

# Introduction to Science Collaboration Portals






By:

Bakinam Tarik Essawy and Jonathan L. Goodall

July 17<sup>th</sup>, 2019

# Overview

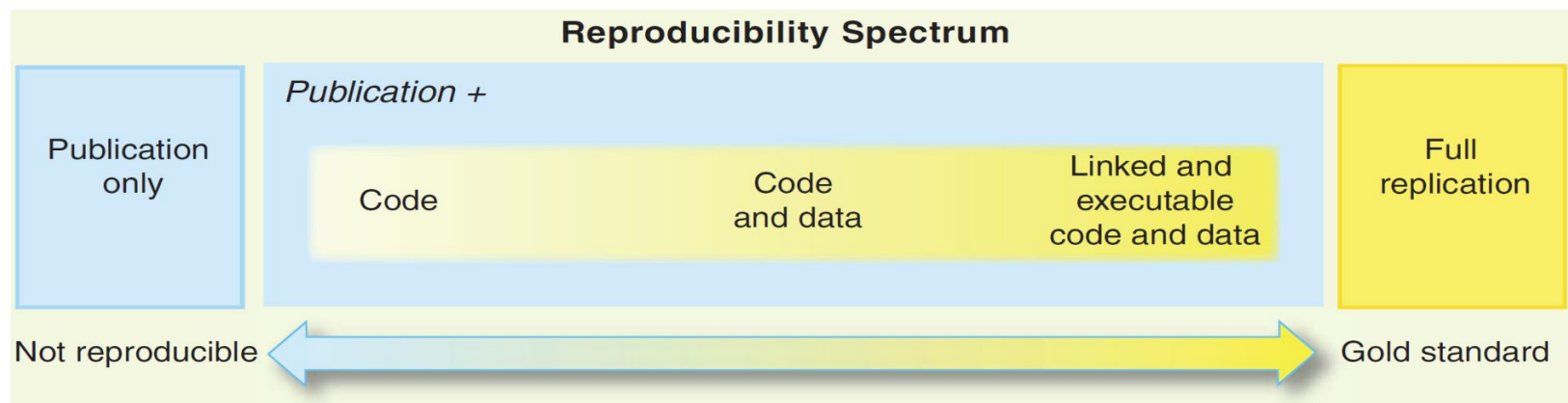
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- Introduction
    - Modeling Data Life Cycle
    - Legacy Software
  - The reproducibility taxonomy for complex computational studies
  -  **HYDROSHARE** Background
    -  **HYDROSHARE** Resource Types
    -  **HYDROSHARE** Resource Example
  - Summary
-

# Introduction

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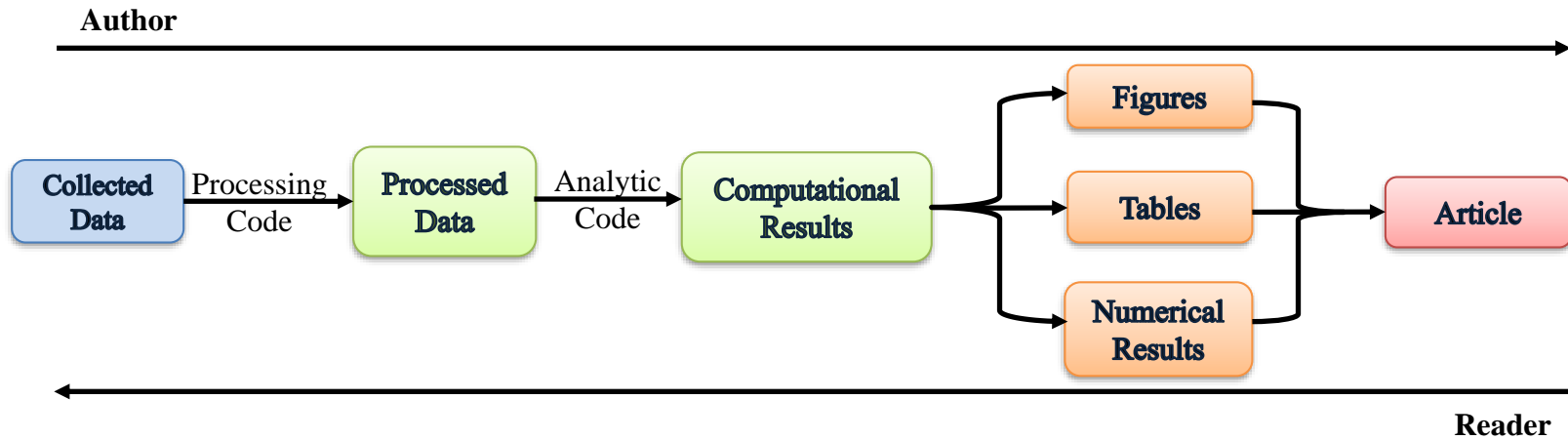
- Hydrologic modeling is complex and requires a diversity of data from many different data providers.
- Modelers often spend weeks or months building, calibrating and validating their models.
- As a result, most of these models lie under the "not reproducible models category" as defined by Peng (2011)



[Peng, R.D., 2011. Reproducible Research in Computational. Science 334, 1226–1227. doi:10.1126/science.1213847](https://doi.org/10.1126/science.1213847)

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# Modeling Data Life Cycle



Peng, R., and S. Eckel, "Distributed Reproducible Research Using Cached Computations," *Computing in Science & Engineering*, pp. 28-34, January/February 2009.

Outcome: it is difficult if not impossible, to reproduce model results.



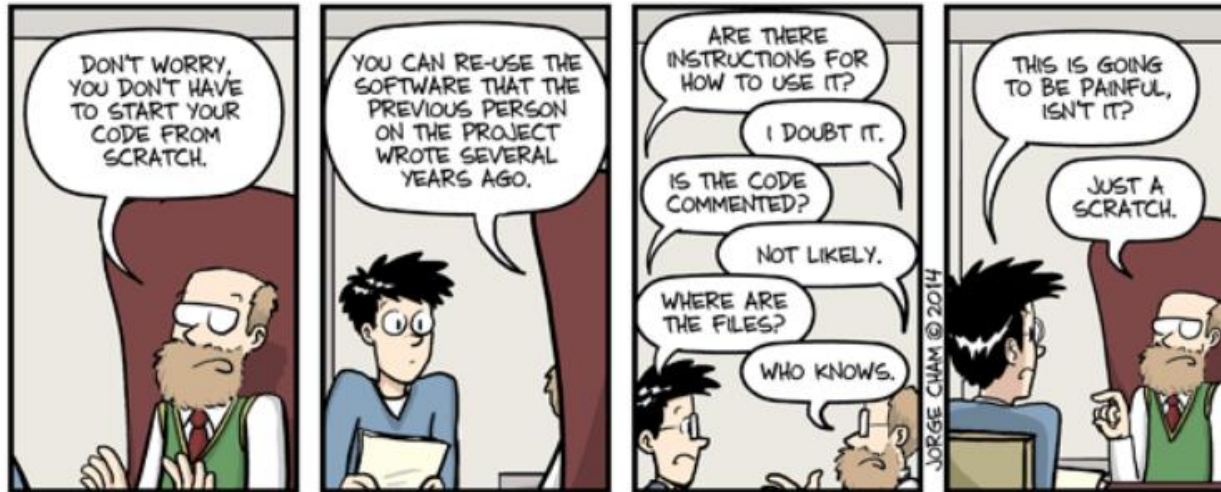
icanhascheezburger.com

# Legacy Software

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- Software that has been developed in the past using older technologies, but is still used today.
- Advantages: Legacy code is still used because it is accurate, working correctly, and meets the user needs.
- Disadvantage: Legacy software often depends on out of date software dependencies that may have limited support.
- "Software dependencies" are software like compilers, libraries, and even operating systems that must be installed for the model to work properly.

