

W18 Python MidTerm Project Proposal
Water Balance
Michael Amodeo

Project Objective - Create a script that will evaluate water demands for parcels of a site given a specific development program. The script will output total water demands by land use type and recommend optimal water use and reuse strategies.

The script will consist of 3-4 python files: one to manage user input and generate output, another to define the classes, and 1-2 more to manage other function calls such as the water use optimization scenarios. Parcel data will be stored in class instances, which will also contain calculations of demands as methods per instance. A second class will be used to aggregate the parcel level data. External modules will be included to handle complicated functions after generation of water demand values, and to streamline the main run file. Additional functionality such as webscraping for input and generation of separate txt files for output will also possibly be included.

1. Inputs:

- a. Climate data - webscrape (if available) based on zipcode
 - i. Monthly rainfall
 - ii. Monthly evapotranspiration
- b. Development program
 - i. Program is a list of parcels with:
 - 1. Acreage
 - 2. Land use type
 - ii. Specify method of input at command line:
 - 1. Table of values to import as delimited txt file
 - 2. Default program (delimited txt file within package)
 - 3. User inputs a simplified program by adding acreages per prompted land use type (5-10 max types)
- c. Other Data - most likely coded into program, not user input
 - i. Land Use Assumptions - could be list of tuples, multiple dictionaries (possibly a dictionary with a list for values)
 - 1. Proposed Percent Impervious Area
 - 2. Percent of Pervious area Irrigated
 - 3. Floor Area Ratio (FAR)
 - 4. Use rates (Occupancy and Population density assumptions)

2. Classes:

- a. Parcels (instance)
 - i. Attributes:
 - 1. Land Use
 - 2. Acreage

- ii. Methods
 - 1. Interior Potable Demand - function of acreage & LU type
 - 2. Interior Non-Potable Demand - function of acreage & LU type
 - 3. Irrigation Demand - function of climate, acreage, & LU type
 - 4. Reclaimed Water Potential - function of acreage & LU type
 - 5. Rainwater Harvesting Potential - function of acreage & LU type
- b. Land Uses
 - i. Use a secondary class to sum demands across multiple parcels of the same type. Each land use type is a single instance with similar attributes and methods as above. Class attributes will sum each of the total project-wide demands. This second class allows for presentation of data at 3 levels (individual parcel, land use, and project).
- 3. Potential Outputs
 - a. Total monthly water use by demand type
 - b. Comparison of supply and demand (table with monthly values)
 - c. Monthly storage requirement and max storage size (call function from an external module)
 - d. Return max day demand required for off-site water
 - e. Ability to choose previously built scenarios or create new ones (no rainwater, rainwater on x% of rooftops, etc)
 - f. Min percentage needed of rooftops on commercial to balance irrigation demands

Google Doc link:

<https://docs.google.com/document/d/1dWpZIUFGqZshzQ-iv-LiMEyh98Hw8cDDzpEQBa8UBo/edit?usp=sharing>