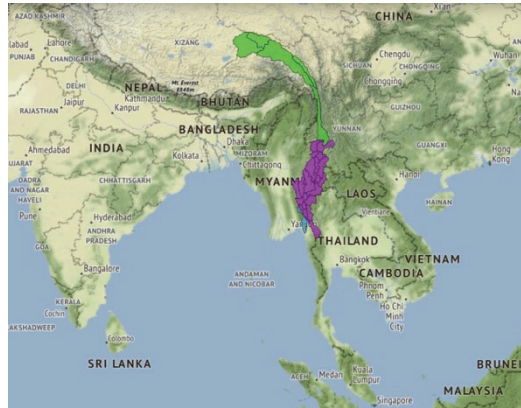


Impasse on the Lower Salween/Thanlwin: is it resolvable?

Lower Salween water resources management coming to a head soon?

The Salween is the largest undammed major river basin SE Asia. It originates in Tibet (PRC), enters into Burma/Myanmar for 300 km, then comprises the international border between Thailand and Myanmar for another 160 km, at which point it re-enters Myanmar and flows another 400 km before debouching into the Gulf of Martaban, below Molawmyine.



For most of its course and catchment throughout Myanmar the Salween Basin is primarily inhabited by non-ethnic Burmese (i.e., “Bamar”) minority peoples; including the Shan, the Kayin (Karen), the Karenni, and the Mon; of which the first three have been in intermittent armed uprisings against the central Myanmar government since the close of the colonial era. Aspects of these conflicts could be described as “genocidal”; and forced removals of ethnic minority communities from prospective reservoir inundation zones have already created some 50,000 or more [internally- or externally-displaced political refugees](#).



Notably, Burma/Myanmar has the worst electrical power situation of any of the ASEAN countries, with total installed generating capacity less than 4,000 MW, for a population of ~65M. By comparison, Thailand, with a population of ~75M has a domestic installed generating capacity of 45,000 MW, with another 5,000 MW coming already or soon so from Thai energy projects in neighboring countries: primarily the Lao PDR.

China has the technical capability, the available capital, and the political will to develop some 15,000 MW (megawatts = 1,000 kw) of hydropower energy in the Lower Salween basin and mainstem entirely below the river's leaving the PRC. Non transparent contracts already have been negotiated between the PRC, the Myanmar government, and Thailand to wheel c. 90% of the prospective power yield to Thailand and/or the PRC, with the remainder connecting to the Myanmar grid.

The proposed operational and capital investment arrangement for the major component projects is “BOT”, for “build, operate, and transfer”: ordinarily on a thirty-year basis. At the end of the BOT period, the facilities would revert completely to the host country. In the near term, the 10% going to Myanmar would increase the present available power by only 1,500 MW, or 30% of existing installed capacity. But assuming that the physical hydropower plant (un-sedimented reservoirs and headponds/tailponds, and well-maintained turbines, generators, gates, and penstocks, and other basic infrastructure) was still in good condition, at the expiration of the BOT, the country’s installed generating capacity would rise by nearly 400% over the present.

The vast percentage of the capital investment would be fronted by the Chinese, who would recoup it fully during the BOT period by energy exports assured by power purchase agreement (PPA) contracts. At present, no alternatives to large-scale hydropower are seen as practicably/technically/economically capable of so substantively augmenting Myanmar’s energy supplies within a similar development timeframe.

Bangkok’s subsidence, flooding, and water deficit problems

As a consequence largely of diversions and abstractions for intensive irrigation of agriculture throughout Thailand’s rice-growing heartland in the Chaophraya basin from the Ping River headwaters all the way down to the estuary (beginning above Bangkok); and secondarily to unsustainable groundwater overdraft to service the Thai capital’s municipal and industrial (M&I) requirements, the surface elevation of much or most of the Bangkok megalopolis has been significantly dropping relative to sea level. Likewise dropping is the phreatic level of the groundwater table. Both of these factors have led to increasing saline intrusion and deteriorating water quality. The cost of flood protection through embankment construction and surface water pumping during the monsoon is rising inexorably and may already threaten the capital’s economic viability.