# Why Reproducibility



<https://about.gitlab.com/2017/08/25/gitlab-and-reproducibility/>

WWW.PHDCOMICS.COM

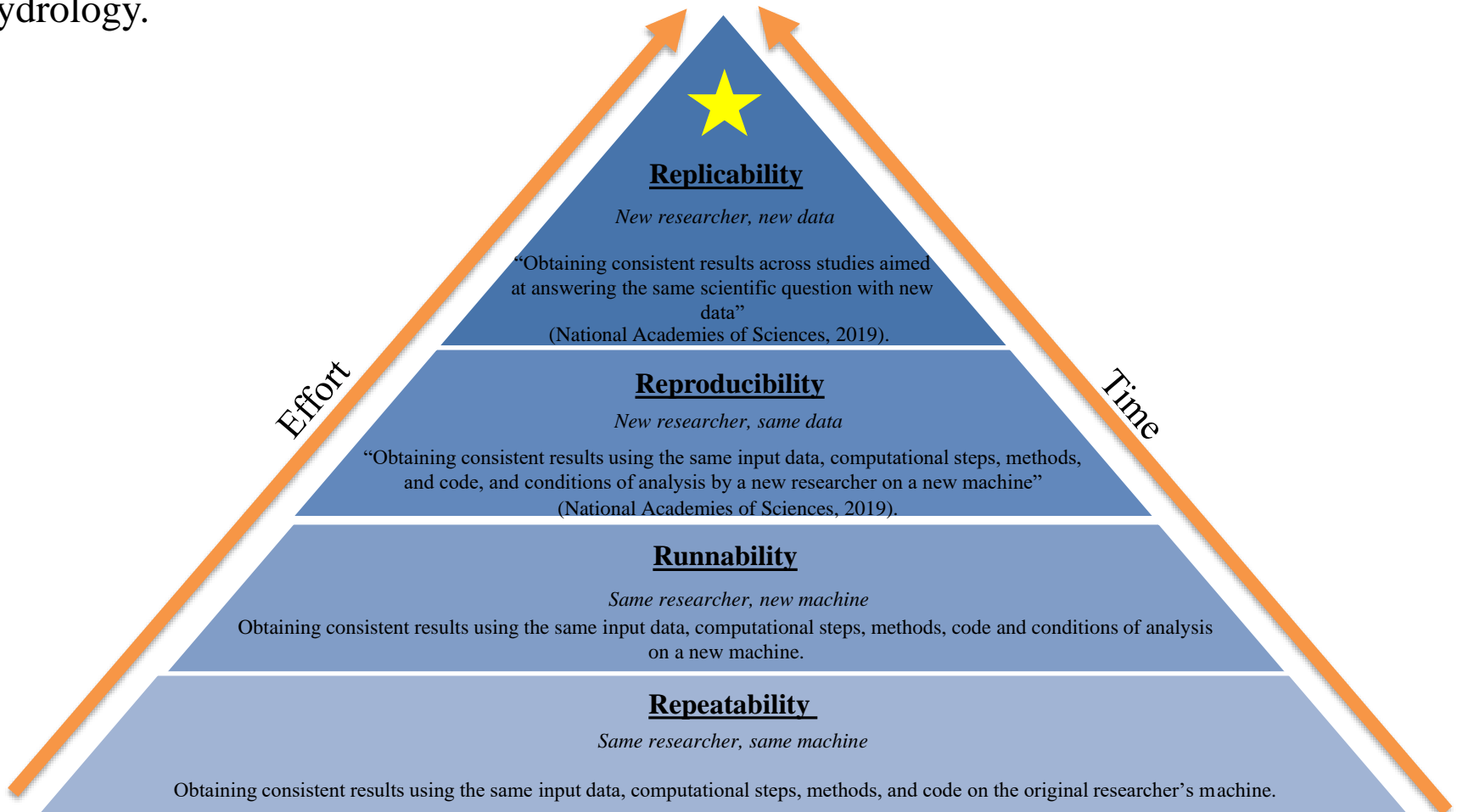


<https://xrds.acm.org/blog/2016/01/is-your-research-reproducible/>

# The reproducibility taxonomy for complex computational studies

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- Several scientists have made efforts to define reproducibility, but there are currently no standard definitions. In this study we put forth some general criteria for establishing reproducible research.
- We also outline the process of achieving reproducibility in a computational workflow in hydrology.




# **HYDROSHARE** Background

- HydroShare is a **web-based** system designed to enable hydrologic scientists to **easily share, collaborate, and publish** all types of scientific **data and models** (Tarboton et al., 2014a, 2014b).
- **Digital content** is stored in HydroShare as resources, with every **resource** belonging to a resource type (Horsburgh et al., 2015)
- HydroShare supports the **Dublin Core metadata standard** and more specific resource types expand on this metadata.



