

DAMS IN THE CORDILLERA

The River Systems of the Cordillera and their Watersheds

The Cordillera is dubbed as the watershed cradle of Northern Luzon. Its forests sustain six of Northern Luzon's major river systems. Perhaps for this reason, government classifies 85% of the Cordillera as forestland, 30% of which is officially designated as forest reserve.

Headwaters

The Mount Data forest reserve, located along the boundary of Benguet and the Mountain Province, hosts the headwaters of five major rivers that traverse the Cordillera provinces and drain into the lowlands.

The most extensive of these rivers is the Chico - or Rio Chico de Cagayan. Its headwaters are located on the northern slopes of Mount Data. The Chico flows eastward across Mount Data before taking a northeasterly turn towards Bontoc in the Mountain Province. It continues in its northeasterly course to and through the province of Kalinga, where it is fed by the Tanudan, Pasil, /and Saltan rivers. From Kalinga, it flows into Cagayan province, where it drains into the Rio Grande de Cagayan.

Also flowing eastward from Mount Data is the Ahin river. It flows through the province of Ifugao, where it is joined by the Ibulao river before it empties into the Magat river along Ifugao's border with Isabela.

The Siffu river, another tributary of the Magat, originates from eastern Mountain Province, cuts through Ifugao, then drains into the Magat in Isabela.

The Abra river originates from the southern section of Mount Data. It descends westward to Cervantes, Ilocos Sur and flows to the province of Abra. At a point near the municipality of Dolores, it is joined by the Tineg river, which originates from the uplands of Abra.

Also flowing in a southwesterly direction from Mount Data is the Amburayan river. It traverses the western section of Benguet province before it drains into La Union. Here, it is fed by the Naguillan and Aringay rivers, which originate from Benguet, and then empties into the South China sea.

A third river originates from the southern slopes of Mount Data. This is the Agno, which flows southward through eastern Benguet then drains into Pangasinan. Here, it takes a westerly course, turns north, then drains into the Lingayen gulf.

The Agno river has numerous tributaries, the largest of which is the Bued river. The headwaters of the Bued are found within the city of Baguio.

The Agno has been dammed at two points - at Ambuclao in Bokod and at Binga in Itogon, both in Benguet. A third dam at San Roque, along Benguet's boundary

with the municipalities of San Manuel and San Nicolas, Pangasinan, is due for completion in the year 2004.

Farthest north in the Cordillera region are the twin rivers, Abulug and Apayao, both originating from the province of Apayao. They meet near the municipality of Kabugao and from there take a northeasterly course towards the sea.

River Basins

The river basins of the Cordillera have enormous water-bearing capacity. They have a total drainage area of 5,447,500 hectares and groundwater storage of about 150 million cubic meters. According to government development planners, this is more than sufficient for supplying the irrigation and energy requirements of not only the Cordillera but the entirety of Northern Luzon.

MAJOR CORDILLERA RIVER BASINS AND THEIR DRAINAGE AREAS

RIVER BASIN	DRAINAGE AREA
Abulug-Apayao	444,500 ha.
Chico	1,049,400 ha.
Magat	1,366,000 ha.
Abra	512,500 ha.
Amburayan-Naguillan-Aringay	687,400 ha.
Agno-Bued	1,387,700 ha.
TOTAL	5,447,500 ha.

Denuded Forests, Critical Watersheds

Most of the forests that support these river systems have been declared as reservations. The classification of forests as watershed reservations has largely been associated with hydropower and irrigation dam projects.

Long before any dam project was undertaken in the Cordillera, though, the Central Cordillera Forest Reservation was already created. The American colonial government in the Philippines decreed its creation in 1929, setting aside 74,631 hectares of land for the purpose.

The Mount Data National Park is part of this reservation. It comprises 7.38%, covering 5,512 hectares.

To ensure the viability of existing and prospective dams, the Marcos government decreed the creation of several watershed reservations:

DAM-ASSOCIATED WATERSHED RESERVATIONS

RESERVATION	LAND AREA
Ambuclao Watershed Reserve	10,000 ha.
Upper Agno (Ambuclao-Binga) Watershed Reserve	73,350 ha.
Chico River Basin Forest Reserve	351,762 ha.
Abulug River Basin Forest Reserve	195,659 ha.
Lower Agno (San Roque) Watershed Reserve	39,304 ha.
TOTAL	670,075 ha.

All of the forest reservations in the Cordillera region are now in a critical state. The Mount Data National Park is in an especially critical condition. Seventy-one percent of its area, or 3,896 hectares, has been logged over and converted to agricultural, residential, and commercial use. It is occupied by 2,277 households.

