Change your avatar](#)

**First name**

**Last name**

**Email address**

**Organization Name**

name of the responsible organization

**Profile**

introduce yourself

**Position Name**

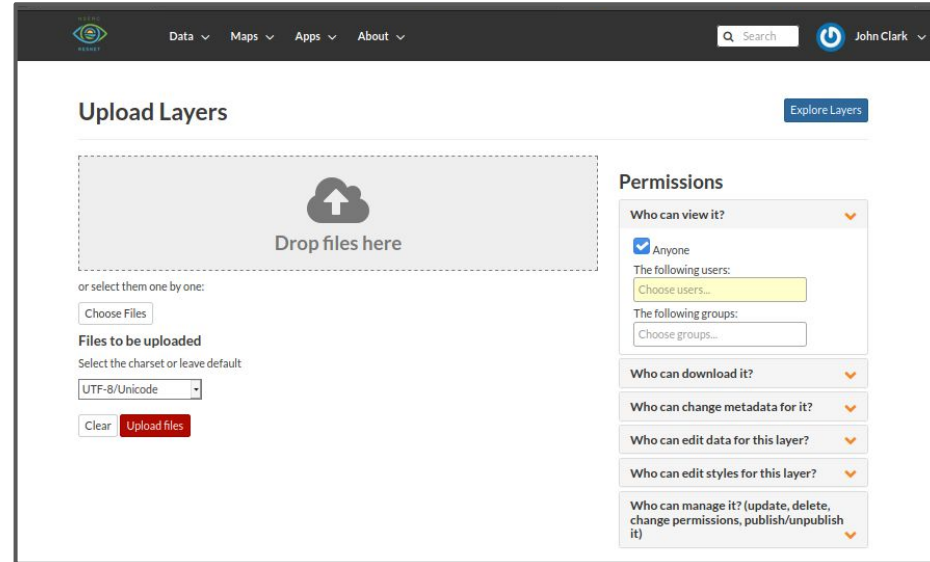
role or position of the responsible person



# Data Portal: Tour

## Adding Layers

- Browse local machine and select
- Formats include
  - Vector: shapefile, geopackage, geojson
  - Raster: geotiff
- Size limitation
  - Issues uploading files > 200 mb
  - Coordinate with data team
- Set permissions



# Data Portal: Tour

## Manage Metadata

- Methods
  - Wizard
  - Advanced Edit
  - Upload Existing
- Customize to our needs
  - ISO standards
  - Keywords, regions, etc
- Integrated Validation

The screenshot displays the 'Metadata for Quebec Subwatersheds' page. At the top, there is a navigation bar with 'Data', 'Maps', 'Apps', and 'About' menus, a search bar, and a user profile for 'John Clark'. A 'Completeness' indicator shows '72%' and a 'Check Schema mandatory fields' button. Below the navigation, a progress bar indicates 'Mandatory' (green) and 'Optional' (blue) sections. The main content area is divided into four numbered steps: 1. Basic Metadata (Thumbnail), 2. Location and Licenses, 3. Optional Metadata, and 4. Dataset Attributes. The 'Basic Metadata' section includes a thumbnail map of Quebec with an 'Edit' button. The 'Optional Metadata' section contains fields for 'Date type' (set to 'Publication'), 'Date' (2021-04-29 01:1), 'Category' (Boundaries), 'Group' (Synthesis), and 'Free-text Keywords' (Quebec, Watershed). The 'Dataset Attributes' section contains a text area with a rich text editor and a word count of 138 words.

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# Data Portal: Tour

## Browse Layers

- Organization/Indexing
  - Keywords
  - Categories
  - Groups (eg landscape, theme)
  - Regions
  - Extent
- Visibility controls
  - Permissions set by owner
  - Group membership

The screenshot displays the NSERC RESNET Data Portal interface. At the top, there is a navigation bar with 'Data', 'Maps', 'Apps', and 'About' menus. Below this is a 'Create a Map' button. The main content area is divided into a left sidebar with filters and a right panel with map layers and a list of results.

**Filters:**

- TEXT: Search [Q]
- KEYWORDS: [ ]
- TYPE:
  - Raster Layer (2)
  - Vector Layer (12)
  - Vector Temporal Series (4)
- CATEGORIES:
  - Biota (2)
  - Boundaries (5)
  - Environment (3)
  - Farming (2)
- RESPONSIBLE: [ ]
- GROUPS:
  - Administrators (3)
  - Synthesis (7)
- GROUP CATEGORIES: [ ]
- DATE: [ ]
- REGIONS: [ ]
- EXTENT: [ ]

**Map Layers:**

- Montérégie F Carbon
- Montérégie V

**Results:**

- Montérégie F Carbon: We investigated the carbon stocks and bio... aboveground carbon s... ha, ~100 ha), and two... satellite data, field-ba... with both woody plan... determine the relat... these forest fragme... predictor of abovegro... management and con... synergies and tradeof... observed. Unmanaged... managed, but demons... functional dispersion... results of biodiversity... relationship was signi... isolated, suggesting in... relationship between... region. Managed stan... demonstrating that an... biodiversity and carbo... that considering mana... increase accuracy in e... Additionally, the signi... regional diversity and... these fragments can p...  
admin 7 May 2
- Montérégie V: No abstract provided  
John Clark 4 M