HydroShare is sponsored by NSF and is maintained by CUAHSI

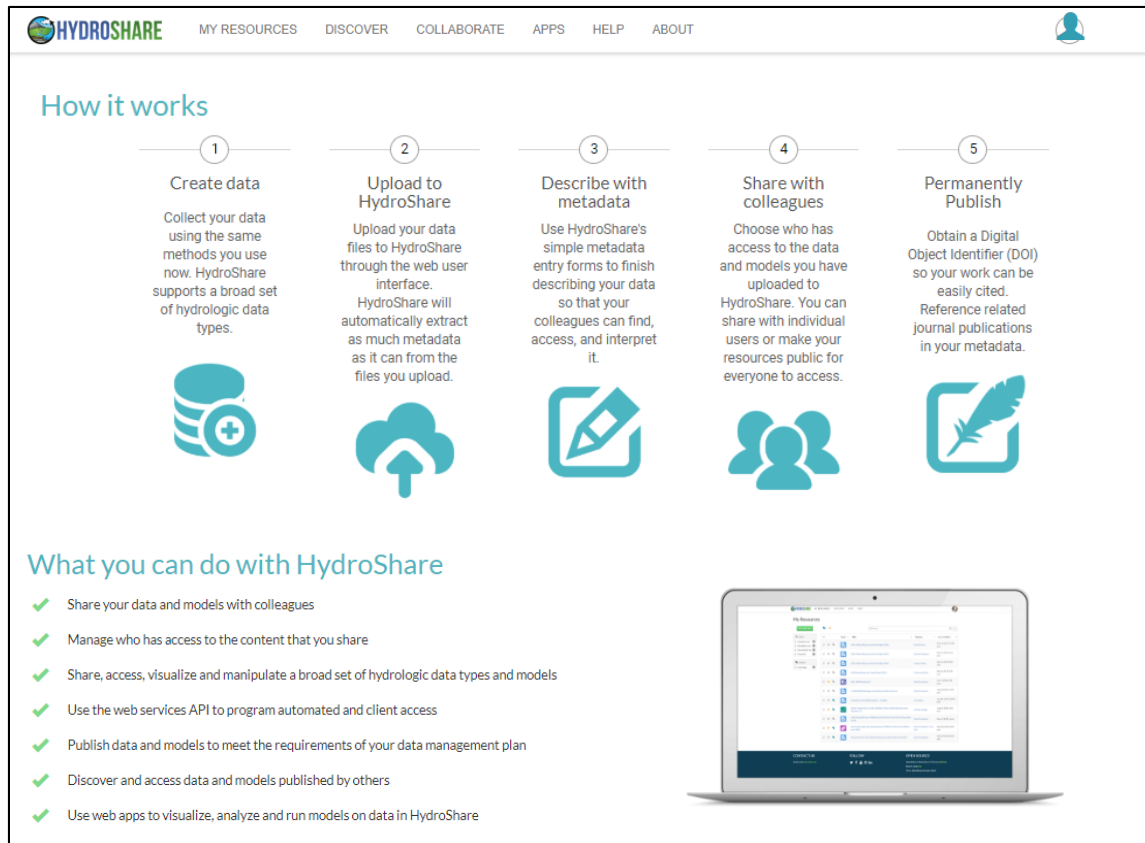


The screenshot shows the HydroShare website interface. At the top is the HydroShare logo and navigation links: MY RESOURCES, DISCOVER, COLLABORATE, APPS, HELP, ABOUT. Below the header is a banner with the text "Share your data and models with colleagues" and "Upload, share, and access a broad set of hydrologic data types and models. Manage who has access to the content that you share." The main content area is titled "How it works" and features a four-step process: 1. Create data (Collect your data using the same methods you use now. HydroShare supports a broad set of hydrologic data types.), 2. Upload to HydroShare (Upload your data files to HydroShare through the web user interface. HydroShare will automatically extract as much metadata as it can from the files you upload.), 3. Describe with metadata (Use HydroShare's simple metadata entry forms to finish describing your data so that your colleagues can find, access, and interpret it.), and 4. Share with colleagues (You choose who has access to the data and models you have uploaded to HydroShare. You can share with individual users or publish your resources for everyone to access.). Below this is a section titled "What you can do with HydroShare" with a list of features: Share your data and models with colleagues, Manage who has access to the content that you share, Share, access, visualize and manipulate a broad set of hydrologic data types and models, Use the web services API to program automated and client access, Publish data and models to meet the requirements of your data management plan, Discover and access data and models published by others, and Use web apps to visualize, analyze and run models on data in HydroShare. A laptop icon is shown on the right side of this section.

<https://www.hydroshare.org>








- HydroShare is a platform that allows sharing and collaborating of digital instance of datasets or model.



The screenshot displays the HydroShare website interface. At the top is a navigation bar with the HydroShare logo and links for MY RESOURCES, DISCOVER, COLLABORATE, APPS, HELP, and ABOUT. A user profile icon is in the top right corner.

The main content area is titled "How it works" and features a five-step process:

- 1 Create data**  
Collect your data using the same methods you use now. HydroShare supports a broad set of hydrologic data types.  

- 2 Upload to HydroShare**  
Upload your data files to HydroShare through the web user interface. HydroShare will automatically extract as much metadata as it can from the files you upload.  

- 3 Describe with metadata**  
Use HydroShare's simple metadata entry forms to finish describing your data so that your colleagues can find, access, and interpret it.  

- 4 Share with colleagues**  
Choose who has access to the data and models you have uploaded to HydroShare. You can share with individual users or make your resources public for everyone to access.  

- 5 Permanently Publish**  
Obtain a Digital Object Identifier (DOI) so your work can be easily cited. Reference related journal publications in your metadata.  


Below this is the section "What you can do with HydroShare" with a list of capabilities, each preceded by a green checkmark:

- Share your data and models with colleagues
- Manage who has access to the content that you share
- Share, access, visualize and manipulate a broad set of hydrologic data types and models
- Use the web services API to program automated and client access
- Publish data and models to meet the requirements of your data management plan
- Discover and access data and models published by others
- Use web apps to visualize, analyze and run models on data in HydroShare

To the right of this list is an image of a laptop displaying the HydroShare web interface, showing a list of shared datasets and models.

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➤ **HydroShare provides:**

- Open data
- Transparency
- Research Reproducibility
- Collaboration
- Enhanced trust in research

➤ **Supports Make Data FAIR:**

- Findable
- Accessible
- Interoperable
- Reusable



<https://eos.org/agu-news/enabling-fair-data-across-the-earth-and-space-sciences>

- HydroShare includes tools like Web Apps that can act on content HydroShare.
- Jupyter Notebooks apps
- HydroShare GIS Apps

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Tarboton, D., R. Idaszak, J. S. Horsburgh, D. Ames, J. Goodall, A. L. Couch, R. Hooper, S. Wang, M. Clark, P. Dash, H. Yi, C. Bandaragoda, A. M. Castronova, T. Gan, Z. (. Li, M. Morsy, M. Ramirez, J. Sadler, D. Yin, Y. Liu (2018). HydroShare: A Platform for Collaborative Data and Model Sharing in Hydrology, HydroShare, <http://www.hydroshare.org/resource/e76494ebad394bdfb06343f54682978c>

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# HYDROSHARE Resource Types

[HOME](#)[MY RESOURCES](#)[DISCOVER](#)[COLLABORATE](#)[APPS](#)[HELP](#)[Create](#)

## Getting Started

[Learn to use HydroShare](#)[Complete profile](#)[Introduction to HydroShare](#)[Example resources](#)[Browse](#)[Recent](#)

