

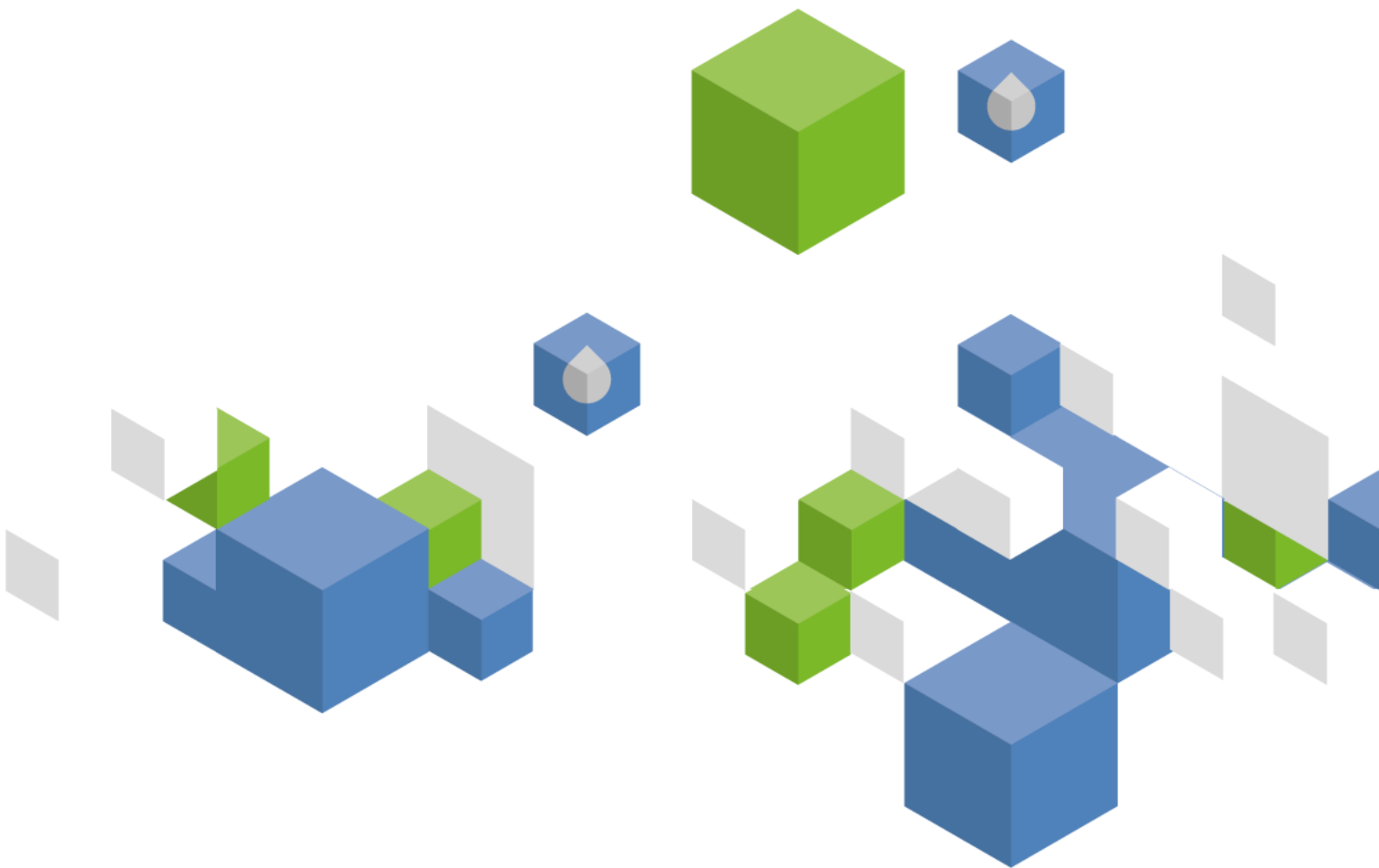


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Salween transboundary river basin

GEOGRAPHY, CLIMATE AND POPULATION

Geography

The basin of the Salween river, also known as Nu river in China and Thanlwin river in Myanmar, is a transboundary basin with a total area of 320 000 km² distributed between China (53 percent), Myanmar (42 percent) and Thailand (5 percent) (Table 1). Approximately 2 400 km long, the Salween river is the second longest river in Southeast Asia after the Mekong river. The river originates 4 000 m above sea level on the mountain Tangua in the Himalayas on the Tibetan plateau in China, then flows southward through Yunnan province, China, down through Shan and Kayah states in the east of Myanmar, along the border between Thailand and Myanmar for about 120 km, then again enters Myanmar and passes through Kayan and Mon states before emptying into the Gulf of Martaban in the Andaman Sea. The Moei river, originating in Thailand, becomes the border between Myanmar and Thailand and joins the downstream Salween river, which has also become the border river between Myanmar and Thailand, before again entering Myanmar.

