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Chinese Investments of hydroelectric in Southeast Asia

- Chinese state-owned firms are building at least 30 dams in Myanmar, 14 in Laos, 7 in Cambodia and 3 in Vietnam (Nathanial M, 2013).


- In 2013, six hydropower projects have been built along Burma’s Salween River
  - Kunlong Dam (1,400 MW), Shan
  - Nong Pha Dam (1,000 MW), Shan
  - Mai Tong Dam also known as Tasang Dam (7,110 MW), Shan
  - Manntaung on a tributary of the Salween (200 MW), Shan
  - Ywathit Dam (4,000 MW), Kayah (Karenni)
  - Hat Gyi Dam. Source: Salween Watch, 2014
Chinese Investments of hydroelectric in Southeast Asia

- Cambodia plans to build **10 dams** between 2010 and 2019, adding 2,045 MW of capacity. Chinese entities are providing financing for **six of these dams** (EIA, 2013).

- In 2011, Laos exported almost 678 million kwh, or nearly 32% of its total generation, and electricity exports accounted for about one third of its total exports (EIA, 2013).

- China's investment in Myanmar's hydroelectric generating capacity is the 6,000 MW Myistone facility. Estimated to cost $3.6 billion, once of the largest hydroelectric plants ever built (EIA, 2013).

- China is the leading investor in Cambodia and Laos, while for Vietnam, its largest trading partner-China is most significant. Vietnam is itself emerging as an investor in natural resources in Cambodia and Laos (IISD, 2008)
Chinese Hydro-investment in Myanmar

Source: International Rivers (2012)
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Upper Salween (怒江)

- Total planned 13 plants' sum up capacity is 21,320MW,103 billion kWh/Year. (China energy org, Aug 2014)
- Announced on 23th of January 2013, the Energy 12th Five-Year Plan (2010-2015) pointed out that Songta, Maji, Yabiluo, Liuku, Saige were being listed on the development plan.
- Among those plants, Songta is a key construction project, and other projects are to be started by orders. (The Observer, Feb 2015)
## Upper Salween Hydro

<table>
<thead>
<tr>
<th>Project</th>
<th>Capacity (MW)</th>
<th>Cross border</th>
<th>State</th>
<th>Developer</th>
<th>Builder</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Song Ta (ซงถ่า)</td>
<td>3,600</td>
<td>China Myanmar</td>
<td>Yunnan</td>
<td>Beijing Survey and Design Institute (designed)</td>
<td>Longtan Hydropower Development Co., Ltd. (中国大唐集团公司)</td>
<td>Under construction (important project)</td>
</tr>
<tr>
<td>Ma Ji (หม่าจี)</td>
<td>4,200</td>
<td>China Myanmar</td>
<td>Yunnan</td>
<td>Yunnan Huadian Nu river Hydropower Development Group</td>
<td></td>
<td>Construction by orders</td>
</tr>
<tr>
<td>Ya BiLuo (หย่าปี่หลัว)</td>
<td>1,800</td>
<td>China Myanmar</td>
<td>Yunnan</td>
<td>YaBiLuo hydro preparation office</td>
<td></td>
<td>Construction by orders</td>
</tr>
<tr>
<td>LiuKu (ลิ่วคู่)</td>
<td>180</td>
<td>China Myanmar</td>
<td>Yunnan</td>
<td>LiuKu hydro preparation office</td>
<td></td>
<td>Construction by orders</td>
</tr>
<tr>
<td>Saige (ไส้เก้อ)</td>
<td>1,000</td>
<td>China Myanmar</td>
<td>Yunnan</td>
<td>Saige hydro preparation office</td>
<td></td>
<td>Construction by orders</td>
</tr>
</tbody>
</table>
At least 15 more dams upstream are planned or under construction.

