



Open Learning Resources for Water Data Analysis

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UTAH
WATER RESEARCH
LABORATORY

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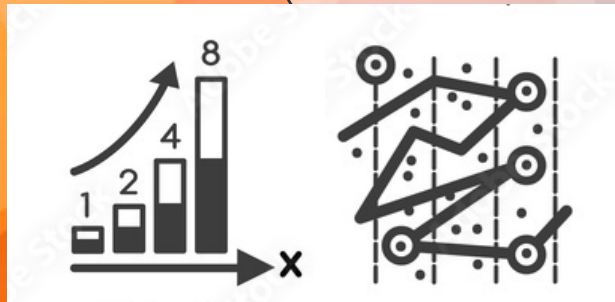


Climate
crisis impacts

Skills
and tools
to address
modern
water data
challenges

Increasing
data volume

Talented
engineers
and
scientists





Online Learning Modules



LEARNING
OBJECTIVES



NARRATIVE
CONTENT AND
SLIDES



REPRODUCIBLE
CODE NOTEBOOKS



AUTHENTIC
ASSIGNMENT



DOMAIN DATASET
WITH ASSOCIATED
ANALYSES

Accessing and analyzing public agency water data

1. Import libraries

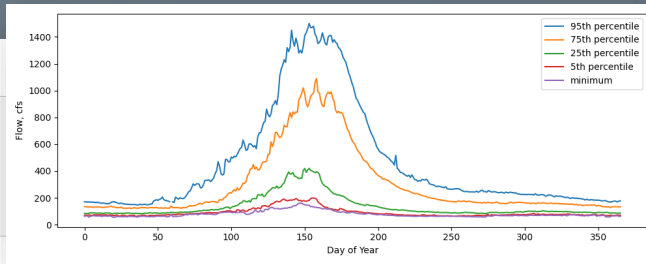
```
In [1]: # May need to install dataretrieval
# import pip
# pip install -U dataretrieval

from dataretrieval import nwis
from matplotlib import pyplot as plt
import pandas as pd
```

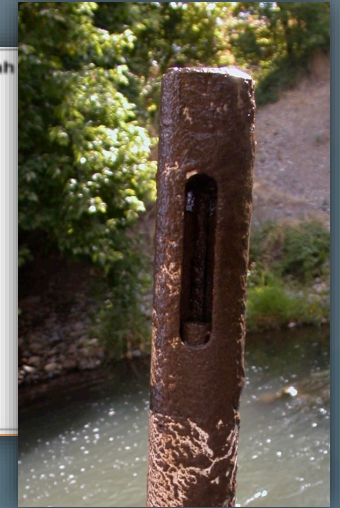
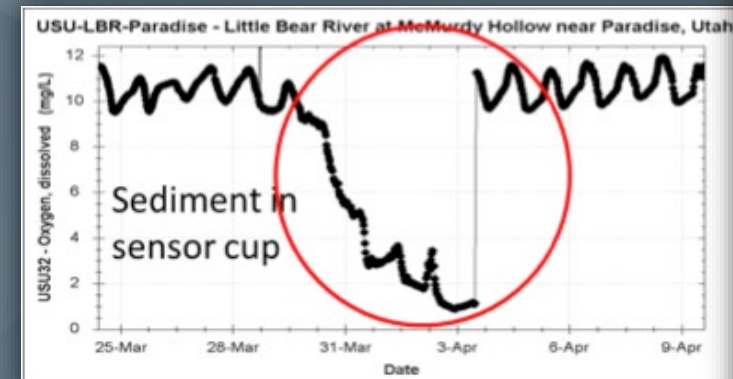
2. Define inputs

Define the site, variable/sensors, and date range for data to be retrieved.

```
In [2]: site = '10109000' # Logan River at State Dam
pcode = '00060' # this is the USGS parameter code for daily flow
startdate = '1971-01-01'
enddate = '2021-07-15'
```



