Sustainable Hydropower Development:
The Middle-lower Lancang River Case

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Ecosystem Study Commission for International Rivers

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Phuket, Thailand
Hydroelectric Resources, China

- Exploitable: 378 million kilowatts
- Uneven distribution
- Insufficient Development

Lancang River

- Exploitable: 36,560 MW
- Yunnan: 70%

- The distribution of hydropower resources in China
Lancang River

- Headwaters: Tanggula mountain range
- Flow through Qinghai, Sichuan, Yunnan in China
- Length: 2160 km, total: 4350 km
- Drainage Area: 740,000 km², total: 23.5%
- Mean Annual Runoff: 64 billion m², total: 13.5%
Hydropower Scheme

- A cascade of Eight reservoirs, with Xiaowan and Nuozhadu as Leading ones.
- Total Installed Capacity: 15.9 million kilowatts
  Total Annual Power Generation: 72.53 billion kWh
- Five in operation; Nuozhadu in impoundment; Ganlanba in planning; Mengsong in suspension.

<table>
<thead>
<tr>
<th>Hydropower Station</th>
<th>Gongguoqiao</th>
<th>Xiaowan</th>
<th>Manwan</th>
<th>Dachaoshan</th>
<th>Nuozhadu</th>
<th>Jinghong</th>
<th>Ganlanba</th>
<th>Mengsong</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status</td>
<td>Operation</td>
<td>Operation</td>
<td>Operation</td>
<td>Operation</td>
<td>Impounding</td>
<td>Operation</td>
<td>Planned</td>
<td>Suspended</td>
</tr>
<tr>
<td>Distance to the Nanla River Mouth(km)</td>
<td>750</td>
<td>582</td>
<td>522</td>
<td>422</td>
<td>210</td>
<td>102</td>
<td>75</td>
<td>28</td>
</tr>
<tr>
<td>Normal Water Level(m)</td>
<td>1319</td>
<td>1240</td>
<td>994</td>
<td>899</td>
<td>812</td>
<td>602</td>
<td>533</td>
<td>519</td>
</tr>
<tr>
<td>Height of Dam (m)</td>
<td>130</td>
<td>292</td>
<td>132</td>
<td>120</td>
<td>262</td>
<td>107</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total Reservoir Capacity ( hundred million m³)</td>
<td>5.1</td>
<td>151.3</td>
<td>10.6</td>
<td>8.9</td>
<td>237</td>
<td>12.3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Installed Capacity(MW)</td>
<td>750</td>
<td>4200</td>
<td>1500</td>
<td>1350</td>
<td>5850</td>
<td>1500</td>
<td>150</td>
<td>600</td>
</tr>
<tr>
<td>Annual Power Generation (hundred million kWh)</td>
<td>39.4</td>
<td>188.9</td>
<td>76.0</td>
<td>67.1</td>
<td>239</td>
<td>76.2</td>
<td>7.8</td>
<td>28.9</td>
</tr>
</tbody>
</table>
Economy Status of Yunnan Province

- GDP accounts for 1.69%, ranks 24; GDP per capita ranks Last but One. (2011)
- 77,350 rural households have no access to electricity. (2012)
- WHY?

  Geological location;
  Mountainous topography;
  Low educational level;
  Unreasonable economic structure etc.
Contribution of hydropower to Yunnan

- Meets Energy Demand
- Improves Grid Stability and Reliability
- Increases local tax revenue
  - “West-East Electricity Transmission”
  - “Yunnan-Outside Electricity Transmission”
- Brings Associated Benefits
  - Flood control
  - Irrigation
  - Water supply
  - Fishery
  - Tourism

Energy Structure, January-June, 2011
- Total: 58.48 B kWh
- Hydropower: 30.71 B kWh
- Fossil: 27.19 B kWh
- Wind: 0.57 B kWh
- Solar: 14.36 M kWh

Yunnan-Guangdong Electricity Sale
2003—2015:
From 1600 MW
To 7800 MW
Case Study

- Focus: GDP growth rate from 2008-2011
  - Pu’er: Manwan, Dachaoshan, Nuozhadu Reservoirs
  - Chuxiong: No Reservoir.

- Conclusion: Hydropower construction can contribute to GDP growth.
Social Issue: Resident Relocation

- Infrastructure Reconstruction
- Economic Compensation
  - Long-term Compensatory Mechanism
  - Endowment Insurance
  - Complimentary Electricity
- Re-employment Opportunities
- Psychological Counseling
Environmental Protection Measures

- Wastewater Treatment System
- Multi-level Intake
- Fish Passage
- Fish Multiplication Station
- Rare and Endangered Species Conservation
- Relocation of Ancient Trees
Thank you!