Stage height – Volume curve

Assignment: analysis of data for hydrological applications

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INWRDAM WATER & DIPLOMACY

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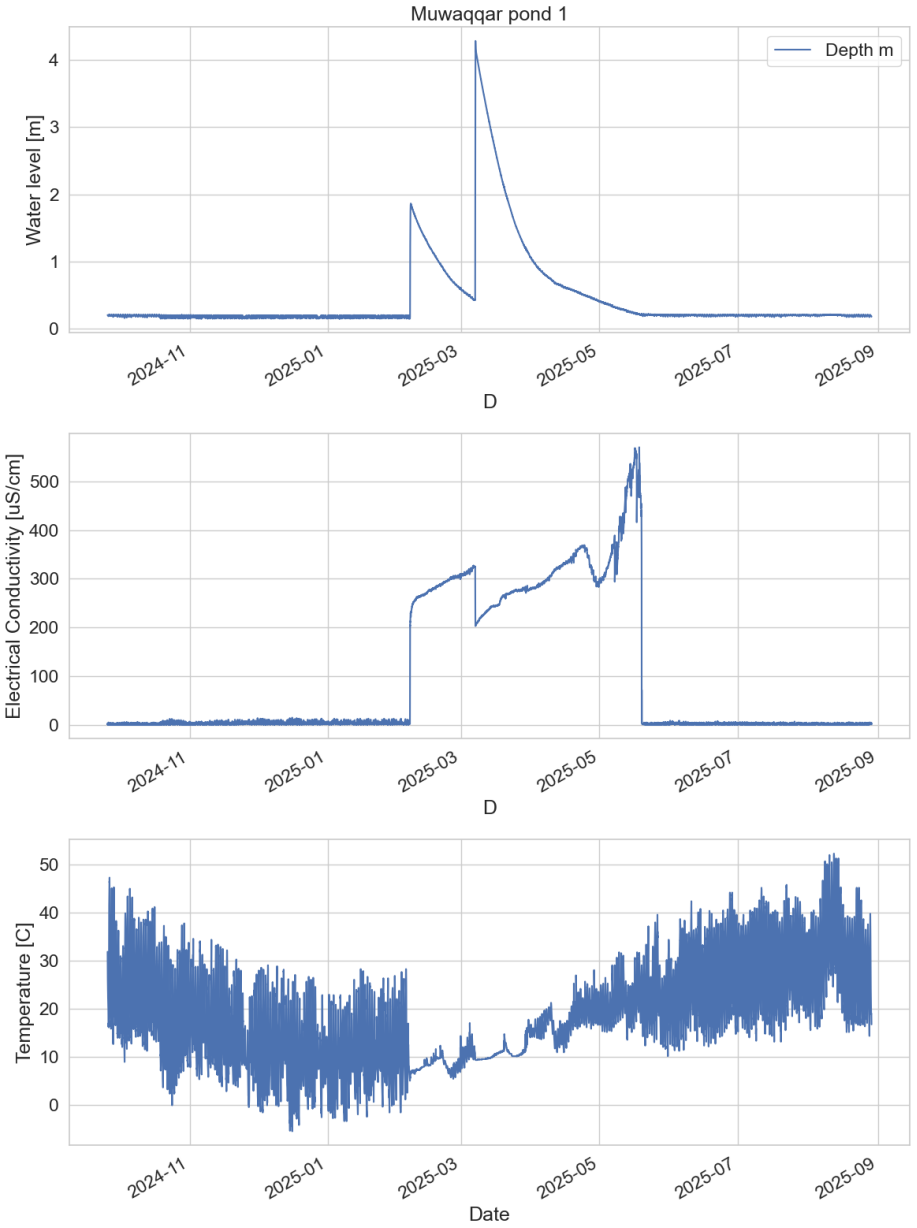
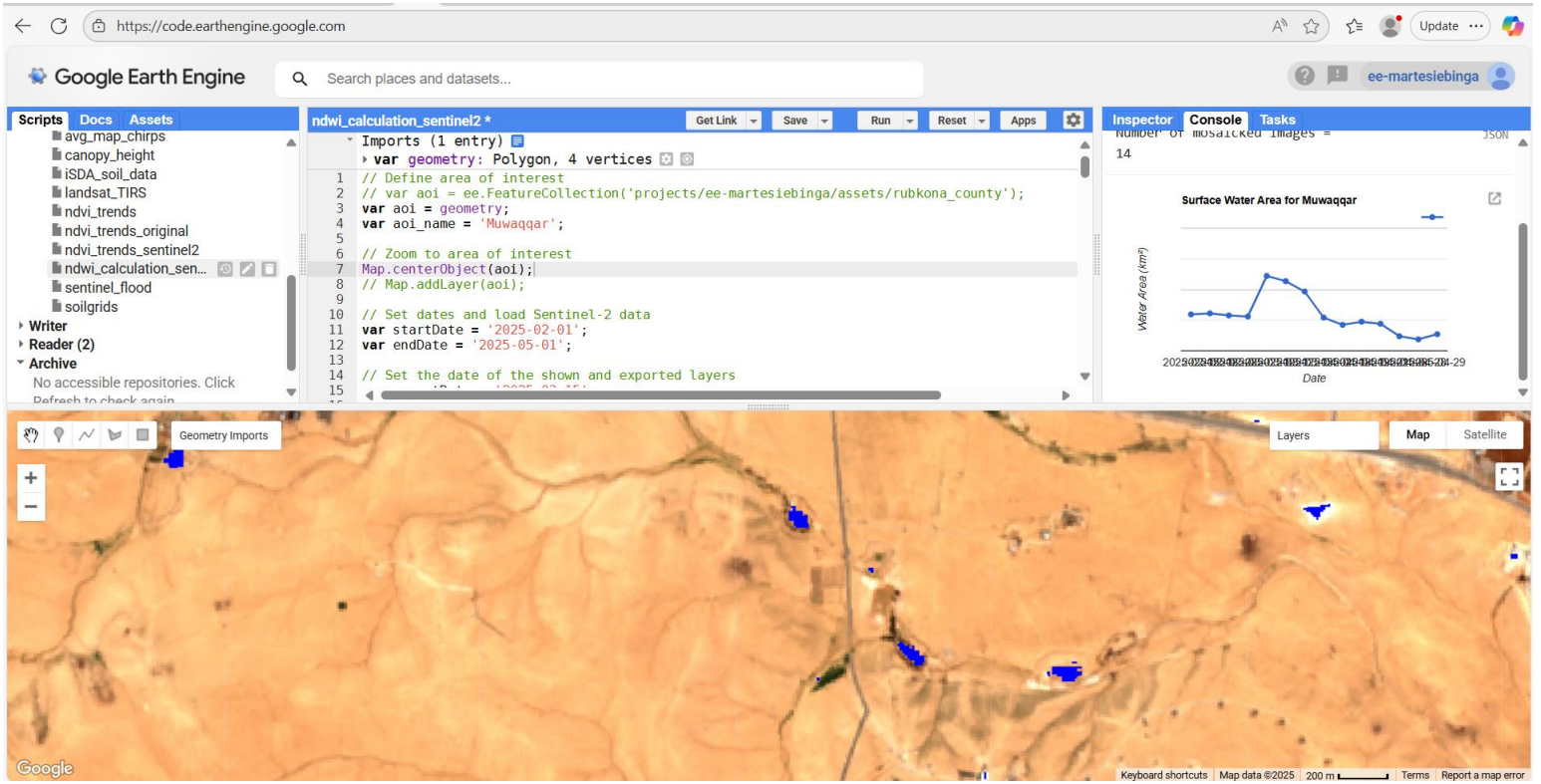
Reservoir level – Volume relations