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# Data Portal: Tour

## View/Manage Layers

- Create styles
- Attribute definitions
- Download data
- Access services (eg WMS)
- Edit permissions

The screenshot displays the Data Portal interface for the layer 'Montréal Ecosystem Services 1971-2006'. The top navigation bar includes 'Data', 'Maps', 'Apps', and 'About' menus, a search bar, and a user profile for 'John Clark'. The main content area features a map of Montréal with various green-shaded polygons representing ecosystem services. A metadata panel on the right side of the map provides the following information:

- Request Download**
- Metadata Detail**
- Editing Tools**
- View Layer**
- Download Metadata**
- Legend**  
Mont\_r\_pk\_E5\_1971\_2006
  - <417494
  - 417494 - 633205.9
  - 633206 - 970033.9
  - 970034 - 1473384.9
  - 1473385 - 2313263.9
  - 2313264 - 6077175
- Maps using this layer**  
This layer is not currently used in any maps.
- Create a map using this layer**  
Click the button below to generate a new map based on this layer.  
**Create a Map**
- Add the layer to an existing map**  
Test Map

Below the map, there is a metadata section with the following details:

- Title**: Montréal Ecosystem Services 1971-2006
- License**: Not Specified
- Abstract**: The Canadian Census of Agriculture provided data for crop and farm animal production at the scale of municipalities, which are referred to as Census Consolidated Subdivisions (CCSs) in the census. Based on the historical CCSs digital boundary files (available from 1981 to 2006, every five years), we could see that over the eight census periods covered by our study, the administrative boundaries of the CCSs have changed. Because no digital boundary maps were available for 1971 and 1976, we created our own files by editing the 1981 digital map to match paper maps for 1971 and 1976. In order to standardize the historical census data to the same spatial unit, we used the CCS digital boundary files for 2006 as a reference to which all other CCS boundary maps were adjusted. The CCSs maps from 1971 to 2001 were individually overlaid with the 2006 reference map, and the overlapping boundaries were clipped to create polygons

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# Data Portal: Tour

## Create Maps

- Combine layers
- Adjust styles
- Save and share

The screenshot displays the NSERC RESNET Data Portal interface. At the top, there is a navigation bar with 'Data', 'Maps', 'Apps', and 'About' menus, a search bar, and a user profile for 'John Clark'. The main area is divided into three sections:

- Left Panel (Layers):** A 'Filter layers' dropdown is at the top. Below it, a list of layers is shown: 'Default', 'Montérégie Bee Abu...', and 'Montérégie Municip...'. Each layer has a small thumbnail and a percentage indicator (e.g., 100%, 48%).
- Center Panel (Map):** A satellite-style map of the Montérégie region in Quebec, Canada. The map is overlaid with a blue grid representing municipal boundaries and several yellow circular markers representing bee abundance data points.
- Right Panel (Catalog):** A 'Catalog' sidebar with a search bar. It lists several data items with thumbnails and brief descriptions:
  - Southern Quebec Maple Production 2005-2018 (Economic Regions):** Maple syrup production (lbu/ha) for southern Quebec economic regions (régions ad...  
559623b-e1ef-11e8-8a5-0242ac150004  
Missing OGC reference metadata
  - Montérégie Municipalities:** No abstract provided  
86282ef4-a222-11e8-931f-0242ac150004
  - Montérégie Bee Abundance:** 2012 bee abundance, species richness, and functional diversity at sample site ne...  
b457af50-9703-11e8-b877-0242ac150004
  - Montérégie Bee Landscape Resource Index:** Bee landscape resource index calculated at a buffer of 830 m and 581 m at vario...  
07c8af24-9b19-11e8-b842-0242ac150004

At the bottom of the catalog, there is a pagination control showing 'Results 1-4 of 16' and a scale indicator 'Scale: 1:577792'.

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# Data Portal: Tour

## Additional Features

- Remote Services
  - Access data from external map servers
- Documents
  - Upload supporting information
- Apps Catalogue

The screenshot shows the ResNet Data Portal homepage. At the top, there is a navigation bar with the ResNet logo, menu items for Data, Maps, Apps, and About, a search bar, and a user profile for John Clark. The main header area is blue and contains the text 'Welcome to the ResNet Data Portal' and a sub-header 'This site uses GeoNode, an open source platform for sharing geospatial data and maps.' Below this is a 'View User Guide »' button. The next section is a dark grey bar with the text 'Search for Data.' and a search input field with a magnifying glass icon and the text 'Search'. Below the search field is a link for 'Advanced Search'. The main content area is light grey and features four statistics: '14 Layers' with a diamond icon, '2 Maps' with a location pin icon, 'No Documents' with a document icon, and '3 Users' with a person icon. Each statistic includes a brief description and a button to explore further (e.g., 'Add layers »', 'Create maps »'). At the bottom, there are two small footnotes: 'As for the layers and maps GeoNode allows to publish tabular and' and 'GeoNode allows registered users to easily upload g'. A 'Privacy & Cookies Policy' link is also visible in the bottom right corner.