Some of these are the households of former workers of Benguet Corporation, which used to operate a logging concession on Mount Data. BenguetCorp is one of several mining companies that have had large sections pine forest in the Agno, Chico, Amburayan, and Abra river basins logged for mine timber. At one time, BenguetCorp and the Lepanto Consolidated Mining Company held logging concessions that covered a total of 45,000 hectares.

In the late 1970s, there occurred a shift from the logging of pine timber for the mines to the logging of hardwood for export to Japan. Some 200,000 hectares of old-growth dipterocarp rainforest in the provinces of Apayao, Kalinga, and the Mountain Province then became the target area for big logging concessionaires. Now, only less than half of these forests have remained relatively untouched. Yet government has continued to issue licenses to hardwood loggers.

The absence of restraints on the logging industry has allowed the forest cover of the Cordillera to dwindle to less than 47%. Through the years, the reforestation program of the government has proven ineffective. Until today, there have been no substantial gains in the rehabilitation of watersheds. Verdant growth can no longer be restored because the ecosystems of the areas that were once occupied by forest have been altered beyond redemption.

Due to massive deforestation, the occurrence of flashfloods in areas downstream of major rivers has become a perennial problem. Flash-flooding is especially frequent in Pangasinan towns located along the Agno. Erosion from the balding mountainsides along the entire length of the Agno river basin has so severely silted up the reservoirs of the two dams at Ambuclao and Binga that these can no longer hold very much water. The dams' floodgates thus have to be opened whenever there is heavy or continuous rainfall.

Hydropower Generation Projects

Development planners have designated the Cordillera region as a major energy producer. If all its hydropower sources were to be tapped, they would be able to supply 4,306 megawatts to the National Power Corporation's Luzon Grid, comprising 65% of the energy required from this grid.

Existing Facilities for Hydropower Generation

At present, only three NPC plants depend on Cordillera rivers for hydropower. These are the Ambuclao, Binga, and Magat power plants. But only the Magat plant, which generates 360 megawatts, is in continuous operation. Because of river and reservoir siltation, the plant in Ambuclao, which used to generate 75 megawatts, no longer runs. The sole function of the Ambuclao dam at present is to augment the water supply for the Binga plant. But even the

Binga plant, which used to generate 100 megawatts, can only be run intermittently.

The Binga reservoir is also badly silted up. It contains about 3.5 million cubic meters of silt. Half a million cubic meters have to be dredged from it annually so that it can be used to generate some electricity. A longer-term alternative to annual dredging would be the construction of a sluice tunnel. But this would cost 250 to 500 million pesos - money the NPC does not have.

Yet the NPC has thrown away a similar amount, in contracting the services of the China Chang Jiang Energy Corporation for the rehabilitation of the Binga dam over a 15-year period. The company has been working on the rehabilitation of Binga for the past eight years but has yet to achieve anything.

Aside from the three large dams at Ambuclao, Binga, and Magat, 12 run-of-river small hydros tap Cordillera rivers for hydropower. All are located in Benguet, in the municipalities of Bakun, La Trinidad, Sablan, and Tuba. They are privately operated but supply the public utility firm BENEKO, either directly or through the NPC.

Under Construction

Three major hydroelectricity generation projects are in the advanced stage of development. These are the Casecanan, Bakun, and San Roque projects, scheduled for completion between the current year and the year 2005.

Two dams and a transbasin diversion tunnel will channel water from the Casecanan river in Nueva Vizcaya to an existing hydroelectric plant that is attached to the silt-logged Pantabangan dam in Nueva Ecija. From the water collected by the Casecanan dams, the Pantabangan plant will be able to generate 140 megawatts of electricity. The water will also help irrigate 50,000 hectares of land.

The Casecanan dams have already been completed, and the diversion tunnel is nearing completion.

Also nearing completion is another transbasin tunnel that will divert water from the Bakun river in Benguet to a new hydroelectric plant in Alilem, Ilocos Sur. The completion of this tunnel will comprise the final stage of the Bakun River Scheme, in which a set of small hydros generate an aggregate of about 70 megawatts of electricity.

Still beset by construction problems is the San Roque project, which involves the building of the largest earthcore-rockfill dam in Asia. The San Roque dam is expected to generate at least 345 megawatts of electricity and supply irrigation to more than 80,000 hectares of land. It is said to be nearing completion, but the truth is that only the San Roque spillway, resting on a mountain left of the dam, has been built. The dam itself has hardly risen to 20 meters; it is supposed to rise to a height of 200 meters and span a breadth of 1.13 kilometers. The main obstacle to progress in its construction is a fissure beneath the ground on which the dam base is being

laid. The fissure is so deep that three years' efforts to fill it have remained unsuccessful.

