PART ONE

INTRODUCTION

A. DEFINITION AND MEANING

The term *dam* refers to a **barrier** that is either made of concrete or earth materials (or a combination) built for purposes of obstructing the flow of water—usually of river, stream or waterway. This common Teutonic[1] word **(***dam* in Dutch, *damm* in Swedish and German, and the Gothic verb *faurdammjan*) literally means **to block up**. Therefore, **dam is a structure** built to block, retard, hold back or impede the flow of water. Dams are constructed either to divert[2] the water flow or impound the water, or both.

People build dams for different usages. The impounded water that backs up against a storage dam forms an artificial lake—the **reservoir**. The stored water is then made available for irrigation (agriculture), town and city water supplies (drinking and sanitation), and other uses, such as producing electricity for homes and industries. Dams are also used to control or contain rockslides, mudflows, and the like to protect nearby communities.

"Dams have been promoted as an important means of meeting perceived needs for water and energy services and as long-term, strategic investments with the ability to deliver multiple benefits. Some of these additional benefits are typical of all large public infrastructure projects, while others are unique to dams and specific to particular projects. Regional development, job creation, and fostering an industry base with export capability are most often cited as additional considerations for building large dams. Other goals include creating income from export earnings, either through direct sales of electricity, or by selling cash crops or processed products from electricity-intensive industry such as aluminium refining. Clearly, dams can play an important role in meeting people's needs."[3]

B. TYPES OF DAMS

Dams may be classified according to **height**, **intended purpose**, **structure,** the type of **material used** in their construction and by their **shape**.

1. Dams according to height and size

There are three types of dams according to height and size—**small**, **large** and **major dams**. A **large dam**, according to the International Commission on Large Dams (ICOLD),

[1] ***Teutonic*** refers to the Germanic-speaking people or culture in the first millennium (the barbarians as threat to the Roman Empire) and second millennium (they dominated much of the Northern Europe, politically organized in the Holy Roman Empire, and the Scandinavian kingdoms of Denmark, Norway and Sweden).
[2] Most dams have a section called a *spillway*, a section of a dam designed to pass water from the upstream side of a dam to the downstream side. Many spillways have gates designed to control the water flow.
[3] WCD Report.

is 15 meters (50 ft.) or more high from the foundation. If dams are between 5 – 15 meters and have a reservoir volume of more than 3 million cubic meters, they are also classified as large dams. A **major dam** is over 150 meters in height.[4] Of the more than 500,000 dams worldwide, the vast majority of all these dams are small structures less than 3 meters (10 ft.) tall, while more than 45,000[5] are large dams built to generate electricity, supply water, control floods and facilitate navigation. The reservoirs formed by these large dams store some 3,600 km of usable water. More than 20,000 of the world's large dams are in China. During the 20th century, an estimated US$2 trillion was spent on dam-building.[6]

Table 1 shows that Asia has the most number of large dams, total of 31,340, followed by North and Central America, 31,340, based on ICOLD 1998 Survey.

Table 1: Regional Distribution of Large Dams
(as of 1998)

Region	No. Dams
1. Africa	1,269
2. Western Europe	4,277
3. South America	979
4. Eastern Europe	1,203
5. North and Central America	8,010
6. Asia	31,340
7. Austral-Asia	577
Total	**47,655**

Note: ICOLD is only using 45,000 figures, but based in their 1998 survey, there are 47,655 large dams throughout the world.

Source: International Commission on Large Dams (ICOLD) and World Commission on Dams (WCD)

Table 2 shows the top 10 countries in the world with the most number of large dams, according to ICOLD and WCD.

Table 2: The 10 countries with the most large dams

By number of large dams	By function			
	Irrigation	Water Supply	Flood Control	Hydropower
1. China	1. China	1. United States	1. China	1. China
2. United States	2. India	2. United Kingdom	2. United States	2. United States
3. India	3. United States	3. Spain	3. Japan	3. Canada
4. Spain	4. Korea	4. Japan	4. Brazil	4. Japan
5. Japan	5. Spain	5. Australia	5. Germany	5. Spain
6. Canada	6. Turkey	6. Thailand	6. Romania	6. Italy
7. Korea	7. Japan	7. South Africa	7. Mexico	7. France
8. Turkey	8. Mexico	8. Brazil	8. Korea	8. Norway
9. Brazil	9. South Africa	9. France	9. Canada	9. Brazil
10. France	10. Albania	10. Germany	10. Turkey	10. Sweden

Note: This table shows that China, India and the United States have outpaced the world in building large dams, based on ICOLD 1998 and WCD correction for China

[4] Alternative classification of dams according to height: low dam is less than 30-meter high; medium-height dam is between 30 and 100 meters high, and a high dam is over 100 meter high.
[5] ICOLD is only using 45,000 figures, but based in their 1998 survey, there are around 47,655 large dams throughout the world (Dams and Development: A New Framework in Development).
[6] World Commission on Dams, November 2000; "Dammed Rivers, Damned Lives." International River Network. March 2003

2. Diversionary and overflow dams

A dam that is built not to block and impound completely the water from a river or lake is called a diversionary or overflow dam. Some of the flow is siphoned off into a separate lake, in front of which is the dam.

An example of a diversionary dam is dike or a *saddle dam*, where the structure is built at the edge of a river or lake to protect nearby land from flooding. Dike is similar to a levee which is a wall built along the river or stream to protect the adjacent land from flooding. Another type of dam for flood control is the *dry dam*. Except during periods—heavy rains or rainy season—where the flow of water is very intense, dry dam normally holds back no water and allows the channel to flow freely.

A dam designed to be overtopped or used to raise the level of a river or stream is called an *overflow dam*. A small overflow dam, that is used to measure water flow, is called weir.[7] Weirs have traditionally been used to create mill ponds. A mill pond provides water mill with the power it requires, using the difference in water level above and below the weir to provide the necessary energy. Weirs are often serves as convenient pedestrian crossing points for the river. Another type of dam designed to reduce flow velocity and control soil erosion is called a *check dam*.

3. Dams according to materials used: embankment and masonry

There are two main types of dams according to the materials used in construction. One is the **embankment dam** and other is the **masonry dam**.

3.1. Embankment dam. This type of dam is built out of fill materials (loose rock, earth, or a combination of these materials) and not joined by mortar. **Mortar** is a mixture of sand, a powder adhesive (cement or lime) and water, and is applied as a paste (or a binding material or a plaster) for bricks and stone which then dry hard. Embankment dams are like concrete gravity dams, holding back water by the force of gravity acting upon their mass. Embankment dams require more material because loose rock and earth are less dense than concrete. An example of an embankment dam is the ADB-funded Tarbela Dam[8] that crosses the Indus river in Pakistan.