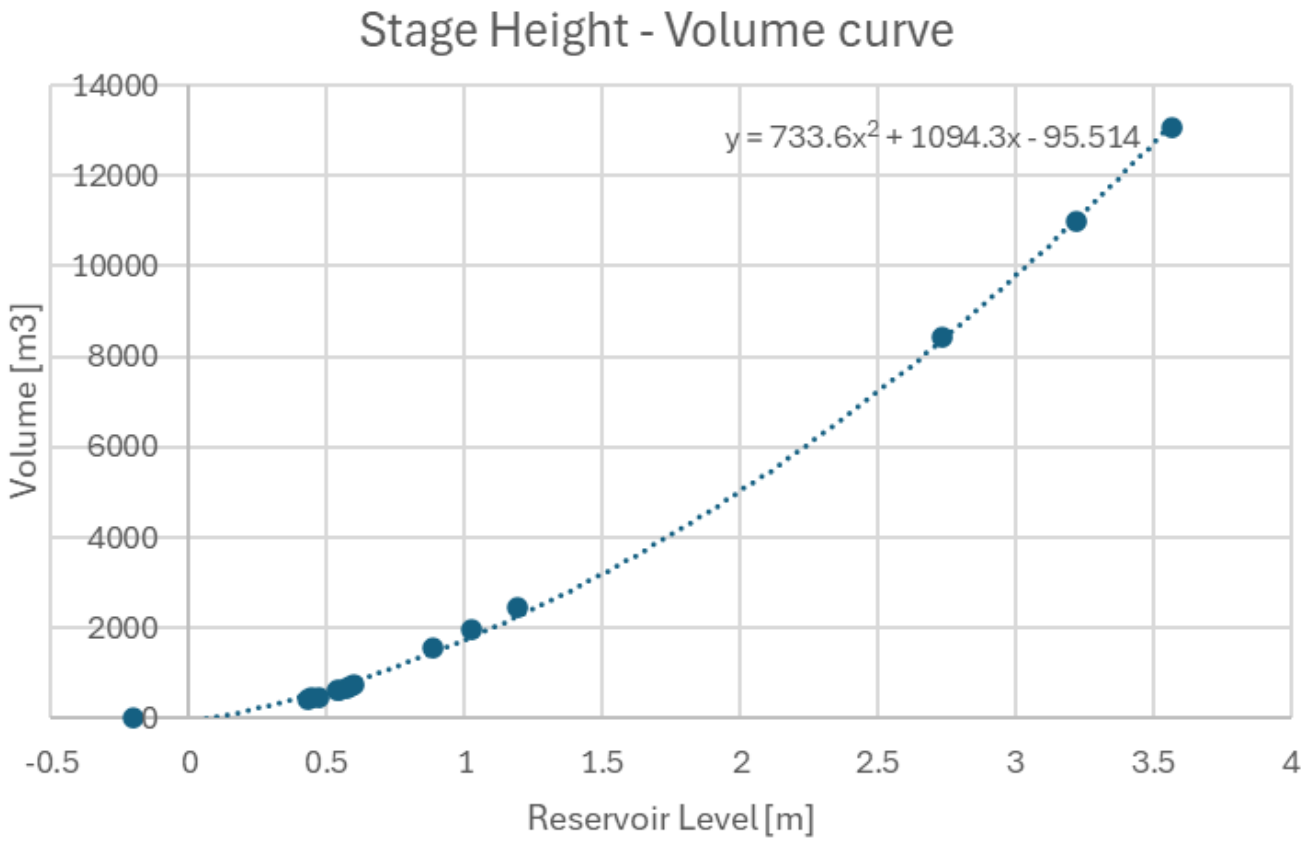
- This morning, we assessed temporal variations in reservoir size (surface water area)
- Now determine the storage volume
- What do we need?