A fourth project has been underway for several years now but features power generation only as a secondary objective. This is the Palsuguan project, which involves the construction of a network of nine low dams, two to 13 meters high, on several rivers in Ilocos Norte and one large dam, 143 meters high, on the Tineg river in Abra. The project is expected to result in the irrigation of 25,000 hectares of land and the generation of about 43 megawatts of electricity.

Dams in the Pipeline

Various other large dam projects made it to the drawing board in the 1970s but were never implemented because of the opposition they drew from the communities they would affect. Several of them are now being considered for implementation, though. Among these are the Agbulu, Binongan, and Matuno dams in Apayao, Abra, and Ifugao respectively.

The opposition to large dams - and especially mega hydros - has, however, spurred development planners into considering more seriously proposals for small, mini, and micro hydro projects that would mostly tap the natural run of rivers. Feasibility studies have been undertaken for 43 such projects, only two of which would involve reservoir-type schemes. Forty of the projects have been found feasible and are now ready for implementation under build, operate, transfer or BOT arrangements with independent power producers or IPPs.

A comprehensive study of mega, big, small, mini, and micro hydroelectricity-generating possibilities has been conducted by the NPC to identify projects which can be offered to IPPs. According the study, untapped rivers in 29 municipalities of the region can be harnessed to generate a total of 2,849 megawatts. The projects being considered for implementation are listed below.

HYDRO PROJECTS 10 MW AND LARGER CONSIDERED FOR IMPLEMENTATION IN THE CORDILLERA AS OF THE YEAR 2000

PROJECT	SITE	TYPE	HYDRAULICHEIGHT	CAPACITY
Agbulu	Apayao	reservoir-type	234.0 m	360 MW
Amburayan A	Benguet	run-of-river	10.0 m	34 MW
Amburayan C	Benguet	run-of-river	10.0 m	30 MW
Binongan	Abra	reservoir-type	112.0 m	175 MW
Lamut	Ifugao	run-of-river	8.0 m	12 MW
Matuno*	Ifugao	reservoir-type	122.0 - 160.0 m	52 - 250 MW *
Nalatang A	Benguet	gated concrete weir	14.5 m	30 MW
Nalatang B	Benguet	gated concrete weir	17.0 m	45 MW
Pasil B	Kalinga	run-of-river	10.0 m	20 MW
Pasil C	Kalinga	run-of-river	10.0 m	22 MW
Pasil D	Kalinga	run-of-river	10.0 m	17 MW
Saltan A	Kalinga	run-of-river	8.0 m	10 MW
Saltan B	Kalinga	run-of-river	10.0 m	24 MW
Tanudan D	Kalinga	reservoir-type	55.0 m	27 MW
Tinglayan B	Kalinga	run-of-river	10.0 m	21 MW
AGGREGATE HYDROPOWER GENERATION CAPACITY				879-1,077 MW

* The NPC and the National Irrigation Authority are considering several options for Matuno.

The NPC study has been timed perfectly to coincide with the passage of the Power Reform Act, which transfers responsibility for the development and operation of power generating facilities to IPPs.

Ownership and Control

Existing dams in Binga, Ambuclao, and Magat are owned and controlled by the NPC. Most of the existing small hydros in Benguet are owned and operated by an IPP, the Aboitiz Group of Companies. All of the large hydro projects being implemented or due for implementation are BOT projects covered by power purchase agreements between the IPPs and the NPC.

The small hydros in the Bakun River Scheme are owned and controlled by the Luzon Hydro Corporation, a joint venture of the Pacific Hydro Latitude and Aboitiz Equity Ventures.

The San Roque dam project is owned and controlled by the San Roque Power Corporation, a consortium of the multinational giants Sime Energies, Marubeni, and Kansai Electric.

Local and foreign investors have the option to take up any of the small and mini hydro projects proposed and facilitated by the Department of Energy. The DoE is also open to having local governments undertake these projects in partnership with non-governmental organizations, local electricity cooperatives, or IPPs.

The Restructuring of the Power Industry

In the late 1980s, during the administration of President Corazon Aquino, the government started to liberalize its control on the power industry.

Previous to this, since 1936, the government-owned-and-controlled National Power Corporation had been the only company involved in the generation and transmission of energy.

Aquino's Executive Order 215 paved the way for the influx of independent power producers to the power industry. They NPC entered into build, operate, transfer contracts and power purchase agreements with these IPPs.