RESOURCE



COLLECTION



WEB APP CONNECTOR



MODEL PROGRAM



MODEL INSTANCE



SWAT MODEL INSTANCE



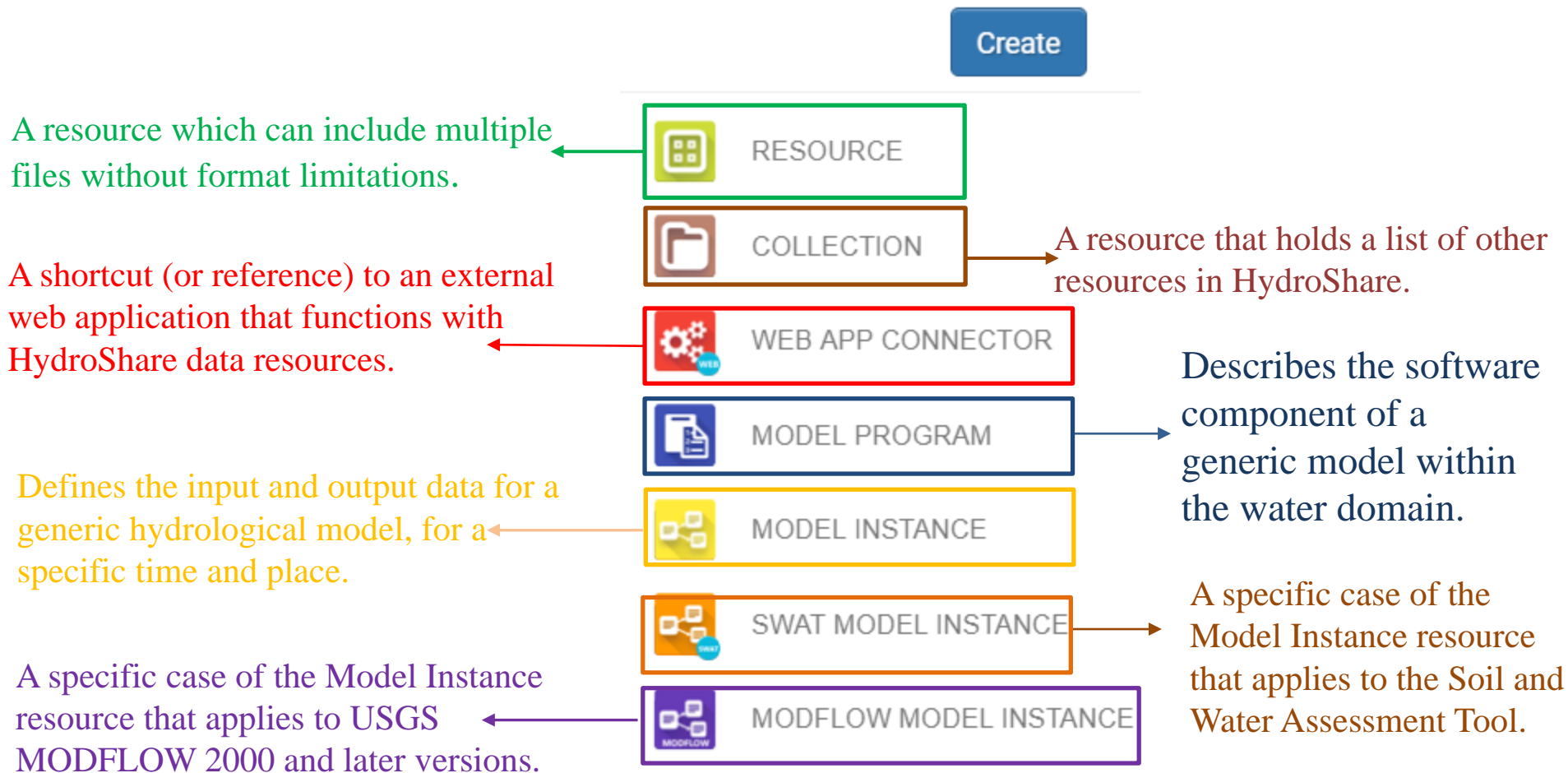
MODFLOW MODEL INSTANCE

## Recently Visited

Accessed	Title	First Author	Resource Type	Visibility
41 minutes ago	<a href="#">test</a>	<a href="#">Essawy, Bakinam Tarik</a>	Composite	Private
1 month ago	<a href="#">MyAnalysis</a>	<a href="#">Bakinam Essawy</a>	Generic	Public
1 month ago	<a href="#">CUAHSI JupyterHub</a>	<a href="#">Anthony Castronova</a>	Web App	Public

## Featured Apps

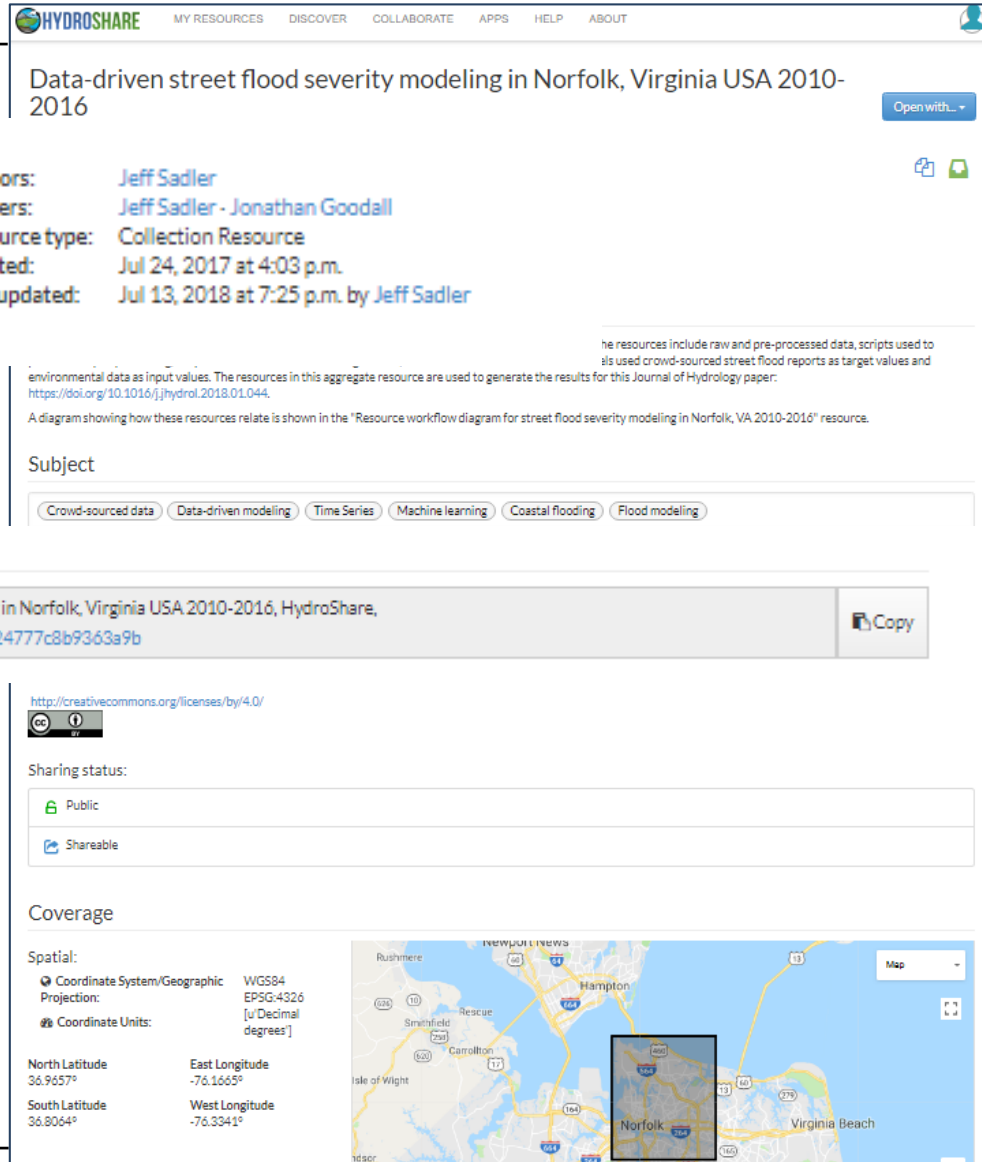
## ➤ What Type of resource should I create ?



<https://help.hydroshare.org/hydroshare-resource-types/>

# **HYDROSHARE** Resource

1. Create a new resource by choosing the Resource Type and adding a Title.
2. Upload digital content (data, scripts, etc., ....) to newly created resource.
3. Edit resource metadata.
  - a. Abstract
  - b. Subject
  - c. Coverage
  - d. Authorship
  - e. Related Resources
  - f. Web Apps
  - g. File Metadata
4. Sharing Status (to make resource public abstract and keywords needs to be added to the resource).



The screenshot shows the HydroShare interface for a resource titled "Data-driven street flood severity modeling in Norfolk, Virginia USA 2010-2016". The page includes a header with navigation links (MY RESOURCES, DISCOVER, COLLABORATE, APPS, HELP, ABOUT) and a user profile icon. The resource details section lists the authors (Jeff Sadler), owners (Jeff Sadler - Jonathan Goodall), resource type (Collection Resource), creation date (Jul 24, 2017 at 4:03 p.m.), and last updated date (Jul 13, 2018 at 7:25 p.m. by Jeff Sadler). A description states that the resources include raw and pre-processed data, scripts used to generate results for a Journal of Hydrology paper, and a diagram showing the resource workflow. The subject section features a list of keywords: Crowd-sourced data, Data-driven modeling, Time Series, Machine learning, Coastal flooding, and Flood modeling. The "How to cite" section provides the citation: Sadler, J. (2018). Data-driven street flood severity modeling in Norfolk, Virginia USA 2010-2016, HydroShare, <http://www.hydroshare.org/resource/9db60cf6c8394a0fa24777c8b9363a9b>. The sharing status is set to Public and Shareable. The coverage section displays spatial information: Coordinate System/Geographic Projection (WGS84 EPSG:4326 [U' Decimal degrees']), Coordinate Units, North Latitude (36.9657°), East Longitude (-76.1665°), South Latitude (36.8064°), and West Longitude (-76.3341°). A map of the Norfolk, Virginia area is shown, highlighting the study area.

# Summary

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- HydroShare is a **web-based** system designed to enable hydrologic scientists to **easily share, collaborate, and publish** all types of scientific **data and models** (Tarboton et al., 2014a, 2014b).
- HydroShare creates a Digital Object Identifier (DOI) for the published resources.
- Published HydroShare resources can be cited in journal publications.
- HydroShare can be used to enhance reproducibility through workflow execution through Jupyter Notebooks.

