ISEA 2018: Workshop #15 Turbidity Paintings

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Die gefährlichste Weltanschauung ist die Weltanschauung derer, die die Welt nie angeschaut haben. (The most dangerous worldview is the worldview of those who have not viewed the world) - Alexander von Humboldt

I love fools' experiments. I am always making them. - Charles Darwin

Introduction:

Over the past three years, we have been exploring the ideas that revolve around transdisciplinary work. Our focus is on water quality, collaborations with biologists and environmental scientists. We are trying to repeat a procedure that we've been developing in Pensacola (and furthering out to Hastings). This procedure can be applied or replicated in other locations.

So, why were we interested in here?
The Umgeni River - One of the Dirtiest in South Africa

https://www.iol.co.za/news/umgeni-river-one-of-dirtiest-in-sa-1529000

Background

- Both art and physics are obsessed in the same fundamental things light, space, time. In the natural sciences you have the work of Darwin, Von Humboldt, Audubon, where you can see the overlap between science and art as they all three used observation and drawings to both document and derive their theories.

- Working to construct common languages that invent mutual benefits to all the professions, a step beyond interdisciplinary.

- The word interdisciplinary is a lopsided affair. Interdisciplinary is epistemologically chained to a 'separate but equal' paradigm. The *inter-* prefix denotes a pathway or bridge to meet which is a nobel ideal but the liminal suggests you are outside areas of expertise

- paraphrasing a colleague (E. Demaray) - "[in Art/Sci practices] you often end up with scientists making a lot of bad art; artists doing a lot of bad science"

- Thus we prefer a term transdisciplinary, the *trans-* prefix has multiple definitions that also refer to passage but also an equal or greater number that refer to overlay, merger,

enveloping of multiple entities

- Important questions for Transdisciplinary practice:
  1. *Is it possible that art and science professions could intersect in a meaningful way?* Not just feel good meaningfulness.
  2. *Is it possible to make work or research that both professions could participate in a rich rigorous way?*
  Not easy questions.
  How do you avoid the pitfall of creating a totally new discipline with inherit prejudices?

- One strategy is participatory practice the arts has been applied for a long time (such as Kaprow and many other mid-20th C. artists). Science has relatively recently deeply engaged participatory practice called citizen science (1989-ish) .

- Early in the process of trying to craft a practice that created a meaningful merger of bioscience and art, we suggested using open source (giving the masses the tools of production). Participatory practices which can educate and empower citizens to participate or even facilitate conversation on problems and policy in spite of academic credentials.

- There are the scientists who want to communicate science, but they don't know how to do it. This is especially true in the Environmental Sciences, where the distance or gulf between the science and the public is less in terms of relevance, but greater in terms of effective communication.

- We found that taking capturing visual phenomena was also a measurement. Images can evoke an emotive response and action.

Brief Description of the Project

The project originated with the question of whether water quality data could be visualized to a general audience. This evolved into focusing on the idea of creating hybrid of aesthetics/data that is simultaneously artistic creation and scientific data. We proposed that a image database measuring the clarity of the water against a backdrop. Our biologist colleagues confirmed that the proposed visual measurement was similar to that of the secchi disk, where a qualitative measurement of the depth is taken when the disk is occluded by the turbidity.