In some cases the BOT contract and PPA were one and the same: it provided that the IPP would build a power facility, operate it for 25 to 50 years, then transfer ownership of it to the NPC; during the period that the IPP owned and operated the facility, the NPC would purchase power from this IPP on terms fixed in the agreement or contract.

In the 1990s, President Fidel Ramos further encouraged the participation of the private sector in the power industry. With the passage of Republic Act 7648, the Electricity Power Crisis Act of 1993, the President was empowered to enter into negotiated contracts for the construction, repair, rehabilitation, improvement, or maintenance of power facilities.

The first onerous contract that was negotiated under this law was the 15-Year Binga Rehabilitate-Operate-Leaseback agreement with the China Chang Jiang Energy Corporation. The Ramos administration also entered into another onerous contract with the San Roque Power Corporation for the San Roque Multipurpose Project.

The San Roque project was formally launched in 1997. It was considered a flagship project by both the Ramos and the Estrada administrations.

President Estrada continued with the power program begun by his predecessor, including measures to have a bill passed by Congress for the privatization of the NPC and of the power industry as a whole. The NPC continued with its study of the hydropower potentials of Cordillera rivers towards the formulation of a comprehensive plan that could be implemented once the privatization bill was passed. When Gloria Macapagal-Arroyo took over the presidency, this bill became her top priority. In less than six months, the new President was able to press for the passage of the bill.

And with the power bill, the floodgates for more BOT dam projects in the Cordillera are now fully opened. The President has stated that she will make sure the San Roque dam will be the last large hydropower dam built on any river of the Cordillera. But it remains to be seen whether this will indeed be the case.

A History of Resistance

The first dam projects in the Cordillera were proposed by the Bell Trade mission, which recommended the use of hydropower in ensuring a stable supply of electricity for the rehabilitation and development of the Philippines' post-World War II economy. In 1946, upon the direction of President Roxas, the NPC and Westinghouse International conducted a survey of potential new sources of energy and identified the Agno river as a major source. Thus, when the first Philippine Power Program was drafted on the basis of the survey team's findings, the development of hydropower facilities in the Agno river basin became one of its major features.

Dam-building was, in fact, a worldwide trend during the post-World War II years. Governments equated the construction of energy and irrigation dams with development.

In the Cordillera, the period was marked by the construction of what would be, for many years to come, the biggest dams in Asia - the Ambuclao and Binga dams.

Geodetic surveying for the twin dams started in 1948. But construction work itself started only in 1952. The Ambuclao dam was completed in 1956, and the Binga dam in 1960.

The Ambuclao and Binga dams were listed as Agno I and II, respectively, in the Agno River Basin Development Program. The Program called for the construction of six dams along the Agno: Agno III in Tabu, Dalupirip and Agno IV in Tayum, Ampucan, both in Itogon; Agno V in San Roque and Agno VI in

Lubas, downstream of San Roque. But Ibaloy resistance to construction of Agno III, the Tabu dam, prevented the NPC from pursuing the Program.

The resistance derived from the Ibaloy's having learned a sad lesson with Ambuclao and Binga. The hundred or so Ibaloy households who were displaced from these two damsites had been sent to pioneer homestead areas in the Conwap Valley of Nueva Vizcaya, in the Conner area of Apayao, and in Palawan. They had not been able to resettle in these areas successfully - being unfamiliar not only with the physical conditions here, but also with the new socio-economic situation they found themselves in. They had been cut off from their former communities and from their kindred. They were also isolated from each other. And they could not survive without the mutual support systems that had sustained their communities, their kindred, and themselves in the land of their birth. Many of them died. Only a few of those who survived stayed on. A few others discovered an isolated hilltop in Laclac, San Manuel, Pangasinan, where they found that they could build a new community. But the majority returned to the Ibaloy homeland, resettling on unoccupied hills above the damsites or seeking refuge with kindred in other parts of Bokod and Itogon.

When President Ferdinand Marcos attempted to revive the plan for the Tabu dam in the 1970s, he met up with a resistance that was even stiffer than the NPC had encountered in earlier years. And the same resistance confronted him when he embarked on the San Roque project.

The stiffening of the Ibaloy resistance to new dam projects had much to do with the Kalinga-Bontok resistance to the Chico River Basin Development Project. This project called for the building of four dams that would have been far larger than those planned for the Agno. It would have inundated substantial portions of three municipalities in the Mountain Province and five other municipalities in Kalinga: Sabangan, Bontoc, and Sadanga; Tinglayan, Lubuagan, Pasil, Tanudan, and Tabuk.

