Turbidity & Rainfall Monitoring for Coastal Water Quality

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Environment: Coastal waters near urban areas

Rationale: After heavy rainfall, stormwater runoff carries, sediments, debris (litter), and pathogens into the ocean, causing turbid & polluted waters.

- Impacts: public health, marine ecosystems

Challenge: Lack of real-time & affordable assessment systems to measure how heavy rainfall impacts water quality in coastal areas

Physical Measurements:

- Turbidity (Nephelometric Turbidity Units (NTU)) - a proxy for fecal contamination, sediment, urban pollutants
- Rainfall (mm) - To correlate runoff with increased turbidity

Spatial Sampling Regime:

- Near storm drain outfall entering the coast
- High use beaches
- Offshore site (control)

Temporal Sampling Regime:

- Every 10-15 minutes to see spikes during rainfall
- Every hour (60 minutes) to see changes over day
- Raspberry Pi will collect/store data (turbidity & rain sensors), and send wirelessly (to see data in real time)

Parts, Vendors, Costs

Raspberry Pi 4 - $35

https://www.raspberrypi.com/products/raspberry-pi-4-model-b/

Turbidity Sensor - $17.46

https://www.tme.com/us/en-us/details/df-sen0189/environmental-sensors/dfrobot/sen0189/?brutto=1&currency=USD&gQT=1

Rain gauge (tipping bucket)

MicroSD card - $13

Waterproof enclosure - $26.96

https://www.amazon.com/TICONN-Waterproof-Electrical-Junction-Enclosure/dp/B0B87V7QTH/ref=asc_df_B0B87V7QTH?mcid=63e7561bd88f3c3ea32b7834efdf5598&tag=hyprod-20&linkCode=df0&hvadid=693410589815&hvpos=&hvnetw=g&hvrand=9167607991139826029&hvpone=&hvptwo=&hvqmt=&hvdev=c&hvdvcmdl=&hvlocint=&hvlocphy=9032807&hvtargid=pla-1968767890490&th=1

Solar panel with battery - $39.99

https://www.amazon.com/Wasserstein-Solar-Panel-Internal-Battery/dp/B0CM93L4KQ/ref=asc_df_B0CM93L4KQ?mcid=fd8ac027d8263f5bb5db614111400c9d&tag=hyprod-20&linkCode=df0&hvadid=693396524357&hvpos=&hvnetw=g&hvrand=9177521624330699985&hvpone=&hvptwo=&hvqmt=&hvdev=c&hvdvcmdl=&hvlocint=&hvlocphy=9032807&hvtargid=pla-2259255217856&th=1

Total ~$133 (not including rain gauge)