Guri Dam – A Case Study

Guri Dam – Background

- AKA Raul Leoni Dam, after President in the 1960's
- Located in Bolivar State, Venezuela and owned by government
- Sixty miles south of River Caroni and River Orinoco juncture in Necuima Canyon
- Concrete gravity dam
- 156 meters high, 1176 meters long
- Dams 110 million acre-feet of water
- 8th largest dam for water retention
- Construction started in 1963, first part opened in 1968, second in 1986 ($1.5 – $ billion

Guri Dam - Hydrology

- Runoff is supplied by the Caroni River Watershed in central eastern Bolivar State
- Area = 92,170 sq. km (10% of Venezuelan land)
- Precipitation: Maximum = 6000 mm/year, Average = 2900 mm/year
- Forests occupy 67% of watershed
- Soil has low fertility, high erosion → ~10% is farmed

– Spillway Structure

- Contains spillgates for controlled release during floods through large winding mechanisms
- Flood control is needed during the wet season (April to December)
- Spillway is designed to create a cushion pool in order to dissipate energy from the plunging water to cu
  foundation and bank erosion
- Cushion pool is created from upward-
  curving spillways

Dam – Penstock Structure

Guri Dam Objective – Hydroelectric

- AKA Simon Bolivar Hydroelectric Power Station
- Venezuela's largest source of hydroelectric power, exports electricity to Columbia, Brazil
- Is capable of being World's second largest hydroelectric power producing plant
- Two machine rooms with ten generators each = 10 million kW/hour
- Its current automated technology requires only a a few operators, even during emergencies, fo entire generating system

Right: Generating house with red transformers

Dam Objective- Recreation

- Created Guri Lake: the second largest lake in Venezuela at 4000 sq. km
- Reservoir extends 80 km upstream
- Relatively new reservoir created dying/rotting tree covered lake banks
- Lacks beaches but development is underway to create them for tourism
- Canaima National Park

Guri Dam – "Green"

- Is considered a very "green" dam
- Creates 70% of Venezuela's electricity
- Saves 300,000 barrels of oil a day
- Prevents 20 million tons per year of Carbon Dioxide from going into the atmosphere from other means of energy productions

Guri Dam - Economy

- Venezuela is one of top ten oil-producing countries in the World
- With electricity output from dam, Venezuela can export more oil – 2.4 million barrels per day
- Selling of electricity to Columbia, Brazil
- Chartering/fishing potential is “tremendous” yet still untapped
- Economic benefits of Guri have been achieved

Guri Dam - Controversy

- As stated earlier, Guri Lake is second largest in Venezuela
- Pemon, Yekuana, Karina Indians displaced
- Destroyed 4300 sq. [image] s diverse and rare ecosystem
- Flooding created ma[illegible] could not sustain necessary populatio[illegible]nced predator, prey populations (lack of
- With no predators, former prey populations exploded (Howler Monkeys)
- Rotting vegetation is quickly and vastly emitting greenhouse gases

Guri Dam - Reliance

- Venezuelans rely too heavily on Guri
- In April (2008), half of the country was blacked out for a day due to forest fires shutting down Guri
- This sparked a major government project by President Chavez to expand 42 sources of renewable energy to reduce the reliance on Guri

Guri Dam – The Future

- Many additions are continually being added
- Beginning in 2000, a continuing Renovation Project on Simon Bolivar Power Plant is still in process
- Project will extend Guri operations by 30 years
- Includes five new runners and main components on Powerhouse II
- Also, the refurbishment of four units on Powerhous I
- Final dimensions are proposed to make Guri 1300 meters long and 162 meters above the river bed

Guri Dam – Future Concerns

Forest Fires

- Very prevalent in catchment area for hunting traditions and by indigenous tribes
- Quickly turns forest into savannah
- Deforestation alters the hydrologic cycle necessary for runoff in the watershed

Sedimentation

- Large gold and diamond mining operations upstream produce large amounts of sediment
- Currently, assessments are being done on the amount of sediment currently in the catchment basin and identification of the problematic sub-basins

Guri Dam – Good or Bad?

Positives

- Hydropower
- Economy
- Recreation
- Reliable water

Negatives

- Reservoir flooding
- Indigenous displacement
- CO_2 release
- Heavy reliance

Compared with other large dams, Guri is a great success. It has over-served its purpose with relatively little controversy and negative impacts.

Questions?