Sensor data quality control



Databases and queries

OrchardID	OwnerName	Area_acres
1	John Appleseed	5.5
2	Daryl Appleseed	15

Orchards

Apple Trees

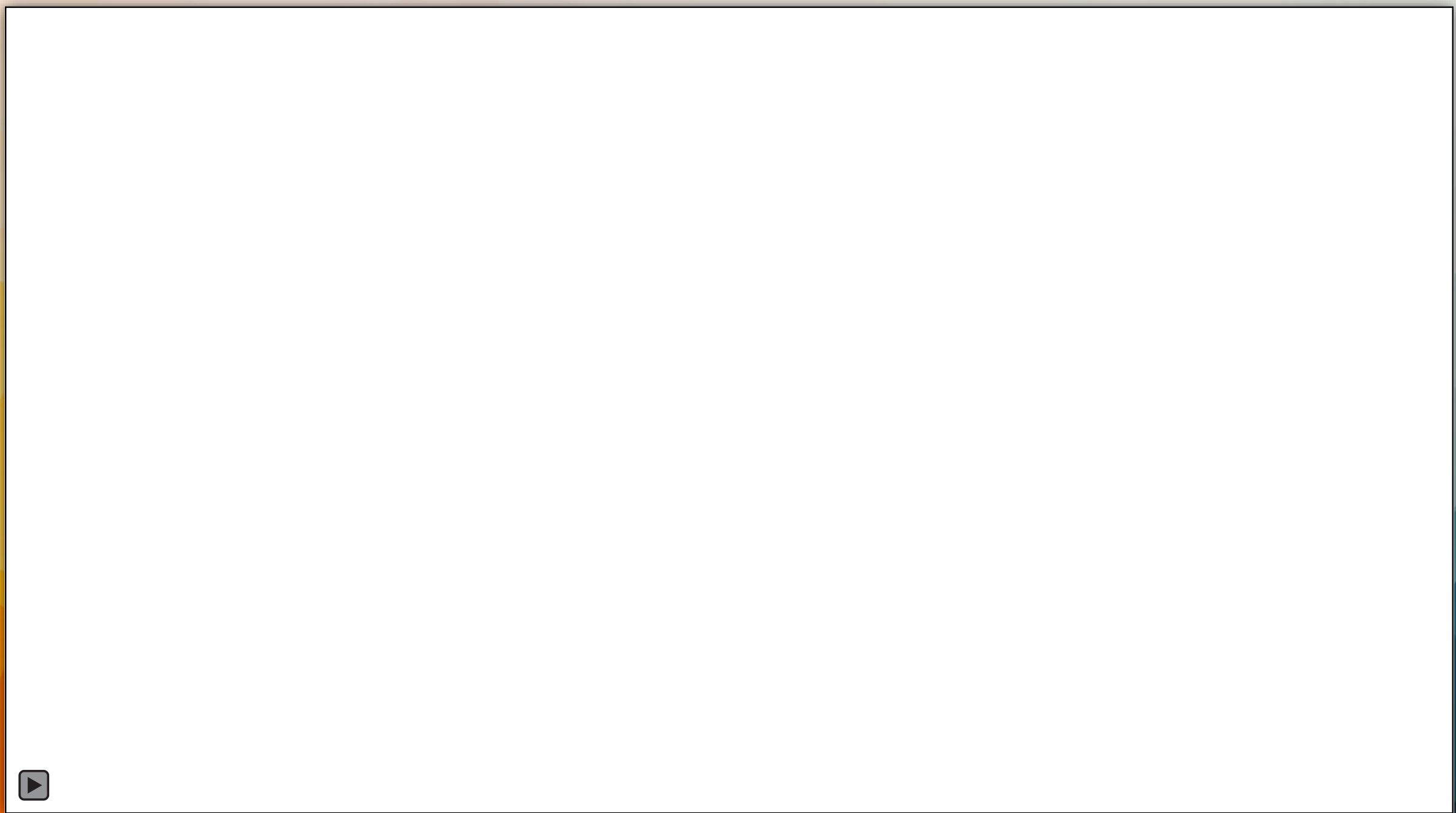
AppleTreeID	Species	Size	DatePlanted	OrchardID
1	Honeycrisp	5	4/15/2010	1
2	Honeycrisp	6	4/15/2010	1
3	Honeycrisp	3	4/15/2010	1


AppleID	Color	Weight	AppleTreeID
1	Green	200	2
2	Green	180	2
3	Green	195	2

Apples

Machine learning classification

True label \ Predicted label	Bathtub	Clothes Washer	Faucet	Shower	Toilet
Bathtub	12	1	0	0	0
Clothes Washer	0	15	0	0	0
Faucet	0	0	113	0	0
Shower	3	1	1	37	0
Toilet	0	0	0	0	92





“I do not expect that students leaving my class will be experts in any of these skills. However, they should ... know which ... will be the most useful in their research and future careers and which may be the most important for them to invest further time and effort into becoming more proficient.”

“...the value proposition of the classroom is fundamentally altered after COVID.”

“...it's not necessarily the content that's most valuable to the students, it's ... facilitating their use of the content. And so ... the content should be shared as broadly as possible.”

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Online Learning Modules:

<https://edx.hydrolearn.org/courses/course-v1:USU+CEE6110+2022/about>