Hardware Options

**Main boards**

1. [Raspberry Pi 3b](https://www.adafruit.com/product/3055) - $40

The Raspberry Pi 3 is one possible solution to our hardware problems. It comes with a large amount of data storage both in RAM (1GB) and with the SD card slot. The built in WiFi adapter can be programmed to have point-to-point contact (mesh network) which will be useful for data transfer between the river node and checkpoint node. It has 40 input/output pins which would allow more than enough expansion for the sensors for the river node or further communication of data to another site.

The largest downsides would be the large file consumption and I would have to find a way to execute the program upon startup of the full fledge Linux distribution. The battery size would add considerable weight to the river node. The Pi model 3 draws around 800mA.

Would still require a GPS chip and sensor for water, but memory and communication are already solved.

1. [Arduino Uno](https://www.adafruit.com/products/50) - $25

The Arduino Uno is an easily programmed microcontroller. This alleviates the problem of not having the code execute at startup. The Arduino indefinitely operates the flashed program. It is also significantly cheaper and uses less power, which would lend to a less sizeable battery. It has quite a few pins (~20). Models with more pins, like the Mega, do exist. I probably will need the mega.

As of right now I am not 100% that this will work, but the Arduino is definitely the best bet.

Will require a GPS breakout, SD card breakout, XBee board (for communication), and possibly another simple sensor.

**GPS Board (not a lot of options here)**

1. [Adafruit GPS Breakout](https://www.adafruit.com/product/746) - $40

This looks to be the easiest (and least pin consuming) GPS breakout board which reads GPS data. There are quite a few tutorials available for it. Adafruit is showing them as out of stock, but there are hundreds available at other retailers for the same price.

**Arduino Storage**

1. [Micro SD Breakout](https://www.adafruit.com/products/254) - $7.50

Looks to be the easiest solution to storing large data sets.

**Communication**

1. XBee boards are low power, arguably low throughput, wireless communication devices which have comparable or better range than WiFi and are commonly available. There also looks to be a few tutorials out there to help me get started.
2. ZigBee boards also look promising but don’t look quite as user friendly as XBee boards.
3. LoRa Packet Radio Breakouts look promising as well. 900MHz should be more than enough to transfer all of the data off of the board.