Muwaqqar pond 1
Depth m
Water level [m]
0
1
2
3
4
2024-11
2025-01
2025-03
2025-05
2025-07
2025-09
D
Electrical Conductivity [uS/cm]
0
100
200
300
400
500
D
Temperature [C]
0
10
20
30
40
50
Date


https://code.earthengine.google.com
Google Earth Engine
Search places and datasets...
ee-martesiebinga
Scripts
Docs
Assets
ndwi_calculation_sentinel2 *
Get Link
Save
Run
Reset
Apps
Inspector
Console
Tasks
avg_map_chirps
canopy_height
iSDA_soil_data
landsat_TIRS
ndvi_trends
ndvi_trends_original
ndvi_trends_sentinel2
ndwi_calculation_sen...
sentinel_flood
soilgrids
Writer
Reader (2)
Archive
No accessible repositories. Click
Imports (1 entry)
var geometry: Polygon, 4 vertices
// Define area of interest
// var aoi = ee.FeatureCollection('projects/ee-martesiebinga/assets/rubkona_county');
var aoi = geometry;
var aoi_name = 'Muwaqqar';
// Zoom to area of interest
Map.centerObject(aoi);
// Map.addLayer(aoi);
// Set dates and load Sentinel-2 data
var startDate = '2025-02-01';
var endDate = '2025-05-01';
// Set the date of the shown and exported layers
14
Surface Water Area for Muwaqqar
Water Area (km²)
Date
Geometry Imports
Layers
Map
Satellite
Google
Keyboard shortcuts
Map data ©2025
200 m
Terms
Report a map error