There are many different kinds of embankment dams. The most common are the **rock-fill**, **earth-fill** and **zoned**-embankment dams.

3.1.1. Rock-fill embankment dam. The materials used in construction consist of a mound of loose rock covered with a watertight or waterproof layer on the upstream face of concrete slabs or timber, or having a watertight core, to prevent excessive seepage and erosion. The waterproof layer may be made of concrete, flat stone panels, or other impervious materials against water seepage.

[7] The crest of an overflow spillway on a **large dam** is often called a *weir*.

[8] The Tarbela dam is the longest dam in Asia and the second largest in the world, 147 meters high, 2743 meter long with a total volume of earth and rock of 153 million cubic meters – several times bigger than the Aswan Dam in Egypt. It impounds the water reaches of the Indus River in a reservoir which can store more than 13 billion cubic meters of water. This amounts to more than 15 times the volume of concrete used in the Grand Coulee Dam.

3.1.2. Earth-fill embankment dam. This is constructed out of well-compacted earth, sometimes with a waterproof or watertight concrete or clay in its core or in its upstream face. Sometimes, an earth-fill dam is contructed with a hydraulic fill[9] to produce a watertight core.

3.1.3.Zoned-embankment dam. This is constructed with a watertight core surrounded by a mound of material where water can penetrate. The supporting mound is usually made of loose rock or earth. The core may be built from concrete, steel, clay, or materials impervious to water seepage.

3.2. Masonry dams are made up of mortar to fill the gaps between concrete blocks in construction and bind the blocks together. **Mortar** is a mixture of sand, a powder adhesive (cement or lime) and water, and is applied as a paste (or a binding material or a plaster) for bricks and stone which then dry hard. There are three types of masonry dam, the **arch dam**, **gravity dam** and **buttress dam.**

3.2.1.Arch dam. This is made either of concrete or masonry structures that curve upstream into a reservoir, stretching from one wall of a river canyon to the other. This design, based on the same principles as the architectural arch and vault, transfers some water pressure onto the walls of the canyon. Arch dams require a relatively narrow river canyon with solid rock walls capable of withstanding a significant amount of horizontal thrust. These dams do not need to be as massive as gravity dams because the canyon walls carry part of the pressure exerted by the reservoir.

Not all concrete and masonry dams that curve into a reservoir qualify as arch dams. In some cases, engineers choose to use an arched shape even if it is not a structural necessity. For example, Hoover Dam features a prominent curve but the structure is actually thick enough to stand as a gravity dam. In many ways, the massive dam's curvature comprises more of an aesthetic effect than it does a structural necessity.

3.2.2. Gravity dam. This is a type of masonry dam that uses the force of gravity by the sheer force of the dam's own weight to holds back the downward pressure of water in the reservoir. To be able to resist from the downward pressure, gravity dams must consist of a mass that is so heavy that the water in a reservoir cannot push the dam downstream or tip it over. Gravity dams are much thicker at the base than the top because as water becomes deeper, it exerts more horizontal and intense pressure on the dam. Conversely, it is thinner near the surface of the reservoir because the water pressure is light. The design reflects how a gravity dam withstands against the distribution of water forces against the dam from top to bottom.

Most **gravity dams** are made from concrete (a mixture of Portland cement, water and aggregates [varying mixtures of sand and gravel]) materials because it is waterproof, extremely strong, and can be easily poured into forms. Loose materials

[9] Is an embankment or other fill in which the materials are deposited in place by a flowing stream of water, with the deposition being selective (Wikipedia).

are not suitable for constructing a gravity dam. Constructing a concrete gravity dam is costly because they require so much concrete to resist the forces of the water pressure.

3.2.3. Buttress dams. A buttress dam consists of a concrete wall supported by a series of several vertical supports called buttresses on the downstream side. The buttresses are made of steel that serve as support or reinforced built against a wall of a dam to strengthen its hold.

The typical space or distance between buttresses supporting the dam's wall is 6 to 30 meters (20 to 100 feet), depending upon the size and design of a buttress dam. The buttresses run along the dam's downstream face—that is, the side facing away from the water's flow. The downstream face of a buttress dam usually slopes outward at about a 45-degree angle. The sloping face and the buttresses serve to transfer the force of the water downward to the dam's foundation. Buttress dams, like gravity dams, are usually built in wide valleys where long dams are needed.

Buttress dams are sometimes called *hollow dams* because the buttresses do not form a solid wall stretching across a river valley.

Buttress dams fall into two basic categories: flat slab and multiple arch dams. **Flat slab buttress dams**[10] have a flat upstream face. **Multiple arch buttress dams**[11] feature an upstream face formed by a series of arches. The arches rest on top of buttresses that extend down to the foundation.

4. The Different Purpose of Dams

The purpose of constructing a dam differs in terms of its intended uses. Some dams are constructed for (1) irrigation and drinking water, (2) hydropower, (3) flood control, (4) navigation, (5) recreation, and (6) multipurpose.

4.1. Irrigation and Drinking Water

There are dry and parched lands where rainfall is not enough to provide ground moisture for agriculture. In this condition, people build dams to capture the water from the river and divert its flow into a pipeline, canal or channel to irrigate lands for agriculture. A simple and ordinary irrigation system depends on a small diversion dam that raises the height of river stream until it overflows into a canal, ditch or pipe that carries the water to agricultural fields. This practice of diverting river stream for irrigation dates back thousands of years ago. In fact, the oldest known man-made dams used for irrigation were built more than 5,000 years ago in arid parts of the Middle East. This ancient practice of diverting river stream still exists today.

[10] Flat slab buttress dams are sometimes called Ambursen dams in recognition of Nils Ambursen, the Norwegian-born American engineer who popularized flat slab dam in the early 20th century. An example of a flat slab buttress dam is the Stony Gorge Dam, which crosses Stony Creek near Orland, California. It stands 42 m (139 ft) tall, stretches 264 m (868 ft) long, and contains 33,000 cubic meters (43,100 cubic yards) of concrete.

[11] An example of a multiple arch dam is the Bartlett Dam, on the Verde River near Phoenix, Arizona. It stands 94 m (309 ft) high, stretches 244 m (800 ft) long, and contains nearly 140,000 cubic meters (182,000 cubic yards) of concrete.

The advancement in engineering and technology paved the way to build large dams that can store large amount of water in the reservoir. This advancement supported the sophisticated modern irrigation systems that dramatically altered the landscape of many arid regions in the world. In the American West[12], for example, large storage of dams had transformed millions of dry lands of deserts into productive agricultural land.