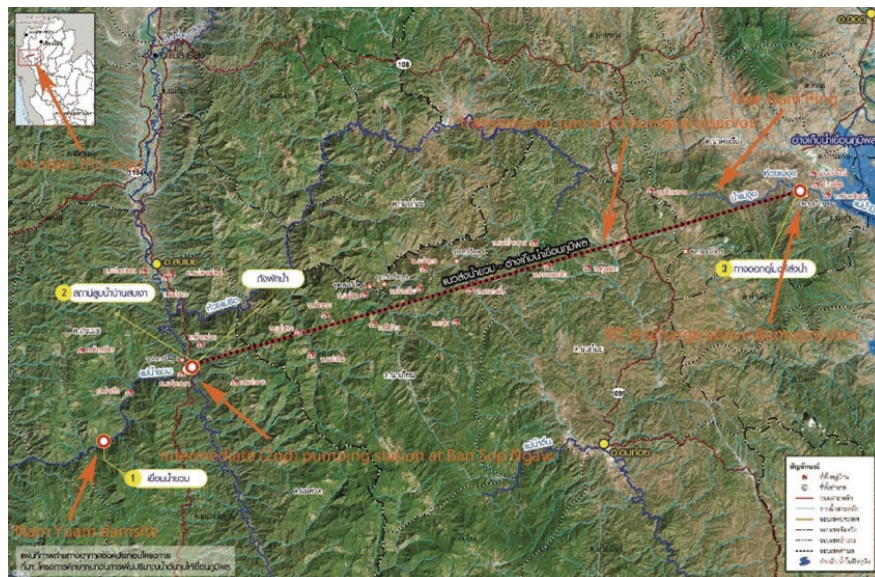
In addition, with declining freshwater deliveries from up-basin during the dry seasons, marine sediments entering the estuary and Port of Bangkok with incoming tides—but no longer re-suspended on the ebbs due to reduced current velocity—may already be impacting inshore navigation and marine commerce.



The solution just now being publicly proposed by the Thai Royal Irrigation Department (RID) is to implement an **elaborate and heroic inter-basin transfer (IBT) scheme** to divert water from the Salween to the Chaophraya. The volumes required would be on the order of hundreds of *cumecs* (cubic meters per second = m³/sec) continuously for several months annually, and the technical aspects would entail constructing one or more intermediate new reservoirs; some 100 km of tunnels entailing nearly 200 m of vertical lift—and assuming electrical pumping— would come at an energy demand of some 200-300 MW throughout the three-month annual operational period.

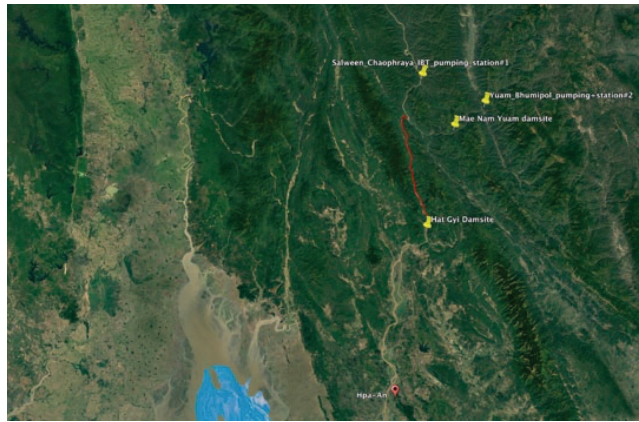
Absence of binding co-riparian agreements

Unlike—as with the case of the “Mekong Compact”, agreed by four of the six co-riparian countries (PRC/China is also a non-signatory, but in recent years has formally agreed to a certain level of candor and cooperation with the MRC, and the other is Myanmar, though its actual significance to the Mekong’s hydrology and future exploitation is relatively trivial), which obligates that substantive changes to volumetric or temporal flow regimes as a result of water management/energy development projects proposed by Compact signatories be discussed and negotiated in advance (but notably, absolute veto power is not entailed). No such agreements are in force, nor even so far under serious consideration, for the three Salween Basin co-riparians: i.e., the PRC, Myanmar, and Thailand.



Thus, Thailand has every right to implement grand-scale IBT as long as all the requisite infrastructure is completely within Thai territory, and the diversionary structures/pump intakes on the Thai side of where the Salween is the international border.





Moreover, the energy requirements for such a project —while hypothetically capable of being met by building long-distance transmission lines from existing or new power plants within Thailand— would be much more practicably met by wheeling power from the proposed 1,300 MW Hat Gyi dam and reservoir on the Salween, which themselves would be located entirely within Myanmar’s territory.

Alan,
Good to hear from you. An interesting problem and one that some of colleagues are also attempting to work on, specifically irrigation system improvement in the upper Mekong River catchments, through recent ACIAR funded projects.

Confirming discharge of 300 cumecs, which you probably understand to be 300,000 Litres/second (6.85×10^9 USgallons/day)? Your “300 cumecs x 24/7/20.5” (300 cumecs for three months) would actually be: $300 \times 3600 \times 24 \times 30.5 = 790.6$ GL. Pipe diameter designs would need to start at 10 metre diameter, and increase for a reduction in energy consumption pending some hydraulic design.

While not having completed an extensive study of all the information you have provided, I believe there to be 180 metres of static lift and at least 62 km of tunnel, which may give you at least 800 metres of TDH (total dynamic head).

