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 – $2 billion
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 \( \rightarrow \) \( \sim 10\% \) is farmed
Guri Dam – 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 curb foundation and bank erosion
- Cushion pool is created from upward-curving spillways
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 few operators, even during emergencies, for entire generating system

Right: Generating house with red transformers
Guri 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
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
As stated earlier, Guri Lake is second largest in Venezuela.

Pemon, Yekuana, Karina Indians displaced.

Destroyed 4300 sq. km of rain forest, along with its diverse and rare ecosystem.

Flooding created many small, isolated islands that could not sustain necessary populations and ecosystems. With no predators, former prey populations exploded (Howler Monkeys).

Rotting vegetation is quickly and vastly emitting greenhouse gases.
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
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 Powerhouse 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
- CO2 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?