TABLE 1
Country areas in the Salween River Basin

Basin	Area		Countries included	Area of country in basin (km ²)	As % of total area of the basin	As % of total area of the country
	km ²	% of Southeast Asia				
Salween	320 000	1.5	China	169 600	53	1.8
			Myanmar	134 400	42	19.9
			Thailand	16 000	5	3.1

In China, the Nu river runs parallel to the upper reaches of the Mekong (also called Lancang) and Yangtze rivers in an area designated by UNESCO as a World Heritage Site for its rich biodiversity. In Myanmar and Thailand, the topography of the Salween river basin is mountainous, with long narrow river valleys. The basin is rich in natural resources, including water (both surface and groundwater), forest, wildlife, fisheries and aquatic life and minerals. Part of the basin in Thailand is a national park and wildlife sanctuary. Its beautiful landscapes include many caves, rapids, cliffs, unusual rocks and waterfalls that serve as tourist attractions. Habitats in the Salween eco-region support rich and endemic freshwater fauna. The river is home to at least 140 species of fish, of which one-third are endemic (Salween Watch, 2011).

Climate

The climate of the basin is influenced by the southwest monsoon in summer, from May to October, and the northeast monsoon in winter, from November to April. The middle and downstream reaches of the Salween and the Moei river basins belong to a typical tropical monsoon. The annual precipitation within the Salween river basin ranges widely, from around 1 200 mm midstream to over 2 000 mm upstream and downstream. In the coastal areas of the basin, the annual rainfall is as high as 4 000 to 5 000 mm (Vatcharasinthu and Babel, 1999).

Figure 1
Salween River Basin



Salween river basin

Legend

- | | |
|----------------------------------|---------------|
| ● Capital, town | ▲ Dam |
| — International boundary | ☪ Lake |
| - - - Administrative boundary | ~ River |
| ☐ Zone of irrigation development | — Canal |
| | ☐ River basin |



0 50 100 200 300 400 km
Albers Equal Area Projection, WGS 1984

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The Upper Salween river basin in China covers four different climate zones (subfrigid, temperate, subtropical and tropical) whereby the northwestern highlands are marked by predominant continental conditions with a dry, cold climate and the southeastern lowlands are characterized by maritime, warm conditions. However, the distinctly seasonal nature of the monsoon planetary circulation affects to a greater or lesser extent all parts of the Upper Salween river basin (Lienert, 2011).

Population

More than 10 million people, representing at least 13 different ethnic groups, depend on the Salween river basin for their livelihoods: fisheries are a major source of dietary protein, and the river's nutrients nourish vegetable gardens in the dry season and fertilize farmland (Wolf and Newton, after 2007). In 2002, the population density in the Salween river basin was 76 inhabitants/km² (Earth Trends, 2002). The most populated section of the river basin is the delta's fertile floodplain that covers thousands of hectares at the mouth of the river. There, most people tend paddy fields in the rainy season and vegetable gardens on the river bank in the dry season. They also fish all year round (BRN, 2011).

WATER RESOURCES

The Salween river is the longest waterway without a dam in Southeast Asia. Numerous major tributaries, including the Pang, Teng, Pawn, Hka, and Hsim rivers join the Salween river in Myanmar. About 320 km from the mouth, for about 120 km the river forms the border between Myanmar and Thailand, before meeting with the Moei river (Thaungyin river) where it reenters Myanmar.

The annual flow of the Salween river basin from China (Nu river) to Myanmar (Thanlwin river) is 68.74 km³. In Myanmar, the Salween river basin drains 20 percent of the territory, mainly the Shan plateau in the east. When becoming the border between Myanmar and Thailand, the flow is estimated at 200 km³/year. Since it flows only over a relatively short distance on the border, the contribution from Thailand, therefore, is considered to be low over that short distance and the accounted flow of the river given to Thailand is $200/2 = 100$ km³/year.

Water quality and environment

The Salween river is among the ten most polluted rivers in the world (The Millennium Project, 2010). Natural resources are being exploited with alarming rates of environmental degradation. With civil war in Myanmar, and development project plans, the state of the Salween river basin is rapidly deteriorating. It is feared that developments on the river, including hydropower and water diversion projects, will destroy the delicate balance between the river and its catchment area. Many of the effects of a dam built on the Salween river will occur in Myanmar's downstream communities and ecosystems, but the forest, river and people in Thailand will also be affected (Salween Watch, 2011).