Goal

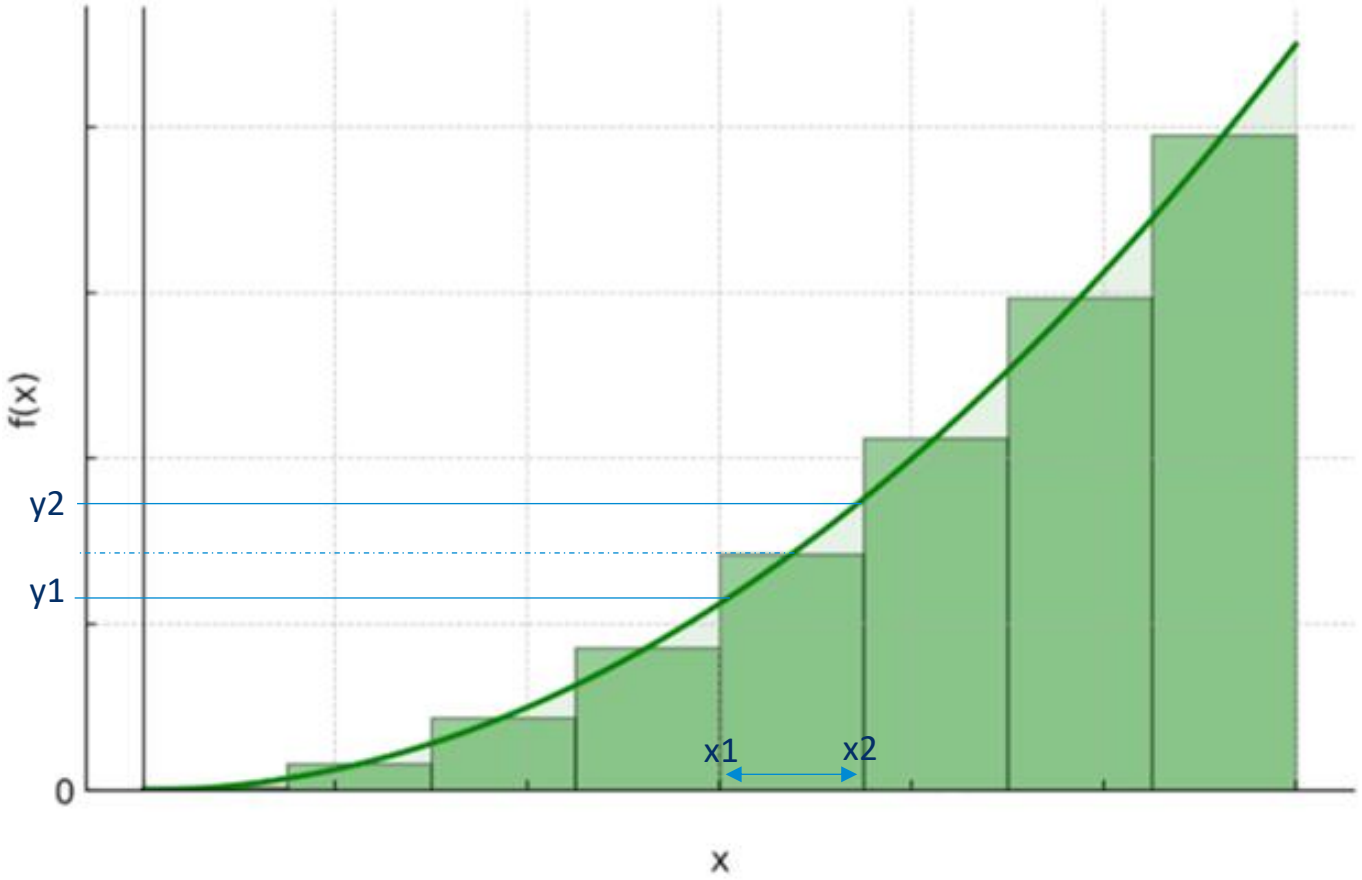
- **Develop a stage height – volume curve** for the storage pond in Muwaqqar
- Which volume belongs to a certain water level
- GEE + Excel
- Instructions can be found in the manual (section 2.1.3)