Dams also replenish the water supply of cities and towns for drinking and other uses, such as sanitation. The impounded water in the reservoir, usually from a river, is treated first before it flows to pipes for distribution in towns or cities.

4.2. Hydropower

A hydroelectric dam is built for purposes of generating electricity for industrial, commercial and residential consumers. Electricity is generated from hydroelectric dam by harnessing the falling water released from the reservoir turning the hydraulic turbines. The hydraulic turbines will convert the energy of the falling water into mechanical energy[13], which is used to power electric generators.

Dams designed to generate electricity deliver water to a building, called a powerhouse, which contains highly specialized power-generating equipment. Large pipes called penstocks carry water from the reservoir down into the powerhouse. Water exits a penstock through small openings, which concentrate the flow and direct it onto the blades of a large hydraulic turbine. The force exerted by the falling water rotates the blades, and this action drives the shaft of an electric generator. The shaft spins giant magnets in the generator, creating an electric current. Power lines transmit the current to consumers within a regional power network.

4.3. Flood Control

Dams are also built to protect low-lying areas from flooding of water. Floods will occur when the volumes of rainfall cannot be absorbed by the soil and vegetation. The excess water runs off the land in greater quantities than rivers, streams, ponds and wetlands can contain. Such heavy rains, and also snowmelt, periodically cause rivers to overflow their banks, spilling onto the surrounding floodplain. Ensuing floods can damage property and endanger the lives of people and animals.

To control floodwaters in floodplains, engineers sometimes construct a group of dams and reservoirs along streams that feed into main rivers. Water from snowmelt and heavy rains is stored in the reservoirs, then released gradually into the main rivers during the dry season. This strategy is exemplified by the dams of the Tennessee Valley Authority (TVA), a federally sponsored corporation created in the 1930s by the President and Congress of the United States.

[12] Hoover Dam, which stretches across the Colorado River near Las Vegas, Nevada, stores about twice the annual flow of the river in its reservoir, Lake Mead. This reservoir holds enough water to cover the state of Pennsylvania to a depth of one foot. Lake Mead helps provide a dependable water supply for more than 400,000 hectares (1 million acres) of farmland in southern California and southwestern Arizona, and 162,000 hectares (400,000 acres) in Mexico.

[13] In physics, mechanical energy is one of several forms of energy that is distinguished by the property, and it can be transferred from one system to another by force known to Newtonian mechanics, and includes kinetic energy and potential energy.

Most dams include an important safety feature called a spillway for use during extreme flood conditions. A spillway provides a way for excess floodwater flowing into a reservoir to be diverted around a dam. Without a spillway, the floodwater could overtop the dam's crest and erode the backside of the dam, which might cause it to collapse. When this happens, millions of cubic meters of water can rush downstream, causing mass destruction. In 1889 more than 2,000 people were killed in Johnstown, Pennsylvania, when, during a heavy rainstorm, the South Fork Dam collapsed after a clogged spillway caused the reservoir to overtop the dam.

In some cases, the spillway is completely separate from the main body of the dam. This type of spillway usually comprises a gently-sloped concrete channel that carries excess water around the dam and deposits it in the river below. In other cases, the spillway is part of the actual dam. Such spillways release water directly over the top of the dam through an overflow area that is slightly lower than the crest of the dam. In still other cases, excess water drains through a vertical shaft spillway, then into a gently sloped conduit that carries it through a tunnel and into the river downstream from the dam.

4.4. Navigation

Dams help make inland waterways accessible to ships and barges. By inundating shallow, rocky streambeds and controlling the release of water from reservoirs, dams make rivers deep enough for ships and barges to pass through without running aground. For example, the upper Mekong River, or the Lancang Jiang, in Yunnan Province of China, was blasted and dredged by the Chinese government to make it deeper more to become navigable for commercial boats. Another example is the Ohio River in the east-central United States, one of the most important shipping rivers in the world. To make the Ohio River navigable throughout its length, engineers constructed a series of 13 dams to enable commercial vessels to travel from Pittsburgh, Pennsylvania, to the Mississippi.

When a dam obstructs a navigable river, engineers build a canal adjacent to the dam to permit ships and barges to bypass the dam. Canals may incorporate one or more locks, which contain mechanisms to control the water level. Ships and barges are raised or lowered with changes in the water level in the lock. One gate in the lock then opens, enabling a vessel to exit to a higher or lower section of the waterway. Locks prevent water from rushing uncontrolled through the canal.

4.5. Recreation

The operation of the dam and reservoir can also attract and enhance tourism. This is a significant benefit, in addition to the other purposes of a dam. The lake created by the reservoir became recreational parks for boating, swimming, fishing, bird-watching and nature walks.

4.6. Multipurpose

Many modern dams serve two or more purposes. For example, Tennessee Valley Authority (TVA) designed and built dams along the Tennessee River and its tributaries to provide flood control, generate electric power, and control river levels to permit year-round navigation.

While a dam can serve many different functions, it can prove impossible to operate at maximum efficiency for each purpose. For example, irrigation, power generation, flood control and recreation may place conflicting demands on dams. A farmer who depends on a dam for irrigation wants water released from the reservoir only when crops need water during the summer growing season. On the other hand, an electric power company wants water released throughout the year to provide its customers with a steady source of power. Dams provide the most effective flood control when reservoir levels are relatively low, enabling them to easily absorb runoff from unexpected storms. In contrast, people who use reservoirs for recreational activities prefer the water levels to be high because it makes for better swimming and boating.

5. History and Origins of Dam-Building

Dams are one of the oldest man-made structures. The earliest known dams were built in Mesopotamia (one of the first centers of urban civilization) for irrigation. Remnants of ancient dams are still standing as ruins or still operational. The ruins of Jawa Dam of Jordan, built in 3,000 BC, still standing today; Ma'rib Dam of today's Yemen, built more than 2,700 years ago, has been rebuilt several times to remain operational.

5.1. Roman empire

The Ancient Rome, around 1st century AD, constructed a system of large dams to impound river water in regions surrounding the Mediterranean Sea. The Lake Homs was the Romans' largest reservoir was built in 284 AD in today's Syria. The Cornalvo and Proserpina dams in Spain remain in service for more than 1,700 years.

The engineers of Ancient Rome not only mastered the collection and distribution of water, they too understood the principle of arch dams. They constructed an arch dam in today's border between Turkey and Syria. They used buttresses to support dam walls.