WATER-RELATED DEVELOPMENTS IN THE BASIN

The Salween river basin has huge potential water resources that, if well planned with careful consideration of the environment, can be developed for hydroelectric power generation and water use for different purposes within the basin or nearby basins. The basin, therefore, can serve as a major source of water and energy for the future social and economic development of Myanmar and Thailand (Vatcharasinthu and Babel, 1999).

The total area equipped for irrigation in the Salween river basin is estimated to be around 400 000 ha, of which Myanmar accounts for approximately 50 percent, China 42 percent and Thailand 8 percent. The area actually irrigated is estimated at 380 000 ha. The equipped area irrigated by surface water and groundwater account for 97 and 3 percent respectively.

Total water withdrawal in the Salween river basin is estimated at 5.1 km³ of which Myanmar accounts for approximately 63 percent, China 32 percent, and Thailand 5 percent. Irrigation withdrawal accounts for 4.2 km³, or 81 percent of the total.

For much of its course, the Salween river is not navigable because of rapids, but in the lower reaches, near the sea, the waterway is used to float timber downstream to sawmills.

Despite the fact that studies made after the 1950s identified tremendous hydropower potential, the Salween river is a relatively undeveloped basin, being the longest river in Southeast Asia that has yet to be dammed (BRN, 2011). However, it is likely that with economic development and further political integration in the region, development pressure in the river basin will increase, and there will be greater demand to use the water for irrigation, municipalities and industries, as well as the need for sufficient water for navigation. The power companies of Thailand and Myanmar, as well as private Japanese concerns, have pursued individual feasibility studies, however, it is only since the 1970s that the potential of the basin as a whole has been investigated. Besides power, serious plans have revolved around large-scale water diversion. Irrigation, barge transportation (to promote trade and tourism), and related surface infrastructure have also been discussed (Salween Watch, 2011).

The Chinese government plans to construct a cascade of up to 13 hydroelectric dams along the Nu river (Songta, Bingzhongluo, Maji, Lumadeng, Fugong, Bijiang, Yabiluo, Lushui, Liuku, Shitouzhai, Saige, Yansangshu and Guangpo) having a combined capacity of 23 320 MW (Salween Watch, 2011). Nine of the 13 proposed dams are in national nature reserves that are close to the World Heritage Area. The proposed dams have been the subject of an unprecedented out-cry from Chinese journalists, environmentalists and everyday citizens who want to protect one of China's last dam-free rivers, and its ecological and social heritage (International Rivers Network).

The governments of Myanmar and Thailand are pushing ahead quickly with plans for a series of five giant dams on the Salween river and its tributaries, which are Hatgyi, Tasang, Wei Gyi (Upper Salween Dam), Dagwin (Lower Salween Dam) and Upper Thanlwin. The 7 110 MW Tasang Dam is the biggest of five dams planned of which the majority of the power generated will be sold to Thailand (Salween Watch, 2011). The planned dam at Tasang is proposed to be more than 180 m high, making it one of the largest dams in Southeast Asia (Wolf and Newton, after 2007).

TRANSBOUNDARY WATER ISSUES

There is no agreement between China, Myanmar and Thailand on the use of the Salween river, thus allowing each of them free use of the river. Each of these countries has unilateral plans to construct dams and development projects along the Salween river.

In 1989, a joint technical committee was established between Thailand and Myanmar, made up primarily of representatives from the power companies of the two countries. Since that time, the committee has continued to meet and to pursue feasibility studies, but no project or management body has been implemented nor a basin-wide plan created. China has not been included in discussions to date, nor has iChina included Thailand and Myanmar in its plans for projects on the Nu river (Wolf and Newton, after 2007).

In 1992, Thailand approved a plan to solve the water crisis in the Chao Phraya river basin, which encompasses the Salween Diversion Scheme and inter-basin water transfer from the Salween river basin to the Chao Phraya river basin. In 2003 several alternative plans were drawn up to divert 2.2 km³ of water from the Salween river's major tributaries – and potentially the mainstream itself – through systems of holding dams, huge pumps and long tunnels to the Bhumipol dam on the Ping river, a tributary of Chao Phraya river that runs through central Thailand. One such plan is to divert floodwaters from the Salween river into a dam on the Yuam river, a major tributary of the Salween river, at Mae

Lama Luang. The water from the Mae Lama Luang dam will then be diverted through a tunnel leading to the Bhumipol dam (Salween Watch, 2011).

