Andy Tonnesen

**Hydropower Opportunities and Challenges across the World**

After watching the videos concerning the Itaipu Dam in Brazil, the Three Gorges Dam in China, and the Grand Coulee Dam in the US, I am able to understand more about the reason for these structures. Hydroelectricity is a growing field, harnessing up to 70% of the world's renewable energy. The main reason for such a large portion is the cost value, hydro electricity is cheap compared to most other forms of renewable energy available today. As glorious as hydro electricity may seem, it comes with a cost that affects more than comes to mind.

The Itaipu Dam was constructed along the border of Brazil and Paraguay in 1984, it spans the Parana River and produces 14.6 GW on average. At the peak of its output it had produces 75% of Paraguay's energy and 17% of Brazil's. As great as this feat was it can be overlooked for its flaws. About 10,000 families were displaced that called Parana River basin home for generations.The world's largest waterfall by volume was engulfed after Itaipu dam was created and the rock formation which created the waterfalls were destroyed after causing too much of a navigational disturbance. In 2009, the dams outflow was disrupted causing complete power outages for all regions supplied by the dam. The most affected was the lower corner of Brazil, an area that holds many of its largest most important cities. Though the Itaipu dam has its faults and short coming it still serves as the main power source for a vastly growing region.

The Three Gorges dam was constructed across the Yangtze River in China, completed in 2012, it produces 22.5 GW on average. The chinese government declares

the project a great engineering feat, but they much opposition. The lake created behind the dam flooded many cultural and archaeological sites as well as displace 1.3 million people. Environmentally the new dam opened a can of worms. Risk of landslides and erosion are at new highs, vast amounts of endangered, valuable plants were flooded and killed, most animals, both terrestrial and aquatic species were killed, injured or displaced by the dam. Both the government and chinese residents hold valid arguments both for and against the dam.

The Grand Coulee Dam was constructed across the Columbia River in the US, completed 1942, but revamped in 1974, it produces 7 GW on average. The dam was met with opposition and fear of encroaching into canada, which would interfere with many treaties. It was passed and built with the concept of irrigating much of Washington to keep the water levels low. The creation of the dam bolstered work in the area, it benefited and employed many people at the time. People who did not denfit were the Native Americans, who lost their annual spawnings of many different fish species mostly salmon. The dam was not constructed with fish ladders so it permanently blocked the migration of the salmon to the upper sections of the Columbia River causing that run of salmon to go extinct. Other species were displaced and damaged by the new dam, and effected river above and below. This dam has proponents and opponents even to this day.

There are recurring themes in all of the dams discussed, ecological damage, population resettlement, and public opposition. Dams are inherently bad for the environment, no matter the size, even beaver dams have negative effects. The water

backed up from them cause problems upstream of erosion and flooding while the downstream lacks water and needed sediment. People are forced out of their homelands, many of which resided there for generations. They are left with no choice but to leave or die once the water begins to rise. Finally people don't want them there! They see or feel the effects of the dams and do not want them there. Whether for personal reasons, economical reasons, or ecological reasons, people will always oppose dams.

On the other hand, these dams are also very beneficial. The hydroelectric created by the turbines are a much needed change to the burning of fossil fuels. Hydroelectricity is relatively cheap compared to other forms of renewable energy, is cleaner than burning fossil fuels and produces much less greenhouse gas emissions. Jobs are created to construct the dam, employing vast amounts of workers for an extended period of time. Once the dam is completed jobs are available to monitor, operate, and maintain the dams.

It doesn't matter what dam you visit, or in what country you are in you will always find opponents and proponents, just like with anything else. Some people will argue for the environmental impacts the dam is creating, while the other argues the economical value it brings. Both bring healthy, factual arguments to the table for either side. Arguing the point to the other will seem useless at this point. As the old saying goes whatever side we choose, we're "damed" if we do, and we're "damned" if we don't.