# Hands on with Science Portals



<https://www.hydroshare.org/>

Click on

Sign up now



MY RESOURCES

DISCOVER

COLLABORATE

APPS

HELP

ABOUT

 SIGN IN

Join the community to start sharing

HydroShare is an online collaboration environment for sharing data, models, and code.

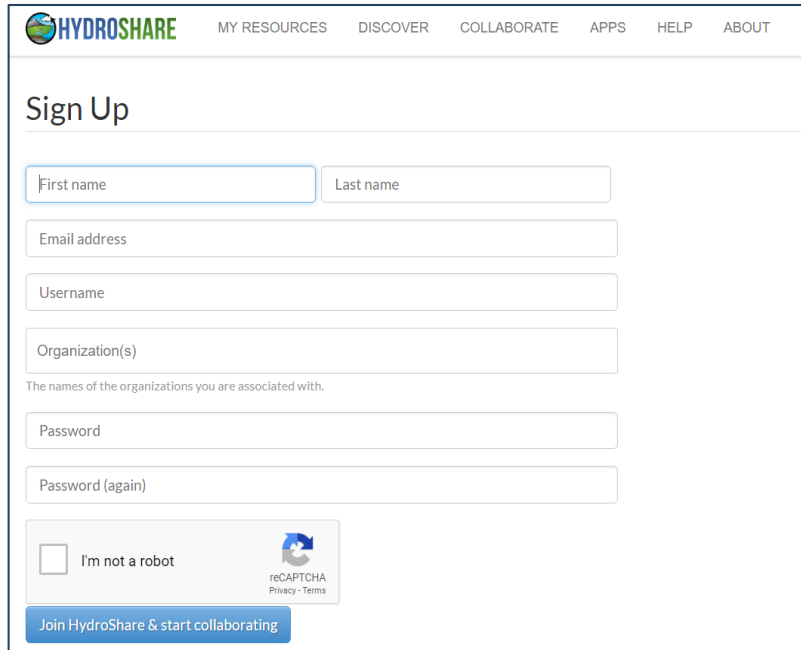
Sign up now





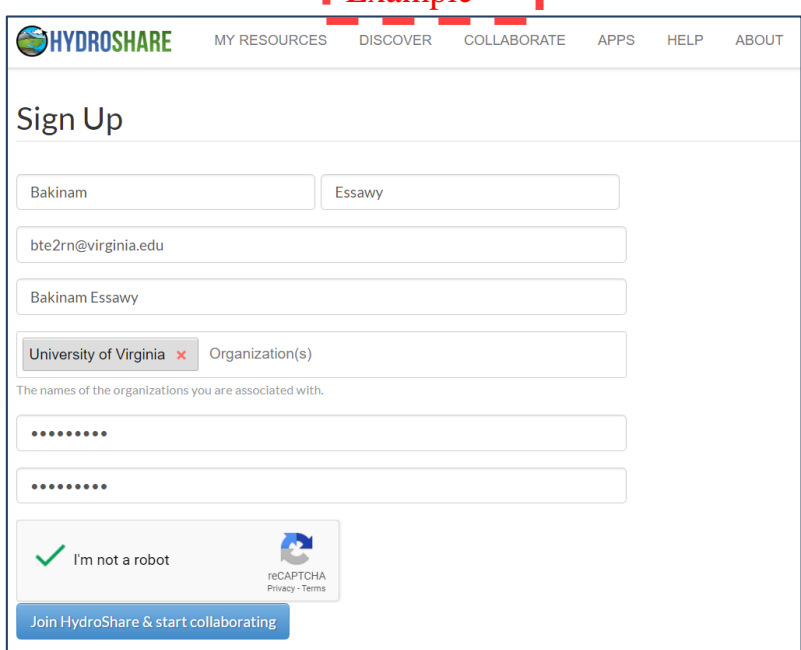
## Fill your information

Example



HydroShare Sign Up form with empty fields: First name, Last name, Email address, Username, Organization(s), Password, Password (again), and a reCAPTCHA checkbox.

→





HydroShare Sign Up form with example data: First name (Bakinam), Last name (Essawy), Email address (bte2rn@virginia.edu), Username (Bakinam Essawy), Organization(s) (University of Virginia), Password (masked), Password (again) (masked), and a checked reCAPTCHA checkbox.

username is not valid - make sure username only contains letters, numbers, dashes, dot, underscore, or @


4. You receive an email shortly to activate your machine    Activate your account in HydroShare

After you activate your account, you need to add more metadata (information) before proceeding to your account.

MY RESOURCESDISCOVERCOLLABORATEAPPSHELPABOUT

Successfully signed up

Information entered here may be publicly visible. Do not enter information that you want to keep private.



[Change password](#)  
[Deactivate account](#)  
[Create your iRODS user account](#)

**First name \***

Bakinam

**Middle name**

Tarik

**Last name \***

Essawy

**Organization \***

University of Virginia

Organization(s)

**Title**

Research Associate

e.g. Assistant Professor, Program Director, Adjunct Professor, Software Developer.

The names of the organizations you are associated with.

**Subject areas**

Hydrology, Hydroinformatics, Ground water,

A comma-separated list of subject areas you are interested in researching, e.g. "Computer Science, Hydrology, Water Management"

☒

**Opt out of receiving system announcement emails such as announcements of planned downtime for system upgrades.**

Cancel

Save changes

[HOME](#)[MY RESOURCES](#)[DISCOVER](#)[COLLABORATE](#)[APPS](#)[HELP](#)[Create](#)

Your profile has been successfully updated. ×



bakinam essawy

University of Virginia

[OVERVIEW](#)[CONTRIBUTIONS](#)

## Recent Activity

This user has no recent activity.

## About bakinam

Username: **CyberCarpentry2019**

User since: **Jul 17, 2019**

You have not created an associated iRODS account in HydroShare user zone ([users.hydroshare.org](https://users.hydroshare.org)).

You can now track your data storage in your profile page. Your quota for HydroShare resources is 20.0 GB. You currently have resources that consume 0.0 GB, 0.0% of your quota. At present, this message is informational. Quota enforcement will begin in a future release. To request additional quota, contact [help@cuahsi.org](mailto:help@cuahsi.org).

CONGRATS!!!! You created your HydroShare account. Lets start exploring it!



## My Resources *Interact with your HydroShare Content.*

+ Create new



Search

Filter

- ☒ Owned by me 0
- ☐ Shared with me 0
- ☒ Added by me 0
- ☒ Favorites 0
- ☐ Recently Updated 0

Labels

No labels found.

<input type="checkbox"/>	Type	Title	First Author	Date Created	Last modified
No data available in table					

Not finding what you are looking for?  
Public resources not owned are searchable from [Discover](#)

Legend

Discover other researcher work.



MY RESOURCES

DISCOVER

COLLABORATE

APPS

HELP

ABOUT



Discover *Public resources shared with the community.*



Search All Public and Discoverable Resources

Show All

Filter by author

- ☐ Myers, Jessie 258
- ☐ Saadoon, Mayss 222
- ☐ Bandaragoda, Christina 151
- ☐ Tarboton, David 104
- ☐ topkapi app 47
- ☐ Greenberg, Joanne 35
- ☐ Schaaake, John 34

Filter by contributor

- ☐ Cox, Chris 90
- ☐ Eiriksson, Dave 87

Temporal Coverage

From Date:

To Date:



Sort Order

Sort By:

Title




Sort Direction:

Ascending

List

Map

« First | Previous | 1 2 3 4 5 | Next | Last » <Page 1 of 110> «results 1 to 20 of 2185»

Type	Title	First Author	Date Created	Last Modified
  	<a href="#">1 Hydrologic Terrain Analysis of Logan Watershed Using Jupyter Notebook TauDEM</a>	Scott, Maya	May 17, 2017 at 2:11 p.m.	May 09, 2018 at 1:50 p.m.