As the glory Rome ended, dam-building in Western Europe followed suit. The Il-khanid dynasty of the Mongol Empire (the Mongols were responsible for Rome's demise) constructed several dams in the present-day Iran. Their landmark, the Kurit Dam, was the tallest dam (a masonry arch structure 58 m [190 ft]) high in the world until the late 19th century.

5.2. Moderns Dams

Modern dams are associated with engineers' applications of mathematical formulas and structural theory to make dams safer. French engineer, Augustin de Sazilly, in the 1850s, used principles of mathematics to minimize the amount material necessary to build a masonry gravity dam. He proposed a triangular shape with a vertical upstream as the most advantageous shape for a gravity dam. His innovation took hold and lives on in the triangular profile and near-vertical upstream face of many modern concrete gravity dams.

In the 19th century urban populations swelled and large dams were constructed to supply water and electricity. And in the late 19th century, dam engineers resurrected the use of concrete, which had not been used in dam construction since ancient Roman times. The first modern concrete dams were constructed in New York in 1872—the Boyd's Corner Dam—and in San Francisco, California, in 1890, the San Mateo Dam. The two were built to provide water to residents.

5.3. Dams of the 20th Century

The engineers in the 20th century were expanding the mathematical formulas and structural designs pioneered in the 19th century. They incorporated in the design are sophisticated mathematics and material science. These gave rise to higher and stronger dams.

These engineering wonders of dams (taming rivers, controlling floods, irrigating arid lands, providing waters and electricity) seized the attention of the general public, and regarded these structures as major symbols of modern civilization.

Today, dams still play a major role in both human and economic development. However, there are drawbacks, such as environmental degradation and community displacement.

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PART TWO

ADB's INVOLVEMENT IN DAM-BUILDING

A. THE ASIAN DEVELOPMENT BANK

The Asian Development Bank (ADB) is a regional multilateral development bank (MDB) established in 1966 with headquarter in Manila, Philippines. It is a **Regional Bank** because its presence and scope of operation is in Asia and Pacific region. It is a **Multilateral Bank** because it is owned by 64 member-countries (46 from Asia and Pacific and 18 from other parts of the globe). It is a **Development Bank** because it is providing loans to its member-countries for purposes of developing their respective economy along the ADB's vision—an Asia and Pacific region free of poverty—and its **Mission**—is to help its developing member countries (DMC's) reduce poverty and improve their living conditions and quality of life.

Table 3 shows the top 10 ADB members, in terms of capital stock and voting power:

Table 3: ADB members, capital stock and voting power
(as of 20 September 2005)

ADB Member Country	Year of Membership	Subscribed Capital (% of total)	Voting Power (% of total)
1. Japan	1966	15.734	12.900
2. United States	1966	15.734	12.90
3. China (PRC)	1986	6.496	5.510
4. India	1966	6.383	5.419
5. Australia	1966	5.834	4.979
6. Indonesia	1966	5.490	4.705
7. Canada	1966	5.274	4.531
8. South Korea	1966	5.079	4.375
9. Germany	1966	4.361	3.802
10. France	1970	2.347	2.109

Source: Asian Development Bank

ADB's **MAIN INSTRUMENTS** in providing help to its developing member countries (DMCs) are: (1) Policy dialogues (conferences), (2) Loans (project lending loans), (3) Technical assistance (preparatory, regional and advisory assistance), (4) Grants, (5) Guarantees, and (6) Equity investments.

In 2003, ADB's total lending volume was US$6.1 billion. Technical assistance, which is used for preparing and implementing projects, supporting advisory activities, and undertaking regional activities, amounted to US$176.5 million. Grants totaling US$483.5 million were also provided.

B. DAM-BUILDING IN ASIA

During the 20th century there were 47,655 dams constructed around the world, according to WCD. An estimated US$2 trillion was spent on dam-building throughout the 20th century.[14] Dam-building around the world peaked in the 1970s at about 5,400 annually, and started to fall by 60% afterwards.

Table 4 shows that Asia has the most numbers of large dams, a total of 31,340 (this figure excludes the 577 dams in Austral-Asia), followed by North and Central America, 31,340, based on the International Commission on Large Dams (ICOLD) 1998 Survey.

Table 4: Regional Distribution of Large Dams
(as of 1998)

Region	No. Dams
1. Africa	1,269
2. Western Europe	4,277
3. South America	979
4. Eastern Europe	1,203
5. North and Central America	8,010
6. Asia	31,340
7. Austral-Asia	577
Total	**47,655**

Note: ICOLD is only using 45,000 figures, but, based in their 1998 survey there are 47,655 large dams throughout the world.

Source: International Commission on Large Dams (ICOLD) and World Commission on Dams (WCD)

Table 5 shows the top 10 countries in the world with the most number of large dams, according to ICOLD and WCD.

Table 5: Top Countries with the most number of large dams

By number of large dams	By function			
	Irrigation	Water supply	Flood control	Hydropower
1. China	China	United States	China	China
2. United States	India	United Kingdom	United States	United States
3. India	United States	Spain	Japan	Canada
4. Spain	Korea	Japan	Brazil	Japan
5. Japan	Spain	Australia	Germany	Spain
6. Canada	Turkey	Thailand	Romania	Italy
7. Korea	Japan	South Africa	Mexico	France
8. Turkey	Mexico	Brazil	Korea	Norway
9. Brazil	South Africa	France	Canada	Brazil
10. France	Albania	Germany	Turkey	Sweden

Note: The table shows that China and the United States have outpaced the world in building large dams, based on ICOLD 1998 and WCD correction for China.
Source: World Commission on Dams

[14] World Commission on Dams, November 2000; International River Network. "Dammed Rivers, Damned Lives." March 2003

Table 6 shows that both in Asia and in the world, China dominates the pictures where half of the world's large dams—22,000 of the total 45,000 dams worldwide—is in this most populous country in the world. In Asia, India ranks next to China with 4,291 dams. It is very important to note that while Laos ranks 36, the last in Asian dam race, this military rules country is considering the building of at least 17 hydropower dams for domestic consumption and to export electricity to its neighboring countries (Thailand, China and Vietnam).