13 dams in China
2 dams in upper SLW
5 dams in SLW

Salween Watch, March 2014
<table>
<thead>
<tr>
<th>Project</th>
<th>Capacity (MW)</th>
<th>Cross border</th>
<th>State</th>
<th>Developer</th>
<th>Builder</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kun Long (กุ่นโพลง)</td>
<td>1,400</td>
<td>China</td>
<td>Shan</td>
<td>Hanergy, Goldwater</td>
<td></td>
<td>Proposed</td>
</tr>
<tr>
<td>Nong Pa (หนองป่า)</td>
<td>1,000</td>
<td>China</td>
<td>Shan</td>
<td>HydroChina, MEP</td>
<td>HydroChina</td>
<td>Proposed</td>
</tr>
<tr>
<td>Tasang (Mai Tong)</td>
<td>7,110</td>
<td>Thailand</td>
<td>Shan</td>
<td>Ratchaburi, Sinohydro, Three Gorges</td>
<td>Sinohydro, Three Gorges</td>
<td>Under Construction</td>
</tr>
<tr>
<td>Ywathit (ยาวดี)</td>
<td>4,000</td>
<td>Thailand</td>
<td>Kayah</td>
<td>Datang, Shwetaung</td>
<td></td>
<td>Proposed</td>
</tr>
<tr>
<td>Weigyi (Mae Saring1) (เวียงชี)</td>
<td>4,540</td>
<td>Thailand</td>
<td>Karen</td>
<td></td>
<td></td>
<td>Suspended</td>
</tr>
<tr>
<td>Dagwin (Mae Saring2) (ดาดี)</td>
<td>800</td>
<td>Thailand</td>
<td>Karen</td>
<td></td>
<td></td>
<td>Suspended</td>
</tr>
<tr>
<td>Hatgyi (ฮัดจี)</td>
<td>1,360</td>
<td>Thailand</td>
<td>Karen</td>
<td>EGATi, Sinohydro, Goldwater</td>
<td>Sinohydro</td>
<td>Proposed</td>
</tr>
</tbody>
</table>
### Key Stakeholders

<table>
<thead>
<tr>
<th>Dams</th>
<th>Developer</th>
<th>Builder</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Song Ta</strong> 松塔水电</td>
<td></td>
<td>✔</td>
</tr>
<tr>
<td><strong>Ma Ji</strong> 马吉水电</td>
<td></td>
<td>✔</td>
</tr>
<tr>
<td><strong>Ya BiLuo</strong> 亚碧罗水电</td>
<td></td>
<td>✔</td>
</tr>
<tr>
<td><strong>LiuKu</strong> 六库水电</td>
<td></td>
<td>✔</td>
</tr>
<tr>
<td><strong>Saige</strong> 赛格水电</td>
<td></td>
<td>✔</td>
</tr>
<tr>
<td><strong>Kun Long</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Nong Pa</strong></td>
<td></td>
<td>✔</td>
</tr>
<tr>
<td><strong>Tasang (Mai Tong)</strong></td>
<td></td>
<td>✔</td>
</tr>
<tr>
<td><strong>Ywathit</strong></td>
<td></td>
<td>✔</td>
</tr>
<tr>
<td><strong>Weigyi (Mae Saring1)</strong></td>
<td></td>
<td>✔</td>
</tr>
<tr>
<td><strong>Dagwin (Mae Saring2)</strong></td>
<td></td>
<td>✔</td>
</tr>
<tr>
<td><strong>Hatgyi</strong></td>
<td></td>
<td>✔</td>
</tr>
</tbody>
</table>

**Notes:**
- ✔ indicates presence
- **Nu River** 汀江 (中国)
- **Salween River** 滇江 (缅甸)
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Main Motivation Behind…

Growing Energy Dependence…

1. Geopolitical Importance of Myanmar
2. The Great Western Development Strategy
   - South-North Water Transfer Project
3. Five Year Plans
   - The West - East Electricity Transfer Project
Chinese Power Mix Forecast

Source: Lawrence Berkeley National Lab, 2050 China Energy Study
Geopolitical Importance

- China’s strategic interest in access to the Bay of Bengal in the context of Beijing’s objective to develop a naval presence in the Indian Ocean. (Uppsala, 2013)

- Bilateral talk for infrastructure development in Myanmar.
The Great Western Development Strategy

The western half of China, however, lagged behind severely. In order to help the western half of China catch up with the eastern half, a Leadership Group for Western China Development was created by the State Council in January 2000, led by former Premier Zhu Rongi.