**Discover** other researcher work.



MY RESOURCES

DISCOVER

COLLABORATE

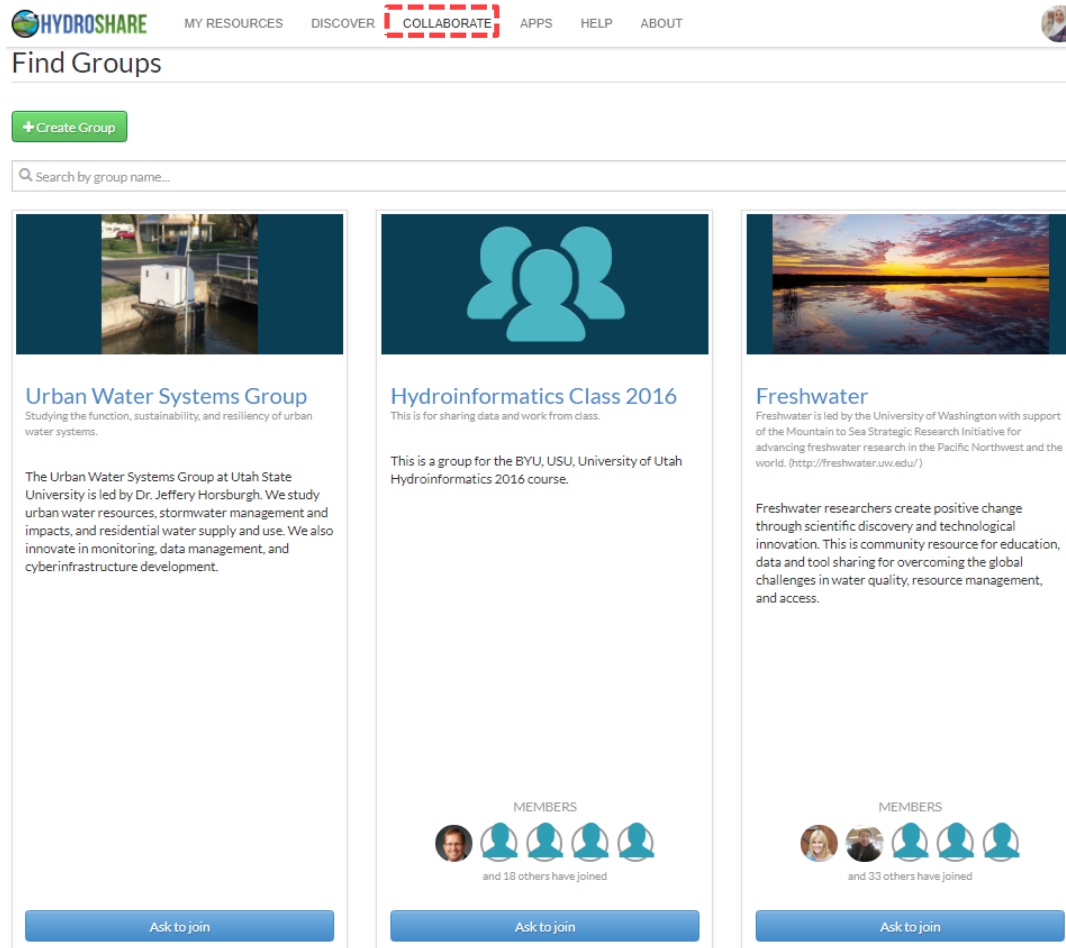
APPS

HELP

ABOUT

- Discover allows you to filter resources by:
  - Resource Title,
  - Temporal coverage,
  - Author
  - Contributor,
  - Owner (Resource creator, could be different than the author of the digital content),
  - Resource Type,
  - Subject, and
  - Availability (public, discoverable, published)



**Collaborate:** Find groups, create your own group, or even ask to join a group.



The screenshot shows the HydroShare 'Find Groups' interface. At the top, the HydroShare logo is on the left, and navigation links 'MY RESOURCES', 'DISCOVER', 'COLLABORATE' (highlighted with a red dashed box), 'APPS', 'HELP', and 'ABOUT' are in the center. A user profile picture is on the right. Below the navigation bar, the heading 'Find Groups' is displayed. A green '+ Create Group' button is on the left. A search bar with the placeholder 'Search by group name...' is below the button. Three group cards are shown in a grid:


- Urban Water Systems Group**: Studying the function, sustainability, and resiliency of urban water systems. The description mentions Dr. Jeffery Horsburgh and research on urban water resources, stormwater management, and residential water supply. A blue 'Ask to join' button is at the bottom.
- Hydroinformatics Class 2016**: This is for sharing data and work from class. The description states it is for the BYU, USU, University of Utah Hydroinformatics 2016 course. It shows 5 member avatars and a blue 'Ask to join' button.
- Freshwater**: Freshwater is led by the University of Washington with support of the Mountain to Sea Strategic Research Initiative for advancing freshwater research in the Pacific Northwest and the world. The description mentions creating positive change through scientific discovery and technological innovation. It shows 5 member avatars and a blue 'Ask to join' button.

## Apps


 MY RESOURCES DISCOVER COLLABORATE **APPS** HELP ABOUT 

## HydroShare Apps Library


HydroShare apps allow you to visualize, analyze, and work with resources (data and models) in HydroShare. Apps are hosted on separate web servers from the HydroShare website ([www.hydroshare.org](http://www.hydroshare.org)) and access HydroShare resources using web services via the REST applications programmers interface (API). Anyone can write an app and then create a "Web App" resource that holds the configuration information for launching the App from HydroShare. This page lists CUAHSI approved web apps that are supported as part of HydroShare.




HydroShare GIS



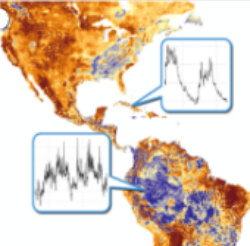
SWATShare




JupyterHub



National Water Model F...



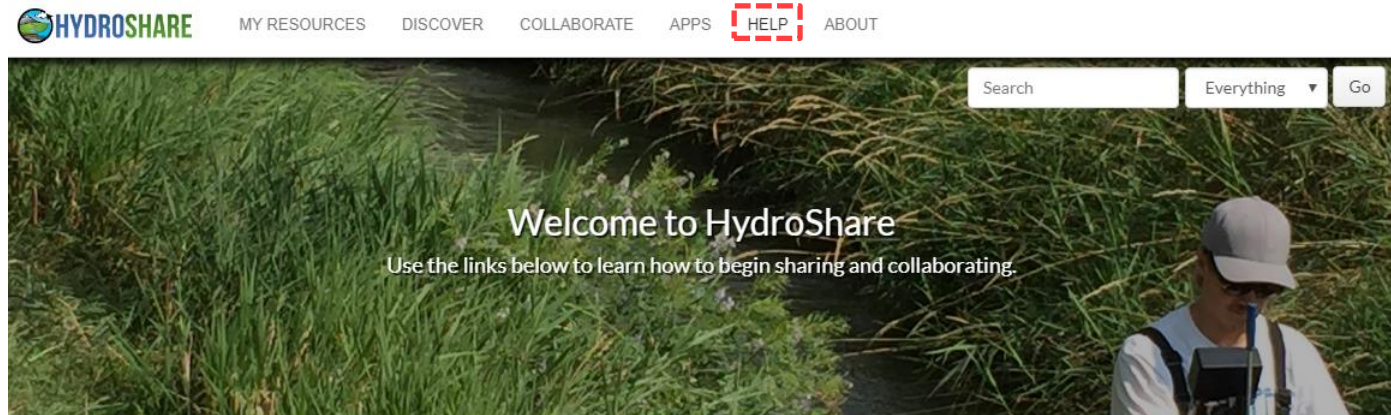
Data Rods Explorer App



OPeNDAP



## Help Page



## HydroShare Support

Get quick answers to the most common questions about how to get started with and use HydroShare.