Where we started and where we have currently ended up is a good illustration of how these sorts of projects (even in the sciences) progress. Our original pitch was to use the open source remote operated submersibles created by OpenROV. This was soon proven problematic, and after a few failed attempts a camera dolly (note: we call it the rig) was constructed out of PVC pipe. Sometimes the saying of simpler is better is accurate.
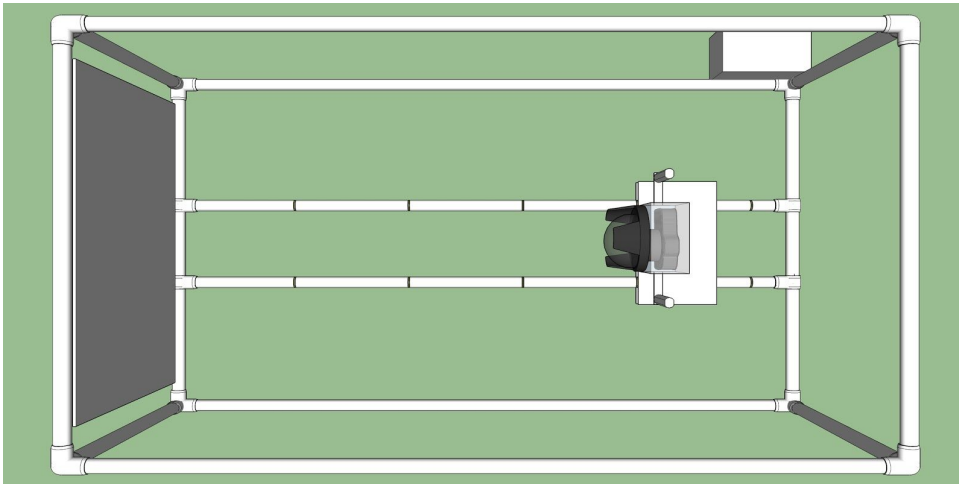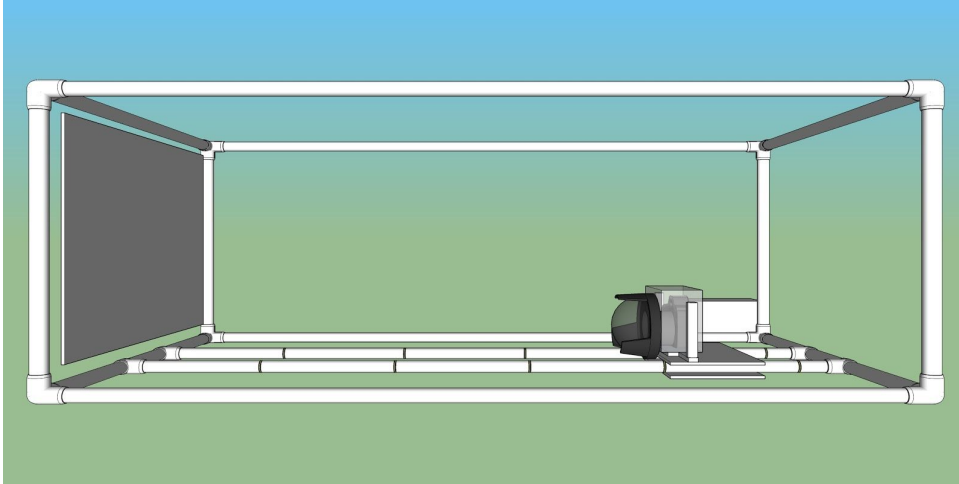
With the development of the bespoke rig system and camera mounts from (hardware items) and with a camera (originally a Gopro, and then a DSLR), images were able to be captured and categorized.