Table 6: Distribution of Large Dams in Asia

Country	No. of Large Dam	Country	No. of Large Dam
1. China	22,000	19. Philippines	15
2. India	4,291	20. Georgia	14
3. Japan	2,675	21. Uzbekistan	14
4. South Korea	765	22. Iraq	13
5. Turkey	625	23. Kazakhstan	12
6. Thailand	204	24. Kyrgyzstan	11
7. Indonesia	96	25. Tajikistan	7
8. Russia	91	26. Jordan	5
9. Pakistan	71	27. Lebanon	5
10. North Korea	70	28. Myanmar	5
11. Iran	66	29. Nepal	3
12. Malaysia	59	30. Viet Nam	3
13. Taipei, China	51	31. Singapore	3
14. Sri Lanka	46	32. Afghanistan	2
15. Syria	41	33. Brunei	2
16. Saudi Arabia	38	34. Cambodia	2
17. Azerbaijan	17	35. Bangladesh	1
18. Armenia	16	36. Laos	1

Source: World Commission on Dams (WCD)

Most of the 31,340 large dams in Asia, 63% were built for irrigation, followed by hydropower[15] (7%), flood control (2%) and water supply (2%) functions. There are few dams in Asia with multipurpose (4%) functions. These tend to be the larger projects.

Across Asia there are large differences as to the purpose and type of dams. In India and Turkey, the primary purposes for dam-building is irrigation; in China, the purpose is for flood control and power, including pumped storage; in Japan, flood management and hydro-pumped storage; and for Iran, irrigation and power supply.

In Asia, the countries of India, China, Turkey, Japan and Iran are among the most active dam-building countries. The overall rate of large dam building peaked in Asia in the 1970s–1980s at over 200 dams per year. Statistics (excluding China) show the pace of construction slowed in the 1990s, reflecting multiple trends, including a focus on improving

[15] Hydropower provides more than 50% of the national electricity supply in nine Asian countries. It represents 19% of the total power generation in China, 25% in India, and 19% in the Russian Federation. The balance is largely based on coal-fired generation.

existing surface irrigation infrastructure. Still, in 2000 more than 83,000 MW of additional hydroelectric generating capacity was under construction in 23 countries. The majority of the development is in China, followed by India, Indonesia and Iran.

The Russian Federation, where economic and institutional restructuring are under way, has focused on completing large projects started under the former political systems but abandoned in the 1990s. Other priorities include the rehabilitation of large dams in operation. Russia is planning to construct five new large dams. Democratization and the emergence of NGOs have led to greater involvement and public debate on water and energy, though active participation of non-governmental interests in decision-making is limited as yet.

C. ADB's INVOLVEMENT IN DAM-BUILDING

Since its establishment in 1966, ADB has been involved in providing technical assistance (TA) and project loans for infrastructure building. ADB has been extensively involved in planning, formulating and financing water resource projects in its DMCs, and has accumulated valuable experiences that must be used to respond proactively to the challenge. The poverty reduction strategy adopted in 1999 enjoins ADB, at the policy level, to continue to support governments in developing, in a participatory manner, master plans for effective management of critical natural resources, including water.[16]

ADB is involved in dam construction schemes through its **energy**, **water supply** and **agricultural irrigation** program activities. In the beginning, the ADB was considered as a neophyte in dam-building. It was the oil crisis in the 1970s that changed everything.

The energy crisis and oil shock in the 1970s characterized by the precipitous increases of oil prices starting in 1974 until the mid-1980s, influenced the energy policy (First Energy Policy) of ADB, as well as the Bank's entry to dam-building. The ADB's lending policy then focused on tackling the energy crisis by helping utilize indigenous energy resources in DMCs. This explains why ADB's financing of dams peaks in the 1970s **(Tables 7, 8 and 10)**.

"Dam project are so big and glamorous that a "newcomer" like the Asian Development Bank was able, in its early years, to pick up for the most of its part only the crumbs, so to speak, left on the table by larger aid organizations. It took up the marginally viable projects spurned by the World Bank, such as the Agus River project in the Philippines. The oil crisis changed all that. Suddenly such projects became viable after all. As long as oil was cheap, hydropower was hardly justifiable in Asia, except perhaps as a windfall by-product of irrigation and water control dams like Tarbela in Pakistan. The Bank was now able to take up numerous dam projects for electricity generation."[17]

[16] "Special Theme: Water in the 21st century." 1999 Annual Report. Asian Development Bank.

[17] Wilson, Dick. A Bank For Half The World: The Story of the Asian Development Bank. 1966-1986. (1987) ADB.

Between October 6, 1970 and December 5, 2003, the ADB had approved a total of 86 **water sector loans with dam components** to 17 countries in Asia and Pacific region amounting to US$ 4.386 billion **(Table 6)**. The first loan was the Andong Multipurpose Dam, an irrigation project, in South Korea amounting to US$0.50 million. The last one was Ganzu Clean Energy Development, a hydropower project, in Peoples Republic of China that loan worth US$35 million. These 86 loans represent not the entire number of dams constructed in Asia and Pacific region. Rather, the figure describes the total number of loans with dam components extended by ADB to its DMC's. There are projects in one country that involve more than two or more loans—in terms of financing the different components or phases in different period. Tarbela dam in Pakistan is an example. Tarbela dam involves 6 financing in different periods—the first loan was in 28 November 1974 and the last one was in 25 October 1984. The Mindanao Power[18] of the Philippines is another example because this one hydropower project involves 7 financing in a different period.

Table 7: No. of ADB-funded water sector loans with dam component (1970-2003)

	1970s	1980s	1990s	2000 - 2003	1970 – 2003
Hydropower	28	14	12	2	56
Irrigation	3	9	4	1	17
Water Supply	4	0	0	4	6
Multi-Purpose	1	2	2	0	5
WS & I	0	0	0	2	2
Total	**35**	**25**	**18**	**11**	**86**

Source: Water Sector Loans with Dam Component, ADB NGO Center

Of the 86 project loans with dam component, hydropower projects dominates, with 56 loans (US$2,977.59 billion); followed by irrigation with 17 loans (US$566.51 million); water supply, 6 loans (US$462.20); multipurpose, 5 loans (US$226.50); and water supply and irrigation, 2 loans (US$154.32).

Table 7 shows that it was in the 1970s where the project loans in water sector with dam component was the highest, totaling 35 loans (US$771.43 million) of the total 86 loans. This was followed by the 1980s with 25 total loans (US$1,213.84 billion). The total loans in the 1990's decline to 18 (US$1,937.53); and, between 2000 and 2003 the total loans is 11 (US$463.30). While there were fewer dams supported by the ADB in the 1990s (12 projects) compared to the 1970s (28 projects), it was the high cost of building dams that made the dams built in 1990s more costly than the 1970s and 1980s.