### Introduction to HydroShare

Learn more about what you can do with HydroShare



### HydroShare Resource Types

Learn more about data and model resources in HydroShare

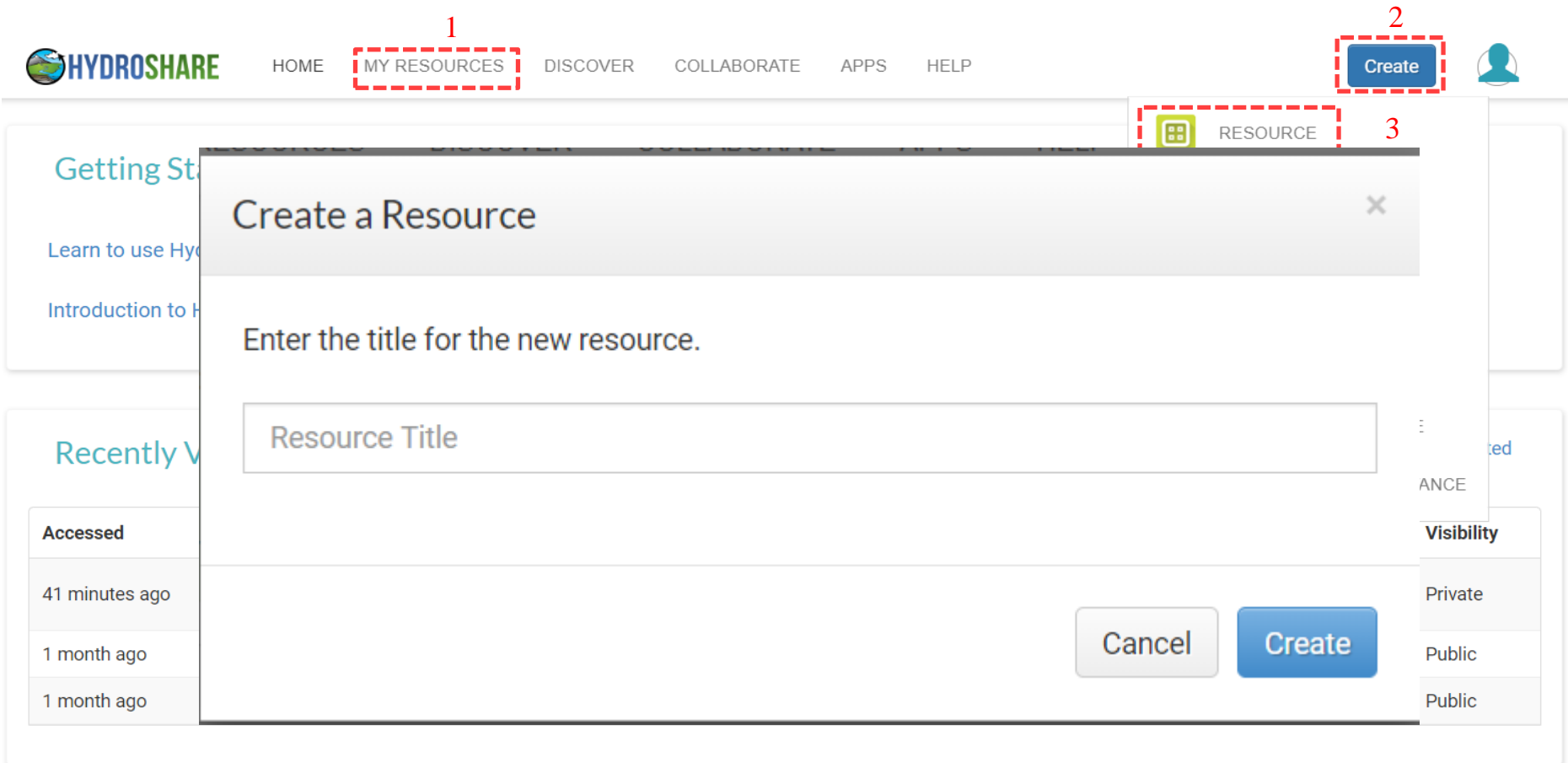


### Uploading and Publishing Data

Create new datasets and models and describe with metadata

## 12. **My Resources** : Start creating your own resource

- Select a resource Type
- Name your resource



The screenshot shows the HydroShare interface with a 'Create a Resource' modal dialog open. Red dashed boxes and numbers highlight key elements:

- 1**: Points to the 'MY RESOURCES' tab in the top navigation bar.
- 2**: Points to the 'Create' button in the top right corner.
- 3**: Points to the 'RESOURCE' tab in the modal dialog.

The 'Create a Resource' modal contains the following elements:

- Title Input**: A text field with the placeholder 'Resource Title' and the instruction 'Enter the title for the new resource.'
- Buttons**: 'Cancel' and 'Create' buttons at the bottom right of the modal.
- Visibility Dropdown**: A dropdown menu on the right side of the modal, currently showing 'Private' and 'Public' options.

The background interface includes the HydroShare logo, navigation tabs (HOME, MY RESOURCES, DISCOVER, COLLABORATE, APPS, HELP), and a sidebar with sections like 'Getting Started', 'Recently Viewed', and 'Featured Apps'.

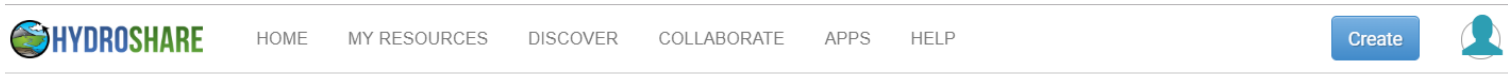
## Featured Apps

7/17/2019

# Hands on with Science Portals HYDROSHARE

Drag your data to HydroShare, or even clicking on to upload data from your local computer.

- Some metadata will be generated automatically every time you create a resource.





This is the landing page for the resource you just created. Add files in the content area below and enter metadata where needed. The following metadata is required for your resource to be published or made public:

- Abstract
- Keywords

You must also add content files to your resource before it can be published, public or discoverable.

CyberCarpentry\_01

**Authors:**  [bakinam essawy](#) 

**Owners:** [bakinam essawy](#)

**Resource type:** Composite Resource

**Storage:** The size of this resource is 0 bytes

**Created:** Jul 17, 2019 at 2:13 p.m.


**Last updated:** Jul 17, 2019 at 2:13 p.m. [bakinam essawy](#)

**Citation:** [See how to cite this resource](#)

**Sharing Status:** Private

**Views:** 0

**Downloads:** 0

**+1 Votes:** Be the first one to  this.

**Comments:** [No comments \(yet\)](#)



Manage who has access.