- **South-North Water Transfer Project**
  - Due to strong urbanization and industrialization, water has become scare and the situation has reached a crisis level in the East part of the country (Uppsala, 2013)
  
  - Diverting water from the upstream sections of six rivers in southwestern China, including the Mekong, the Yarlung Tsangpo and the Salween, to the dry areas of northern China (Craig Simons, 2006)
Five-year plan: key indicators of the directions and changes in development philosophy at the highest levels of Chinese leadership

- The People’s Republic of China began implementing five-year plans in 1953 in order to align the economy with top policy goals and to communicate this directive throughout the government bureaucracy. Five year plans are designed to be roadmaps for regulators and provincial officials, who are responsible for their implementation.

- **10th Five Year Plan (2000-2005)**

  The West-East Electricity Transfer Project, initiated in the Tenth Five-Year Plan (2000-2005), was designed to bring investment and development to China’s lagging west while satisfying the growing electricity needs of the country’s eastern provinces. (Wilson center, 2012)

- **11th Five Year Plan (2006-2010)**

  During the "11th Five-Year Plan" period, the Yunnan state started the development of the Liuku and Sai-ge Hydropower Stations on the Nu River.

  Until 2010, China's renewable energy aimed to reach 10% of the national energy consumption, and the amount of renewable energy will reach 300 million tons of standard coal.
West - East Electricity Transfer Project

7 cities: Beijing, Tianjin, Hebei, Shanghai, Zhejiang, Jiangsu, and Guangdong

Source: Wilson center, China Environment Forum
12th Five Year Plan (2011-2015)

- China is already the world’s largest emitter of CO$_2$, approximately 78% of the country’s electricity demand is made by coal burning, and the International Energy Agency predicts that the country will account for 40% of the growth of global annual CO$_2$ emission over the next 25 years (Philip H, 2008)

- An alternative source of electricity-hydropower produces far fewer emissions, and China already derives more of its electricity from hydropower than virtually any other country.

- It is clearly said that ‘Nu river hydropower project’ is on the main list of development for during the 12th Five-Year Plan (2011-2015).

- In the 12th Five-Year Plan paper, obviously listed large hydropower base development projects: Nu River Songta plant, Nu River Ganliu sixth dam: Maji, Yabiluo, Saige and other projects.
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## Recognized Barriers(1): Environmental Impact

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<thead>
<tr>
<th>Land resources loss due to reservoir inundation</th>
<th>(Zhao, Zheng, Wang 2006)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landscape influence</td>
<td>(Zhao, Zheng, Wang 2006)</td>
</tr>
<tr>
<td>• Main natural and cultural attractions affected (UNESCO heritage sites)</td>
<td></td>
</tr>
<tr>
<td>Terricolous plants/ Aquicolous species and animals</td>
<td>(Zhao, Zheng, Wang 2006)</td>
</tr>
<tr>
<td>• 37 kinds of fish in the middle and lower reaches of the Nu river</td>
<td></td>
</tr>
<tr>
<td>Greenhouse gas emissions from reservoir</td>
<td>(Zhao, Zheng, Wang 2006)</td>
</tr>
<tr>
<td>Environmental protection measures and costs</td>
<td>(Zhao, Zheng, Wang 2006)</td>
</tr>
<tr>
<td>Natural hazards: Earthquakes - Nu river is located on an active fracture zone of China</td>
<td>(Hudongbaike, 2013)</td>
</tr>
<tr>
<td>Debris flow: there are 762 Nujiang Prefecture landslides, mudslides point</td>
<td>(Hudongbaike, 2013)</td>
</tr>
</tbody>
</table>
Recognized Barriers(2): Societal Impact

1. Barriers for migrants from the dam sites (Yang, Ou, Luo 2010)
   - Local ethnic minorities have strong regionalism about their hometown, Psychological fear about living in a new environment
   - From primary industry (agriculture based) change into secondary or tertiary industry is a big challenge for local ethnic
   - Immigrants high expectations for compensation (Increase awareness of the rights of migrants, more migrants required a long-term compensation rather than cash and in-kind compensation)
   - Per capita arable land area is not enough for whole migrants since 98% of the Nu river area is consist of mountains, cannot meet the production needs of immigrants
   - Poor migrants status, although most of the migrants life standard is improved but for less competitive immigrants are even poorer than their previous life
   - Fair distribution issues of immigration interests, exist personal feelings and corruptions lead unfair distribution and delaying. This will stimulate group events.