Major features of the dolly

Size, Stability, Buoyancy
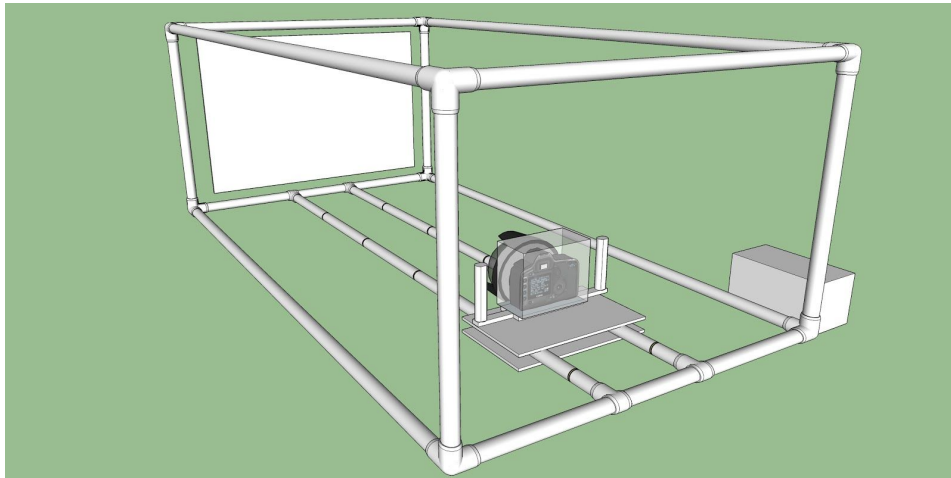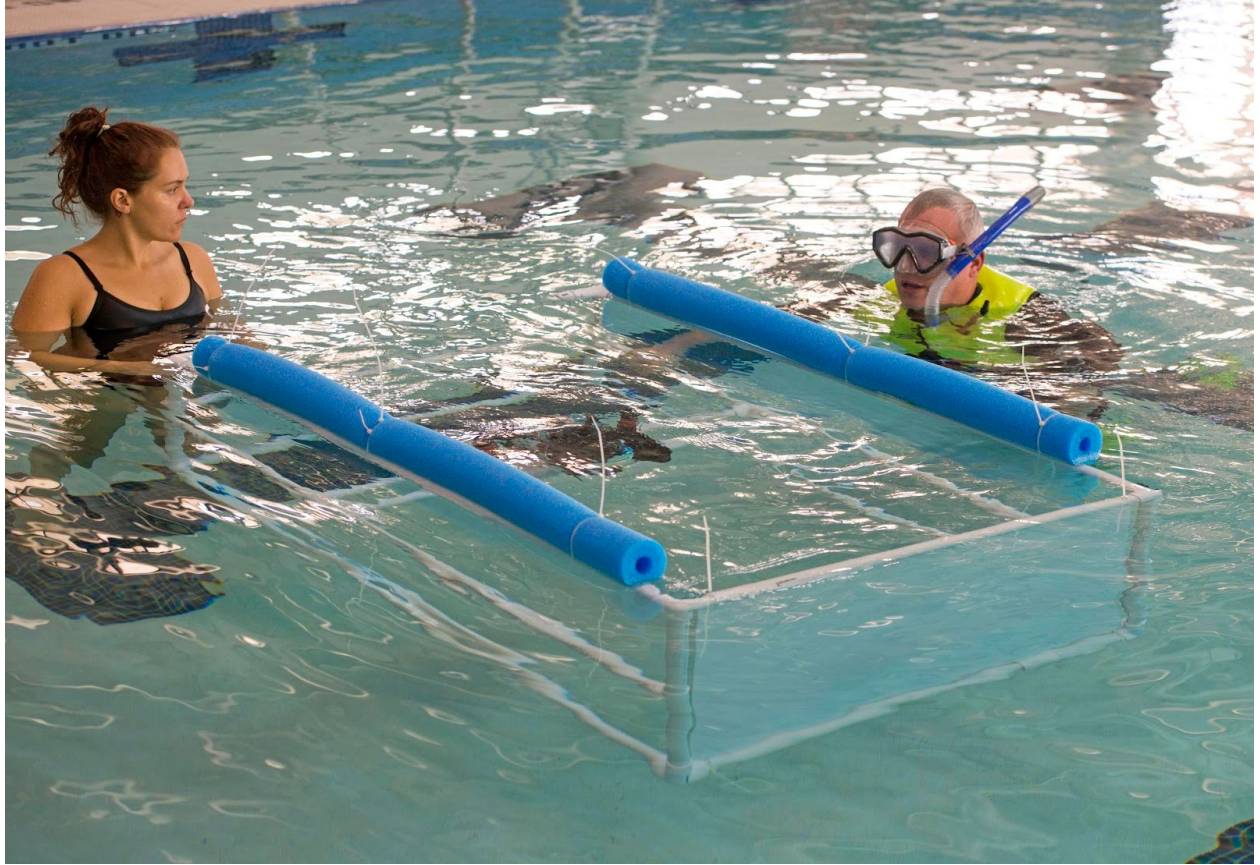
We understood that the procedural art methodology was what is called the experimental design/process in science.