In 1992, Japan's Electronic Power Development Corporation (EPDC) selected eight major hydroelectric dam projects, some of which are entirely in Myanmar and others are on shared sections within the Salween river basin.

In 2001, the Prime Minister of Thailand reversed past policy of distancing Thailand from Myanmar and pursued a policy of conciliation, cooperation and public support. Thai businesses were encouraged to invest in Myanmar, Thailand agreed to construct a bridge across the border to boost trade and tourism, and began a hydroelectric dam project on the Salween river. Thailand decided to channel water from Myanmar to solve its needs for irrigation and drinking water, and as a source of electrical power.

Since December 2002, the Myanmar Military and the Electricity Generation Authority of Thailand (EGAT) have been discussing the possibility of constructing large dam projects on the Salween river. Between October 1998 and March 1999 several teams of experts from Myanmar and Thailand, assisted by about 20 Japanese specialists, inspected three sites in the Salween river gorges about 120 km from the Thai border and carried out geological studies, test bores and feasibility studies. A quarter of the total energy production estimated would go to Myanmar and Thailand would purchase the rest. Environmental groups expressed concerns about the ecological effects of the projects, and human rights advocates warned against coinvesting with a military junta that is oppressive, unpredictable, and might not respect benefit-sharing agreements. Nonetheless, in August 2004, Thailand and Myanmar agreed to set up a joint venture to construct five hydropower dams in the Salween river basin, beginning with Tasang dam (Wolf and Newton, after 2007).

In 2003 China announced plans to build 13 hydropower projects on the Nu river in China. More than 80 environmental and human rights groups in Thailand and Myanmar petitioned China to consult downstream countries before proceeding with the project. In April 2004, the government of China purportedly suspended plans for the massive dam system, and ordered officials to conduct a review of the hydropower project and an environmental impact assessment.

Table 2 lists the main historical events in the Salween river basin.

TABLE 2
Chronology of major events in the Salween River Basin

Year	Plans/projects/treaties/conflicts	Countries involved	Main aspects
1989	Joint technical committee was established between Thailand and Myanmar	Thailand and Myanmar	Made up primarily of representatives from the power companies of the two countries. The two countries enter into an agreement of cooperation in water development projects
1989	Coordinating team calls for the first meeting in Bangkok	Thailand and Myanmar	In November. Seven hydropower dam projects are proposed
1992	Eight major hydroelectric dam projects were selected	EPDC (Japan), Thailand and Myanmar	Some of which are entirely in Myanmar and others are on shared sections within the Salween river basin
1992	Salween diversion scheme	Thailand	Approval to a plan to solve the water crisis in the Chao Phraya river basin (Thailand), which encompasses the Salween Diversion Scheme
1998-1999	Inspection of three sites in the Salween gorges about 120 km from the Thai border carrying out geological studies, test bores and feasibility studies.	Thailand, Myanmar and Japan specialists	Several teams of experts from Myanmar, Thailand, assisted by about 20 Japanese specialists. A quarter of the total energy production estimated would go to Myanmar and Thailand would purchase the rest .
2001	Policy of conciliation, cooperation, and public support	Thailand and Myanmar	Thailand pursued a policy of conciliation, cooperation, and public support with Myanmar. Thai businesses were encouraged to invest in Myanmar.

TABLE 2 (Continued)

Chronology of major events in the Salween river basin

Year	Plans/projects/treaties/conflicts	Countries involved	Main aspects
2002	Discussing the possibility of constructing large dam projects on the Salween	Thailand and Myanmar	Between the Myanmar Military and the Electricity Generation Authority of Thailand (EGAT)
2003	Several alternative plans drawn to divert water from the Salween river to the Chao Phraya river		Several alternative plans were drawn up to divert 2.2 km ³ of water from the Salween river's major tributaries, and potentially the mainstream itself, through systems of holding dams, huge pumps and long tunnels to the Bhumipol dam on the Ping river, a tributary of Chao Phraya river
2003	China announced plans to build a 13 hydropower projects on the Nu river in China	China, Myanmar and Thailand	
2003	Protests against dam projects on the Nu River	China, Myanmar and Thailand	In December, Groups in Thailand and Myanmar protest China's plans for 13 large dams on the Nu/Salween river
2004	Protests against dam projects on the Nu river	China, Myanmar and Thailand	In March, approximately 80 environmental and human rights organizations protested China's proposed dam projects on the Nu river
2004	Suspension of dam plan for the Nu river	China, Myanmar and Thailand	In April, China suspends dam plan for the Nu river.
2004	Agreement on construction of 5 dams	Myanmar and Thailand	Agreement to set up a joint venture for the construction of five hydro-powered dams beginning with Tasang dam

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