Table 7 also shows that there were more hydropower projects supported by the ADB in the 1970s due to the oil crisis that crippling the world's energy sector, particularly the industrialized countries. The oil crisis was a direct consequence from the oil embargo imposed by the oil-rich countries in the Middle East. The oil prices went quadruple in the international market. Hydropower then became the alternative source of power for the industries. The crippling oil crisis in the 1970s influenced the ADB's **First Energy Policy**[19] (March 1981-

[18] The first loan for Mindanao Power (hydropower project) was approved in November 2, 1971; the second financing was approved in July 13, 1972; the third financing, November 7, 1974; fourth, May 27, 1975; fifth, December 21, 1976; sixth, December 9, 1977; and seventh, November 27, 1979.

[19] Working Paper No. 2-81. *Role of the Bank in the Energy Sector in the Region*, March 1981.

late 1980s) wherein the lending policy of the Bank is to focus on tackling the energy crisis by helping to utilize indigenous energy resources in its DMC's. Energy crisis and oil shock in the 1970s characterized by the precipitous increases of oil prices starting in 1974 and continuing until the mid-1980s.

Table 8: ADB water sector loans with dam component
(1970 - 2003) *(in US$ M)*

	1970s	1980s	1990s	2000 - 2003	TOTAL
Hydropower	559.63	634.46	1,604.50	179.00	2,977.59
Irrigation	379.10	326.38	130.03	30.00	565.51
Water Supply	132.20	130.00	100.00	100.00	462.20
Multi-Purpose	0.50	123.00	103.00	0.00	226.50
WS & I	0.00	0.00	0.00	154.30	154.32
Total	**771.43**	**1,213.84**	**1,937.53**	**463.30**	**4,386.10**

Source: Water Sector Loans with Dam Component, ADB NGO Center

Table 8 shows that, in terms of amount lent by ADB for water sector loans (with dams component) for hydropower, the 1990's period topped them all with total loans amounting close to US$1.9 billion, followed by 1980s with US$634.46 million cost of loans.

Table 9: ADB water sector loans with dam component by country
(1970 - 2003) *(in US$ M)*

Country	Hydropower	Irrigation	Water Supply	Multi-Purpose	TOTAL
1. Afghanistan	9.00	0.00	0.00	0.00	**9.00**
2. South Korea	74.63	0.00	0.00	0.50	**75.15**
3. Singapore	0.00	0.00	31.09	0.00	**31.09**
4. Taiwan	0.50	0.00	0.00	0.00	**0.50**
5. Philippines	209.80	60.00	161.00	0.00	**500.10**
6. Indonesia	711.60	219.98	0.00	87.70	**1,019.24**
7. Sri Lanka	25.50	140.63	0.00	38.00	**204.13**
8. Pakistan	599.70	59.00	0.00	0.00	**658.70**
9. Malaysia	175.20	0.00	0.00	35.30	**210.50**
10. Myanmar	14.60	45.90	0.00	0.00	**60.50**
11. Thailand	129.98	40.00	0.00	0.00	**169.98**
12. PNG	23.38	0.00	0.00	0.00	**23.38**
13. Nepal	168.30	0.00	0.00	0.00	**168.30**
14. Laos	163.00	0.00	0.00	0.00	**163.00**
15. Samoa	7.40	0.00	0.00	0.00	**7.40**
16. China	665.00	0.00	200.00	129.30	**994.30**
17. Vietnam	0.00	0.00	0.00	90.00	**90.00**
TOTAL	**2,977.59**	**565.51**	**462.20**	**380.08**	**4,386.10**

Source: Water Sector Loans with Dam Component, ADB NGO Center

Table 9 shows that Indonesia is the country that got the highest amount of loans from ADB, amounting to US$1.019 billion, followed by China with total loans of US$994.3 million, and third is Pakistan with US$658.7 million. China ranks next to Indonesia despite the fact that they got their first loan only in 1993. This only affirms that China is an aggressive

country in dam-building in Asia and in the entire world. The countries with the lowest amount of loans they got from ADB are Taiwan (US$0.50 million), Samoa (7.40 million) and Afghanistan (US$9 million). Taiwan and Vietnam are the countries who only got one project loan each from the ADB for a dam-related project. The Philippines, where the ADB headquarter is located, got 11 project loans from November 2, 1971 to December 18, 1998 amounting to US$500.1 million.

1. South Korea got three dam-related project loans amounting to US$75.15 million. The Andong Dam Multipurpose Development involved two financing, in October 6, 1970 and in December 16, 1971. The two loans combined amounted to US$22.50 million. The second dam-related project was the Samrangji Pumped Storage Power, amounting to US$52.63 million, the biggest in terms of amount.

Title	Fund	Amount (US$M)	Date Approved	Sector
1. South Korea – 3 projects, US$75.15 million				
Andong Dam Multipurpose Development	OCR	0.50	6-Oct-70	Multi
Andong Dam Multipurpose Development	OCR	22.00	16-Dec-71	HP
Samrangjin Pumped Storage Power	OCR	52.63	18-Sep-80	HP

2. Singapore got two water supply and sanitation projects loans from ADB amounting to US$31.900 million. The first loan was approved in December 23, 1970 and the second loan was approved in April 13, 1976.

Title	Fund	Amount (US$M)	Date Approved	Sector
2. Singapore – 2 projects, US$31.09 million				
Water Supply	OCR	8.300	23-Dec-70	WSS
Second Water Supply	OCR	23.600	13-Apr-76	WSS

3. Taiwan got only one project loan from ADB, a hydropower amounting to US$500,000, approved in May 18, 1971. This is the smallest loan extended by ADB among the water sector loan with dam component.

Title	Fund	Amount (US$M)	Date Approved	Sector
3. Taiwan, 1 project, US$500,000				
Li-Wu Chi Hydroelectric Power Development	OCR	0.500	18-May-71	HP

4. Philippines, the host country for ADB headquarter, got 11 dam-related project loans from ADB amounting to US$500.10 million—seven hydropower, three water supply and sanitation, and one irrigation. Of the 11 projects, seven project loans were for the Mindanao Power amounting to US$209.80 million, and two project loans for Manila water supply and

sanitation amounting to US$60 million. The biggest single loan extended to the Philippines from ADB is the Angat Water Supply Optimization costing US$130 million. The Angat dam project is related to the two Manila water supply projects. The second biggest loan was the Southern Philippines Irrigation Sector amounting to US$60 million.