2. Lost local migrants' culture diversity (Yang, Ou, Luo 2010)
   - Nu river area consists of several minorities such as Lisu, Bai, Nu, Pumi, Dulong, Tibet ethnic. Variety ethnic customs and traditional cultural heritage (food, clothing, crafts, houses, music, dance) will be affected after migration.

3. Local ethnic immigration and relocation of facilities (Zhao, Zheng, Wang 2006)
   - Waste pollution (三废污染): Solid, liquid and gas wastes
Barrier Removal: Hints from Chinese Literature

1) Reduce the number of cascade hydropower stations (Fu,Sun,Liu,Wang,Yang 2011)
   • Not divide Nu river into an artificial 13 Lakes but leave several segments of the river in sufficient length to preserve ecosystem. Maji,Yabiluo,Saige and Liuku are feasible for cascade development, others are need to be considered carefully.

2) Carefully select on dam site, prevent further geological disasters (Fu,Sun,Liu,Wang,Yang 2011)
   • Some of the Nu river are located on active zone

3) Make clear list about prohibit development river (Fu,Sun,Liu,Wang,Yang 2011)
   • Avoid habitat diversity, rare species focusing area, environment protection, world heritage areas for development

4) Establish technologies for detect the whole basin (Fu,Sun,Liu,Wang,Yang 2011)
   • Biomonitoring Network System is needed combine with ecological survery for detection

5) Implementation of fish protection technology (Fu,Sun,Liu,Wang,Yang 2011)
   • Construction of fish proliferation station/ Artificial reproduction and releasing facilities

6) To set local integration of migrants as a priority, if for relocation immigration then will consider fellow-based migrants together (Yang,Ou,Luo 2010)

7) Provide workforce training to achieve full employment of labor migrants into different industries (Yang,Ou,Luo 2010)

8) Establish a harmonious immigrant communities, to educate local people accept different minorities as one community before new migrants arrived (Yang,Ou,Luo 2010)

9) Focus on tourism development at new place after migration, provide work opportunities for migrants and increase their living standard from earnings (Yang,Ou,Luo 2010)

10) Establish a strict supervision to achieve a fair and equitable distribution of benefits (Yang,Ou,Luo 2010)
Way Forward

- Yunnan Province is an important base for China’s “West-East Electricity Transfer Project”. Hydropower development, especially upper/lower Salween have a huge potential for power supply in the China's future energy.

- On the other hand, socio-environmental negative impact and migrant issue are currently well recognized by the Chinese investors as well as government.

- The solution should be in accordance with global standard, which requires some funding resources. In this regard, currently, it is suggested that investors should set up a fund for compensation for social and environmental impact.
References

- Nathanial M, 2013, 'Chinese hydropower electrifies southeast Asia, but at a cost'
- EA, 2013, 'Chinese investments play large role in Southeast Asia hydroelectric growth'
- Salween Watch, 2014, 'Hydropower Projects on the Salween River: An Update'
- The Observer, Feb 2015, '西藏怒江水电站将开工 民忧地质灾害'
- Upper Salween hydro source:怒江水电基地,Hudong baike.
- Chinese Energy Demand Trend, Nankai University
- EIA, 2013, China’s natural gas imports
- Uppsala, 2013, 'IWRM in international river basins'
- Chinese Energy Strategy Trend, Baidu
- Craig Simons, 2006, 中国南水北调
- Wilson center, 2012, 'China’s West-East Electricity Transfer Project'
- Philip H, 2008, 'Socioeconomic vulnerability in China’s hydropower development'
- 西部大开发‘十二五’规划
- 怒江水电开发的生态影响与保护对策－符建荣、孙治宇、刘少英2012年
- 怒江水电开发政策变迁研究－周琛 2012年
Thank you for your attention