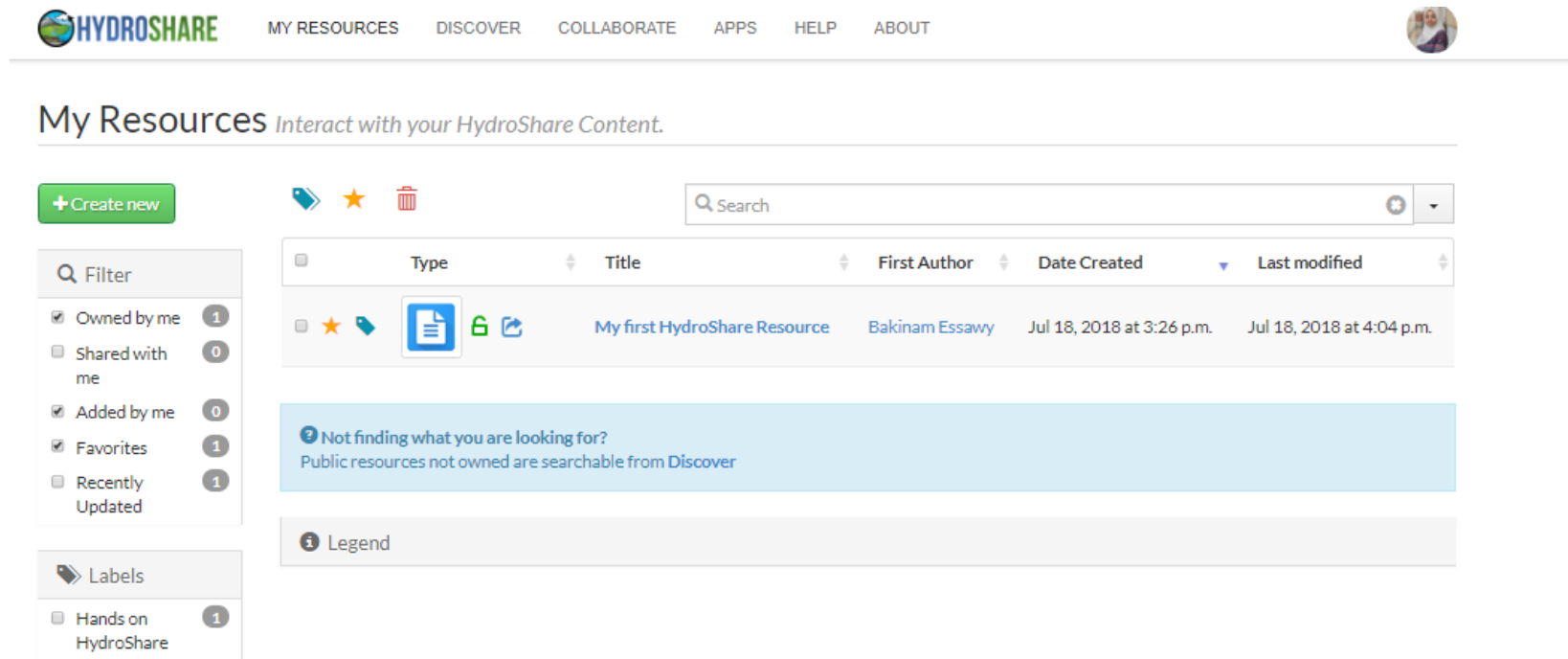
Use this button to share your resource with specific HydroShare users.

You can give others users the ability to view or edit this resource.

You can also add additional owners who will have full permissions.

## Abstract

- MY RESOURCES page will look like:



**HYDROSHARE** MY RESOURCES DISCOVER COLLABORATE APPS HELP ABOUT

## My Resources *Interact with your HydroShare Content.*





[+ Create new](#)

Filter

- ☒ Owned by me (1)
- ☐ Shared with me (0)
- ☒ Added by me (0)
- ☒ Favorites (1)
- ☐ Recently Updated (1)

Labels

- ☐ Hands on HydroShare (1)

Type	Title	First Author	Date Created	Last modified
  	 My first HydroShare Resource	Bakinam Essawy	Jul 18, 2018 at 3:26 p.m.	Jul 18, 2018 at 4:04 p.m.

Not finding what you are looking for?  
Public resources not owned are searchable from Discover

Legend

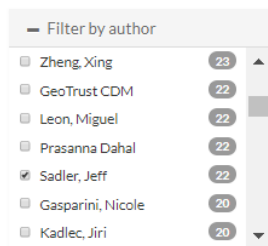
- You can create a label and add your resource to that label.
- You can favorite this resource.

- Now let's try to discover Project I resources:

- Click on  MY RESOURCES **DISCOVER** COLLABORATE APPS HELP ABOUT

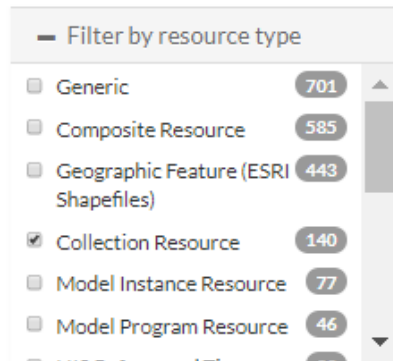
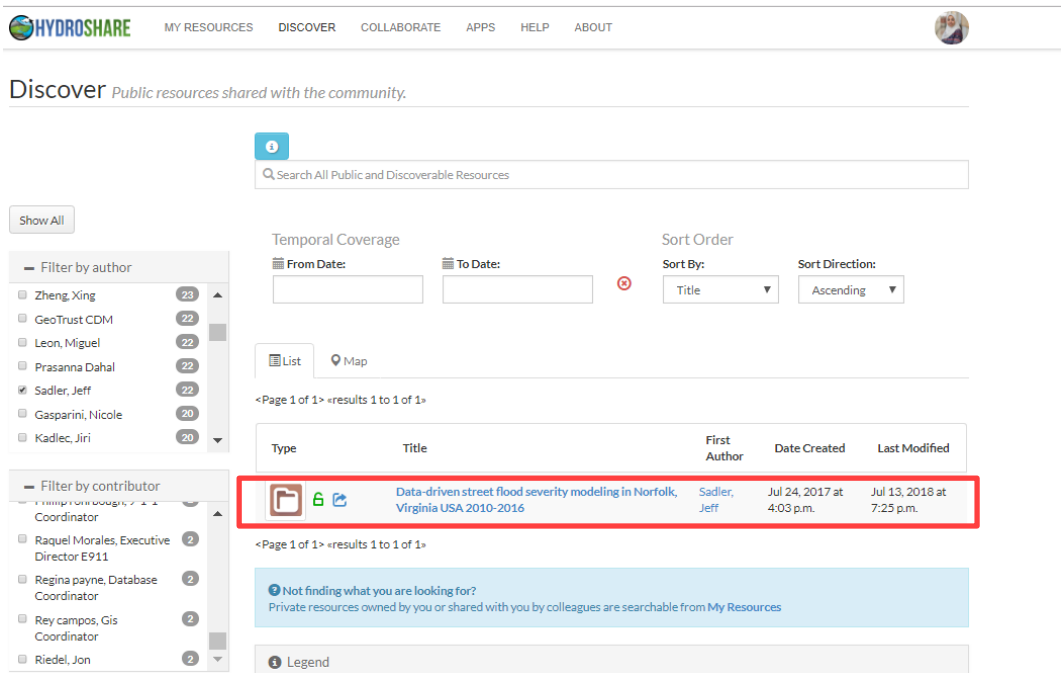
- Search by:

- Filter by author → Sadler, Jeff



Click on the required resource

- Filter by resource type  
→ Collection Resource



Discover *Public resources shared with the community.*

Search All Public and Discoverable Resources

Temporal Coverage: From Date: To Date: Sort Order: Sort By: Title Sort Direction: Ascending

List Map

<Page 1 of 1> «results 1 to 1 of 1»

Type	Title	First Author	Date Created	Last Modified
 	Data-driven street flood severity modeling in Norfolk, Virginia USA 2010-2016	Sadler, Jeff	Jul 24, 2017 at 4:03 p.m.	Jul 13, 2018 at 7:25 p.m.

<Page 1 of 1> «results 1 to 1 of 1»

Not finding what you are looking for?  
Private resources owned by you or shared with you by colleagues are searchable from My Resources

Legend

## ➤ Summary

- Now you know how to create a HydroShare resource,
- Edit your resource ,
- Allowing your resource to be public by adding abstract and keywords,
- Add metadata to your resource, contributors, etc., ...
- Creating label and adding your created resources to that label,
- Discover other resources by filtering,

Thank you