If that were the case, then you would be looking at something like 2.7 million MW.h of energy to shift that volume of water each year.

I trust that assists you in some way to understand your challenges.

Best Regards
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AUSTRALIA

However, the leaked confidential terms of the existing semi-secret contract to build and operate Hat Gyi, already agreed by the three Salween co-riparians, would have 90% of the power yield going to Thailand in any case throughout the BOT period.

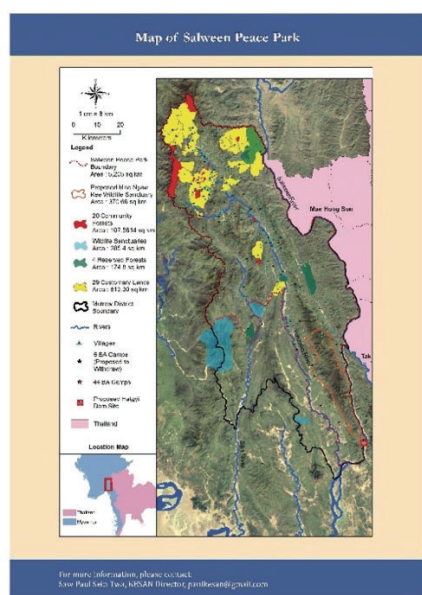
Fierce resistance by Myanmar’s ethnic minority communities to any large-scale hydropower development anywhere in the Salween Basin and to IBT schemes primarily benefiting Thailand

Intended in large part specifically to preclude the development of the Hat Gyi project, and indeed all the other proposed Salween hydropower schemes upstream from Hat Gyi, separatist-leaning political and armed factions within Kayin (Karen) State have just in the past several months declared/promulgated the “Salween Peace Park” (SPP): encompassing some 5,500 km² which would be under the complete authority of the Karen people, in perpetuity.

Guest Column

The Salween Peace Park: A Radical, Grassroots Alternative to Development in Karen State





The events of the SPP's dedication ceremonies, and terms of acceptable land use and the specific geographic demarcation were determined with apparently **no fore-knowledge of, nor participation by, the Union of Myanmar national government.**



Given that the *Tatmadaw* (the Burmese national military forces) presently occupy the territory of the putative SPP almost in its entirety —and indeed within their constitutionally-delegated authority to do so— and are unlikely to be removed forcibly by the several Karen separatist armed factions, for the SPP to become an actuality and an appropriate re-settlement area for the tens of thousands of internally and [internationally-displaced Karen refugees](#) would require negotiating a “grand bargain” amongst the key players.

This would probably entail both allowing Hat Gyi to be constructed and used to provide energy for the Salween-Chaophraya IBT scheme; and in recompense, accepting almost all aspects of the SPP, of which only some 20-40 km² of the **proposed 5,500 km² park** would be occupied by the Hat Gyi dam and reservoir.

To our knowledge, no such proposals have been put forward by any of the contending parties and armed forces, and would likely be very widely opposed by all who are presently well-served to some degree by the status quo, or who may have unrealistic expectation of outcomes exclusively favoring their positions. If some such agreement was not negotiated, and the Myanmar government unilaterally moved forward with developing the Hat Gyi project in the near term, it would not be farfetched to suggest a [quasi-genocidal military campaign by the Tatmadaw](#)—like those launched several decades ago against the Shan and Karen—would result.

The downsides...

- The level of **opposition to top-down “pharaonic” hydropower** in general and specifically against developing large-scale hydropower anywhere within the heretofore-undammed Nujiang/Salween/Thanlwin basin is **ferocious and unrelenting across the minority communities**; the local, regional, and international enviro NGOs; and not least, within certain sub-agencies of the international development apparatus: e.g., see **UNDRIP**.

**Karen Villagers Protest Hatgyi Dam,
Other Projects on Salween River**



- Heretofore there wasn't much material on the ichthyology of the Salween canyon—which begins c. 100 km above its estuary (extending roughly from the Gulf of Martaban below Molawmyine, in Mon State to Hpa An, capital of Kayin State), thence continuing up-basin into Tibet, about 2,000 km northwards— if **migratory fish species exist and play role in riverine cultures**, the 31m high Hat Gyi dam at the toe of the canyon, with a head-pond extending 90 km upstream entailing the alteration of river ecology through that reach from lotic (i.e., stream-like), to lentic (i.e., lake-like), which alone could be extremely damaging to fish stocks! Thence the mainstem upbasin through China... and while the ichthyofauna throughout is reputedly biodiverse and rich in endemics, “fisheries” as such may be unimportant: nutritionally and culturally. **There may already exist compelling data to evaluate this issue.**



The semi-analogous situation with the Pak Mun dam in Thailand constructed in the 1990s just above the confluence of the Mun-Chi basin (comprising a catchment of c. 117,000 km²) with the Mekong was devastating to fisheries and in part may have precipitated the unresolved “Red Shirt” anti-national uprisings in Isaan and Lan Na against central Thai authority).