The Bontok and Kalinga had likewise learned of the Ibaloy experience with Ambuclao and Binga, and thus fought to stop the construction of the Chico dams. Although many of them were traditional enemies, the Bontok and Kalinga tribes in the Chico area united with one another in this new struggle. They took up arms against the Marcos government; their warriors either joined or allied themselves with the revolutionary New People's Army. Their uncompromising and unrelenting resistance forced the Marcos government to back off from Chico area.

Word about the Chico struggle spread far and became a source of inspiration, as well as of many lessons in the tactics of sabotage. In the Agno valley, the Ibaloy adopted those tactics which did not entail the use of military weapons, inasmuch as they had none of these. Unarmed, they rolled boulders down mountain passes to block off the entry of the NPC. They grabbed the engineering instruments and materials of NPC personnel who made it through. They hurled these down ravines and into the raging waters of the Agno.

Keeping 24-hour vigils over the passes into the Tabu damsite and the San Roque reservoir site, the Ibaloy succeeded in forcing the NPC out, and

keeping it out until Marcos gave up on both the Tabu and San Roque dam projects.

In Apayao in 1984, the indigenous Isneg and their settler neighbors adopted the Chico tactic of confiscating construction materials and burning the equipment. Like the Bontok and Kalinga of the Chico valley, they took up arms and joined or allied themselves with the NPA. Their aim was to stop the construction of the Gened dam in Dacao, Flora - and they, too, succeeded.

In Ifugao and Nueva Vizcaya in 1985, the building of the Matuno dam at Banti was also successfully aborted by the affected communities.

In 1986, the new government of Corazon Aquino declared the Chico project officially suspended - although, in fact, it had never gotten off the ground. Meanwhile, the World Bank, which had allocated a large sum of money to the project, made it official policy to never again fund a large dam project in the Cordillera.

The struggle against the project had achieved international fame. It had drawn the sympathy of the world media and elicited support from environmentalist and social activist groups in many countries. As a rare success story, it inspired many communities worldwide in their own struggles against the construction of large dams. It continues to inspire such communities today.

A Growing International Anti-Dam Movement

The adverse impact of dams - especially large dams - has become a serious concern of the international public. Still, projects to build large dams continue to proliferate. Now widely rejected by people in the affluent European and North American countries, the dam construction industry is being aggressively exported to the poorer countries of Asia, Africa, and Central and South America.

In the late 1980s and through the 1990s, projects to build gigantic dams were launched by dam builders and funders in conjunction with the national governments of Guatemala, Brazil, Chile, India, China, Thailand, Malaysia, and the Philippines. Affected communities responded by launching protests. Along with earlier struggles, like Chico, these protests inspired the formation of anti-dam activist organizations like the International Rivers Network and the convening, in 1997, of the first international conference of dam-affected peoples.

The 1996 conference validated a growing perception among the international public that dam projects usually promised more than they could actually deliver, and at a cost that was too high socially, environmentally, as well as economically. Conference participants thus challenged governments, dam builders, and their funders to review dams on the basis of their allrounded cost-effectiveness, and passed a resolution that called for an independent investigation of ongoing, as well as past, dam projects.

In 1998, the World Commission on Dams was formed to review the development performance of dams. Commissioners were drafted from among governments, the dam construction industry, funding institutions, dam-affected communities,

and anti-dam activist organizations. After two years of study, this multi-stakeholder Commission validated the conclusions of the 1996 conference, stating that dams were not as "development-effective" as technocrats thought them to be.

Defining a large dam as any dam which rose to a height of 15 meters or more from its foundation, or which was between five and 15 meters high but had a reservoir volume of more than three million cubic meters, the Commission concluded that more than 45,000 large dams had been built internationally. And it estimated that these large dams had physically dislocated a total of 40 to 80 million people worldwide, and modified 46% of the world's primary watersheds. Dams had also irredeemably altered riverine ecosystems that were critical to nutrient recycling, water purification, soil replenishment, and flood control, and to supplying people with an important protein source - fish. Yet dams - built to store water for hydropower, irrigation, and general public consumption - could not remain optimally serviceable for very long: they lost at least 1% of their storage capacities annually to sedimentation. Dams - often equated with development - did not necessarily lead to the upliftment of economic conditions in poor countries because the sharing of benefits from dams was not equitable. Yet for the development benefits that could presumably be derived from dams, the right of host communities were often sacrificed.

The Commission, however, did not recommend against the building of dams. The Commission's report, published last year, simply provided the tools and suggested guidelines for more rational decision-making on proposals to build dams - citing the need to evaluate all costs and benefits, social, environmental, as well as economic.

It remains the task of anti-dam activists around the world to bring pressure to bear upon governments, dam builders, and funders so that they might be forced to give up on dams. #

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