Integration 1

(y2 + y1)/2 * (x2 - x1))

- Sort based on water level values (smallest to largest)
- Split up the area under the curve in smaller sections
- Calculate the areas of the smaller sections (= change in volume between consecutive WL measurements)
- To find the total storage at a certain water level (= area under curve) add up the smaller sections

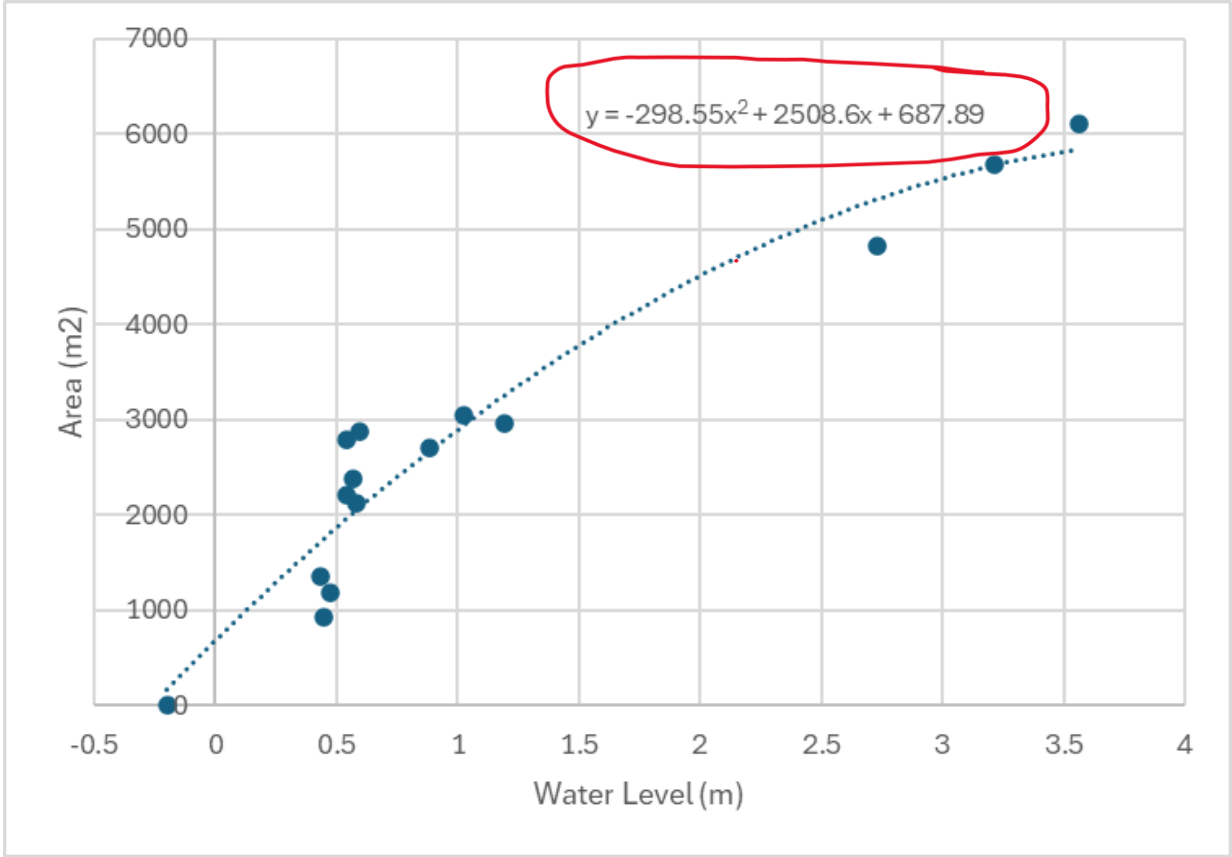


Integration 2

$$\int ax^n \, dx = \frac{a}{n+1} x^{n+1}$$

$$\int -298.55x^2 + 2508.6x - 687.89 \, dx =$$

$$-99.52x^3 + 1254.3x^2 - 687.89x$$



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