Title	Fund	Amount (US$M)	Date Approved	Sector
4. Philippines – 11 projects, US$500.10 million				
Mindanao Power	OCR	23.400	2-Nov-71	HP
Second Mindanao Power	OCR	21.000	13-Jul-72	HP
Manila Water Supply	OCR	51.300	28-Aug-74	WSS
Third Mindanao Power	OCR	1.000	7-Nov-74	HP
First and Second Mindanao Power (Supplementary)	OCR	22.700	27-May-75	HP
Fourth Mindanao Power	OCR	52.000	21-Dec-76	HP
Fifth Mindanao Power	OCR	29.000	9-Dec-77	HP
Second Manila Water Supply	OCR	49.000	7-Sep-78	WSS
Sixth Mindanao Power	OCR	60.700	27-Nov-79	HP
Angat Water Supply Optimization	OCR	130.000	14-Nov-89	WSS
Southern Philippines Irrigation Sector	OCR	60.000	18-Dec-98	Irrigation

5. Indonesia got 12 dam-related project loans from ADB amounting to US$1.019 billion, six for hydropower, five for irrigation and one for a multipurpose dam. The biggest loans in terms of amount extended by the ADB to Indonesia are the Power XXIII (US$275 million), Power XX (US$235 million), and Power XVIII (US$135 million), all three are hydropower projects.

Title	Fund	Amount (US$M)	Date Approved	Sector
5. Indonesia – 12 projects, US$1,019.24 billion				
Sempor Dam and Irrigation	ADF	9.200	2-Dec-71	Irrigation
West Sumatra Power Supply	ADF	7.100	7-Dec-71	HP
Garung Hydroelectric	OCR	19.800	13-Nov-75	HP
Maninjau Hydropower	OCR	39.700	8-Apr-76	HP
Wadaslintang Multipurpose	OCR	87.700	23-Jun-81	Multi
Bali Irrigation Sector	OCR	25.460	17-Sep-81	Irrigation
Second Irrigation Sector	OCR	75.790	22-Sep-83	Irrigation
Power XVIII	OCR	135.000	20-Dec-83	HP
Nusa Tenggara Agricultural Development	OCR	84.530	7-Feb-89	Irrigation
Nusa Tenggara Agricultural Development	ADF	25.000	7-Feb-89	Irrigation
Power XX	OCR	235.000	25-Sep-90	HP
Power XXIII	OCR	275.000	25-Nov-93	HP

6. Sri Lanka got nine dam-related project loans from ADB amounting to US$204.13 million, six for irrigation, two for hydropower and one for multipurpose. The Kirindi Oya Irrigation and Settlement consists of three loans amounting to US$60.6 million.

Title	Fund	Amount (US$M)	Date Approved	Sector
6. Sri Lanka – 9 projects, US$204.13 million				
Bowatenna Power	ADF	8.000	19-Dec-72	HP
Canyon Hydropower	ADF	17.500	26-Jul-77	HP
Kirindi Oya Irrigation and Settlement	ADF	24.000	9-Dec-77	Irrigation
Kirindi Oya Irrigation and Settlement (Supplementary)	ADF	10.000	9-Dec-82	Irrigation
Kirindi Oya Irrigation and Settlement Phase II	ADF	26.600	30-Oct-86	Irrigation
Southern Province Rural Development	ADF	38.000	26-Nov-91	Multi
North Western Province Water Resources Development	ADF	30.000	25-Jun-92	Irrigation
North Central Province Rural Development	ADF	20.030	24-Sep-96	Irrigation
Water Resource Management	ADF	30.000	19-Sep-00	Irrigation

7. Pakistan got 11 dam-related project loans from ADB amounting to US$658.70 million, nine for hydropower and two for irrigation. Of the three hydropower projects the Tarbela Hydropower consists of six project loans while Mangla Hydropower got two project loans and one project loan for the Ghazi Barotha Hydropower. There were two project loans for irrigation. The Ghazi Barotha Hydropower project, approved in January 16, 1996, was the biggest single loan extended by the ADB in a hydropower project amounting to US$300 million. The Tarbela case is an interesting project. Originally built for irrigation, the ADB, during the oil crisis, lent US$47 million in November 28, 1974 for two turbine generations at the Tarbela hydropower station. This was followed by four additional loans for four additional hydropower electric-generating units.

Title	Fund	Amount (US$M)	Date Approved	Sector
7. Pakistan – 11 projects, US$658.70 million				
Mangla Hydropower	OCR	12.800	17-Dec-73	HP
Mangla Hydropower	ADF	3.900	17-Dec-73	HP
Tarbela Hydropower	OCR	13.000	28-Nov-74	HP
Tarbela Hydropower	ADF	34.000	28-Nov-74	HP
Tarbela Hydropower (Supplementary and Extension)	OCR	38.000	15-Dec-77	HP
Tarbela Hydropower Extension Units 9 & 10	OCR	29.000	23-Nov-82	HP
Tarbela Hydropower Extension Units 11 & 12	ADF	31.800	25-Oct-84	HP
Tarbela Hydropower Extension Units 11 &12	OCR	137.200	25-Oct-84	HP
Small Dams	ADF	39.000	31-Oct-85	Irrigation
Kotri Barrage Rehabilitation	ADF	20.000	26-Sep-91	Irrigation
Ghazi Barotha Hydropower	OCR	300.000	16-Jan-96	HP

8. Malaysia got six dam-related project loans from ADB amounting to US$210.5 million, five for hydropower and one for multipurpose project.

Title	Fund	Amount (US$M)	Date Approved	Sector
8. Malaysia – 6 projects, US$210.50 million				
Tenom Pangi Power	OCR	1.200	17-Jun-75	HP
Trengganu Hydropower	OCR	45.400	5-Dec-78	HP
Batang Ai Hydropower	OCR	40.400	17-Sep-81	HP
Mini-Hydropower Sector	OCR	24.000	25-Nov-82	HP
Sungai Piah Hydropower	OCR	64.200	6-Dec-84	HP
Perlis Agricultural Development	OCR	35.300	26-Nov-85	Multi

9. Myanmar got two dam-related project loans from ADB amounting to US$60.5 million, each for hydropower and irrigation. The unfavorable political situation in Myanmar, after the military took over the country and put an opposition leader under house arrest, prompted ADB to suspend any loan to this country. However, strange enough, ADB continues to accommodate this country to participate and host any Greater Mekong Sub-region (GMS)-related activities, such as conferences.

Title	Fund	Amount (US$M)	Date Approved	Sector
9. Myanmar – 2 projects, US$60.50 million				
Third Sedawgyi Multipurpose Dam and Irrigation	ADF	45.900	22-Jun-76	Irrigation
Sedawgyi Hydropower	ADF	14.600	24-Apr-79	HP

10. Thailand got five dam-related project loans from ADB amounting to US$169.98 million, three for hydropower and two for irrigation projects. The government of Thailand has stopped availing loans from ADB, while on the other hand, the private sector continues to do so.