The procedure is to take images of a backdrop in the water at set distances from the background. These essentially create the "data points." Measurements are taken at prescribed transect points along a river or water body at seasonal or regular periods.

1. Submerge the rig with attached backdrop
2. Set the camera distance to 4 ft, take a burst of images
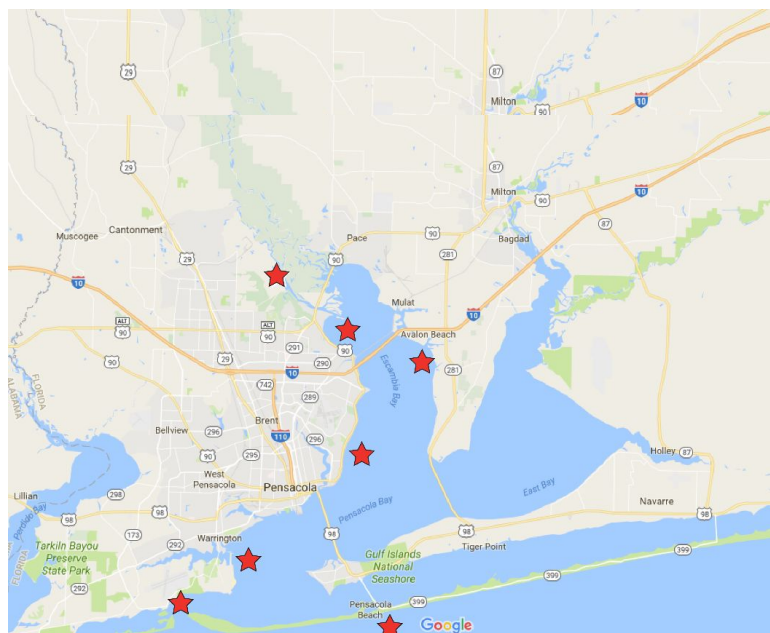
3. Reset camera distance to 3ft, take a burst of images
4. Repeat at 2 and 1 ft respectively.
5. Move to another transect station (long/lat)

Demonstration and Explanation of new sensor with Arduino for Turbidity

- Logs data that can be correlated back to photos (ground truthing)
- The particular sensor can be changed out. Right now we are using an open source turbidity sensor. The original plans came from Noisebridge out of San Francisco. After working with their plans, we built upon the project using CAD software to get a more streamline, easy to use and 3D print design.
- Can be expanded to add other sensors, for example temperature, conductivity, etc. (Have already develop a larger box that is rated for submersion with Temp., salinity, pH, etc)

- Demonstration of more traditional testing materials

  Test strips

Pull out water soluble pencils and watercolor brushes as inspiration for the following discussion:

  Question to ask participants -

  - you are all artists, what in your art tool kit would you suggest/consider that could be used for replacement of the test strips?
  - What art/art related supplies could you see being taken out into the field? What haven't you seen used to record field conditions yet?
  - What kind of media, performance, or other aesthetic output could be used to record and then communicate field conditions?

Resources:

Citizen Science:
- Butterfly monitoring https://xerces.org/citizen-science/butterfly-monitoring/
- https://www.epa.gov/citizen-science/citizen-science-projects-supported-epa (USA)

DIY Science:

- Bio-Hacking, open source bio labs as a research launch point and support. Find citizen science groups near you
  - List of favorite labs
  - OpenLab
  - Noisebridge
  - Manylabs.org
  - Science for the People