- Third, there doesn't appear to be a publicly accessible hydrological database for the lower Salween—and depending on the inter-basin transfer (IBT) regime both volumetrically and temporally—should the Thai Royal Irrigation Department move forward on the proposed Salween/Nam Yuam/Chaophraya IBT scheme (which again they have the full legal authority to do. The Lançang-Mekong is a much larger basin, and the minimum dry season discharge into its estuaries is as little as 3,000 cumecs. Realistically, the minimum dry season discharge of the Salween could be as little as 1,000 cumecs or less, and diverting 300cumecs of that to the Chaophraya (at phenomenal energy cost, to be sure) would itself induce a number of potentially destructive changes to fisheries ecology,

sedimentation, and channel morphology/navigability (large ships ply considerably upstream of Molawmyine).

- Fourth, even with the direct involuntary displacement of only a trivial number of households (~20-80) by the proposed Hat Gyi dam/reservoir, and the inundation thereby of an equally trivial area of prime agricultural lands (~500-1,500 ha), the social impacts resulting from the temporary presence throughout the construction period of a predominantly Han Chinese workforce, numbering in the hundreds or maybe thousands —with a much smaller number of Chinese technicians likely remaining in local residence throughout the BOT period— arguably outweighs the project's strictly physical impact. As a consequence of the PRC's now-abandoned "one child policy", with the resulting gender imbalance caused by sex-selective abortion (and some degree of female infanticide), the marriage prospects for tens of millions of Chinese men within the PRC itself are not great.
- Fifth, while the creation of the Salween Peace Park (SPP) as a result of a hypothetical "grand bargain" involving Hat Gyi and the IBT would likely create a much greater benefit stream to the Kayin/Karen than the foreseeable dis-benefits —ecological, economic, and social—in Kayin State, some of the dis-benefits would extend down-basin to the Mon people in the regions between Mowlawmyine, Thatong, and Martaban who would gain little from the SPP, other than a possibly-lucrative increase in tourism.



Also, if Hat Gyi were built, the floodgates —so to speak— would be opened for major mainstem dam construction all the way up the Salween/Thanlwin to the Chinese border, and maybe into Yunnan as well. The Shan, who have already been on the receiving end of a semi-genocide in the 1990s over their resistance to the prospective loss of their extraordinary waterfalls and broad valleys above the Nam Pang/Salween confluence would be very deleteriously and disproportionately impacted by the 7,100 MW Tasang/Mongtan hydropower project, but they would gain no such major benefit as the SPP.



- Sixth, even while the [visuals](#) put forward by the proponents of the [Mae Lama Luam dam \(MLLD\)](#), at least so far, don't bring up the Salween/Thanlwin IBT dimension, it necessarily figures large because the proposed [MLLD, at the indicated height of 69.5 m, and reservoir capacity of 68.74 million cubic meters \(= mcm, a volumetric\)](#) "to augment the storage of the Bhumipol Reservoir", if an increase to the Chaophraya discharge of ~200 cumecs was required continuously for 60 days; volumetrically, that's ~1.04 billion m³, i.e., of which the total capacity of the MLLD reservoir could provide only 0.66%.

If the heroic pump/tunnel infrastructure somehow transferred to the Chaophraya basin the entire annual discharge of Nam Mae Luam 5,990 km² catchment, which is ~2.9 *billion* m³, this would be ~2.8x that needed to stabilize or reverse megacity Bangkok's worsening drought situation, i.e., now nearly zero freshwater delivered from up-basin every dry season.

However, the [available capacity of the Bhumipol reservoir to receive IBT flows](#) will be when it is drawing down its stage releasing to Chaophraya headwaters; but under the present flow regime, demonstrably insufficient to achieve the Bhumipol Project's original objectives (as I'd presume): keeping the Chaophraya fresh enough to stabilize metro Bangkok's M&I requirements and also its subsidence problems.

From the [confluence with Nam Ngao, when the MNY turns west](#), until the MNY confluence with Nam Moei, the majority of the present population of the canyon —and indeed, well upslope— are Karen refugees having fled the recurrent violence on the Myanmar side. The small first-wave came a generation or two ago, and their settlements and livelihood would be inundated if the MLLD project went ahead. They probably number less than 100 households. The cluster of official refugee camps along and upslope those reaches of MNY below the MLLD dam site appears to presently house several thousand Burmese Karen who had arrived much more recently.



The Kingdom will be relieved to see them all successfully repatriated: perhaps into the Salween Peace Park.

