

A DEVELOPER'S PERSPECTIVE ON SUSTAINABLE HYDROPOWER DESIGN AND OPERATION

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The Overall Goal

- ▶ Ensure return on investment within legal requirements and in compliance with social and environmental standards
- ▶ Focus on costs and management of risks
- ▶ Focus on compliance and reputational risks



Design: Hydrology and Water Quality

WATER = ENERGY = REVENUE

- ▶ Quality hydrological data over time to ensure production
- ▶ Multiple or competitive water use in the basin
- ▶ Stable Water Quality standards
- ▶ Climate change analysis – potential impacts on inflows and extreme weather conditions (design criteria)



Design: Geology

- ▶ Geological studies conclusive
- ▶ Earthquake prone areas: design of dam structure and features
- ▶ Challenges for tunnelling or use of TBM
- ▶ Risk of leakage – contingency for construction and loss of production for operation



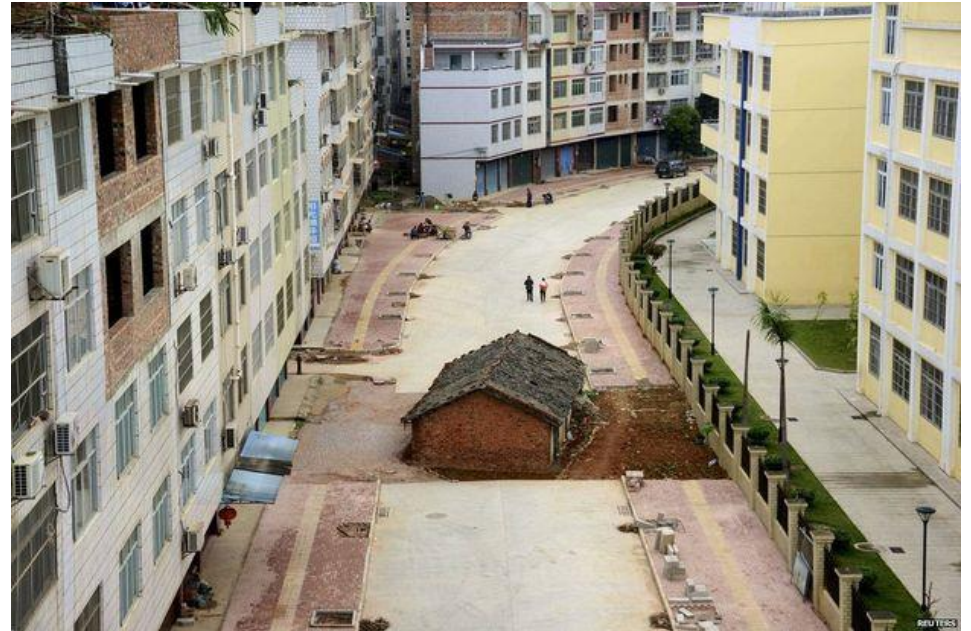
Design and Operation: Fisheries

- ▶ Ample baseline data for the identification of impacts
- ▶ Viable mitigation measures that address fisheries
 - Monitoring indicators
 - Fish passages/ladders
 - Hatcheries or breeding programs
 - Introduction of new breeds
 - Alternative sources of protein
 - Biodiversity offset for aquatic



Design: Viable Resettlement Options

- ▶ Most challenging and costly part of social planning and mitigation
- ▶ Need enough good quality land or viable livelihood options
- ▶ Need cooperation from local people and government
- ▶ Need to be able to tackle opposition and criticism



Design and Operation: Catchment Management

- ▶ Identification of measures to protect or manage catchment area
- ▶ Link between erosion or destruction of catchment and impact on operations?
- ▶ Implementation plans in accordance with environmental standards (combined with off-set)
- ▶ Limit encroachment and potential competition for water use



Design and Operation: Structures and Infrastructure



- ▶ Routes for roads and transmission lines need to be secure and safe – protection against theft and damage
- ▶ Ownership of all key land plots as part of the concession or licence agreement
- ▶ Retaining control of access to key structures and maintain them
- ▶ Avoid third-party ownership of access roads and other infrastructure

Management of Expectations from Stakeholders

- ▶ Building long-term relationships with important stakeholders
 - Local communities
 - Local government organizations
 - National government entities
- ▶ Managing criticism from opposition groups
 - Communication Strategy
 - “Reasonable” level of transparency



Operation: E&S Closure and Running Costs

- ▶ Plan to wind down and handover E&S programs to government and local organizations
 - Ensure land ownership, livelihoods and institutional capacity
- ▶ Identification of essential support for the remaining concession period
- ▶ Optimize environmental monitoring programs to suit operational needs





THANK YOU



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