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Data ▾ Maps ▾ Apps ▾ About ▾

Search John Clark ▾

## Welcome to the ResNet Data Portal

This site uses GeoNode, an open source platform for sharing geospatial data and maps.

[View User Guide »](#)

### Search for Data.

Search

[Advanced Search](#)

**14 Layers**

Click to search for geospatial data published by other users, organizations and public sources. Download data in standard formats.

[Add layers »](#)

**2 Maps**

Data is available for browsing, aggregating and styling to generate maps which can be saved, downloaded, shared publicly or restricted to specify users only.

[Create maps »](#)

**No Documents**

**3 Users**

As for the layers and maps GeoNode allows to publish tabular and  
GeoNode allows registered users to easily upload g [Privacy & Cookies Policy](#)

# Thoughts, Insights, Questions

- Are there aspects of the Data Portal you're excited to use? Concerned?

[bit.ly/agm21-feedback-portal](https://bit.ly/agm21-feedback-portal)

# Upcoming:

- User Survey
  - Research Environment
  - Current Practices
  - Support Priorities
- Workshops
  - ResNet Data Orientation
    - First session Fall 2021
  - Data Portal Onboarding
  - Data Management
- Data Policy and Documentation
  - Data Management Plan
    - Roles and responsibilities
    - FAIR, CARE principles
  - In depth guidelines and best practices
    - File formats
    - Metadata
    - Projections
    - Data types



## Data Essentials:

What do you need to track this summer?

- External Data
- Internal Research
- Field Work

*Remember, more in depth guidelines will be available soon!*

# Data Essentials: External Data

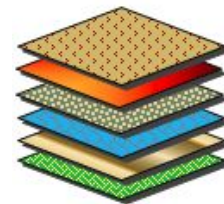
## Document your inputs!

### Always document:

- Source (URL, platform, point of contact)
- Attribute definitions (description, units)
- Processing steps
  - Initial projection
  - Transformations

### When possible:

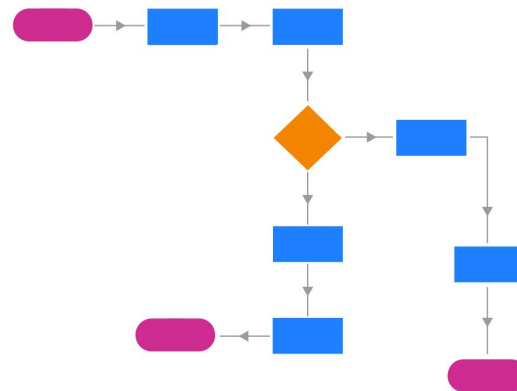
- Preserve an unmodified copy
- Retrieve existing metadata
- Licensing and usage agreements
- Share your findings with the network!



# Data Essentials: Internal Research

## Document your workflow!

- Coding
  - Use versioning
  - Comment as you go
- Create a “readme.txt”
  - Describe directory structure
  - Document outputs
    - Attribute description
    - Projection



**Maintain backups!**

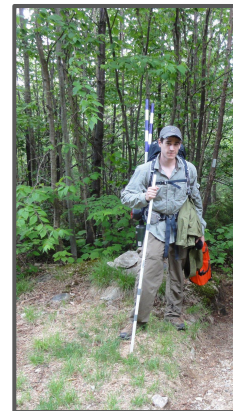
# Data Essentials: Field Work

Establish a data plan before heading out

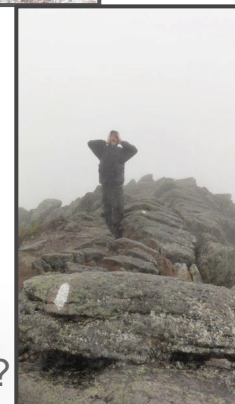
Organize, digitize, and clean your data early and often

Take pictures!

- Amplify your research impact
- Great resource for ResNet



Day 001



Day 1??

# Data Essentials: Resources

“Good enough practices in scientific computing” - Wilson et al 2017 <http://bit.ly/agm21-scicomp>

“Data Organization in Spreadsheets for Ecologists” - Data Carpentry <http://bit.ly/agm21-sheets>

“Metadata Questionnaire” - USGS <http://bit.ly/agm21-metaqs>

Shared dataset discovery doc: <http://bit.ly/ResNetDataDoc>

ResNet Slack channel: ‘data’

Contact John Clark: [resnet-data.nrs@mcgill.ca](mailto:resnet-data.nrs@mcgill.ca)

Additional thoughts, comments, or feedback?

[bit.ly/agm21-feedback-general](http://bit.ly/agm21-feedback-general)