Title	Fund	Amount (US$M)	Date Approved	Sector
10. Thailand – 5 projects, US$169.98 million				
Third Power	OCR	47.000	25-Aug-77	HP
Kud Multipurpose	OCR	1.380	14-Nov-78	HP
Medium Scale Irrigation Package	OCR	25.000	10-Dec-81	Irrigation
Medium Scale Irrigation Package	ADF	15.000	10-Dec-81	Irrigation
Second Power System Expansion	OCR	81.600	9-Dec-82	HP

11. Afghanistan got only one hydropower project loan from ADB on October 13, 1977 amounting to US$9 million. Afghanistan is one of the three countries that got only one dam-related loan from ADB. Like Myanmar, it was the unfavorable political situation that prompted the ADB to suspend its loans to a war-torn Afghanistan.

Title	Fund	Amount (US$M)	Date Approved	Sector
11. Afghanistan – 1 project, US$9 million				
Khanabad Hydropower	ADF	9.000	13-Oct-77	HP

12. Papua New Guinea got four dam-related project loans from ADB amounting to $23.38 million. All were hydropower projects. The loan amounts extended to Papua New Guinea were relatively minimal.

Title	Fund	Amount (US$M)	Date Approved	Sector
12. Papua New Guinea – 4 projects, US$23.38 million				
Provincial Mini-Hydropower	OCR	2.700	22-Nov-77	HP
Upper Warangoi Hydropower	ADF	6.000	27-Sep-79	HP
Upper Warangoi Hydropower	OCR	6.250	27-Sep-79	HP
Divune Hydropower Project	OCR	8.430	6-Jul-89	HP

13. Nepal got two hydropower project loans from ADB amounting to US168.3 million. The current political situation of Nepal after the February 1, 2005 *coup d 'etat* by the King of Nepal, and the subsequent closure of the parliament and arrest of the King's opposition, led to the withdrawal of support and aid from donor countries and agencies. The ADB is assessing the situation while continue to honor its obligation to already approved assistance.

Title	Fund	Amount (US$M)	Date Approved	Sector
13. Nepal – 2 projects, US$168.3 million				
Mini-Hydropower	ADF	8.300	21-Apr-81	HP
Kali Gandaki "A" Hydroelectric Power	ADF	160.000	23-Jul-96	HP

14. Laos got six hydropower project loans from ADB amounting to US$163 million. These six project loans financed four hydropower projects, and out of the same six loans, Xeset Hydropower got three loans.

Title	Fund	Amount (US$M)	Date Approved	Sector
14. Laos – 5 projects, US$163 million				
Xeset Hydropower	ADF	1.000	23-Oct-84	HP
Xeset Hydropower	ADF	15.500	27-Oct-87	HP
Xeset Hydropower (Supplementary)	ADF	3.000	11-Dec-90	HP
Nam Song Hydropower Development	ADF	31.500	21-Dec-92	HP
Theun-Hinboun Hydropower	ADF	60.000	8-Nov-94	HP
Nam Leuk Hydropower	ADF	52.000	10-Sep-96	HP

15. Samoa, one of the Pacific islands DMC's, got only one hydropower project—the Afulilo Hydroelectric—from ADB amounting to US$7.4 million. This is one of the smallest dam-related loans, in terms of amount, a DMC got from ADB.

Title	Fund	Amount (US$M)	Date Approved	Sector
15. Samoa – 2 projects, US$7.4 million				
Afulilo Hydroelectric	ADF	5.400	4-Dec-86	HP
Afulilo Hydroelectric Power (Supplementary)	ADF	2.000	22-Apr-93	HP

16. China got nine project loans from ADB amounting to US$7.4 million, five hydropower projects, two water supply and sanitation projects, one multipurpose project and one project that combine water supply and irrigation. China got its first dam-related loan only in August 3, 1993.

Title	Fund	Amount (US$M)	Date Approved	Sector
16. PRC – 9 projects, US$994.3 million				
Guangzhou Pumped Storage Stage II	OCR	200.000	3-Aug-93	HP
Hunan Lingjintan Hydropower	OCR	116.000	27-Sep-94	HP
Fujian Soil Conservation and Rural Development	OCR	65.000	28-Sep-95	Multi
Fujian Mianhuatan Hydropower	OCR	170.000	14-Dec-95	HP
Zhejiang-Shanxi Water Supply Project (Phase I)	OCR	100.000	24-Sep-97	WSS
West Henan Agricultural Development Project	OCR	64.300	19-Dec-00	WS/I
Hebei Zhanghewan Pumped Storage Project	OCR	144.000	18-Oct-02	HP
Harbin Water Supply	OCR	100.000	11-Mar-03	WS
Gansu Clean Energy Development	OCR	35.000	5-Dec-03	HP

17. Vietnam got only one project loan from ADB, a multipurpose dam for irrigation and water supply, amounting to US$90 million. Vietnam is the DMC where it got only its first dam-related project very late, on November 27, 2003.

Title	Fund	Amount (US$M)	Date Approved	Sector
17. Vietnam – 1 project, US$90 million				
Phuoc Hoa Multipurpose Water Resources	ADF	90.000	27-Nov-03	I/WS

D. ADB AND LARGE DAMS

The Asian Development Bank (ADB) has supported a total 29 large dams in, at least 12 countries in Asia and Pacific region. Most of ADB-supported large dams (48%) were built in the 1970s. In the 1980s and the 1990s, ADB reduced its involvement in supporting large dams, particularly in the water supply and irrigation sectors. ADB's operational shift in thrust towards small and medium-scale irrigation projects partly explained the decline.[20]

Most of ADB-funded large dams constructed are hydropower dams in at least seven countries across Asia, which translates to a total of 16 dams. Because of the high cost of building large dams, some projects are co-financed with other multilateral development agencies such as the World Bank or bilateral funding agencies, such as those based in Japan.

Table 10 shows the number of ADB-funded large dams in Asia and Pacific region between 1970s to 1990s.

Table 10: Number of ADB-Funded Large Dams in Asia and Pacific Region

	1970s	1980s	1990s	1970s – 1990s
Hydropower	6	4	6	16
Irrigation	2	2	0	4
Water Supply	4	0	0	4
Multi-Purpose	2	2	1	5
Total	**14**	**8**	**7**	**29**

Source: Survey of Multilateral Bank Practice on Financial and Economic Analysis of Large Dams, WCD Secretariat

The first large dam project supported by the ADB was the second Andong Dam Multipurpose Development, a hydropower project, in Andong, South Korea, approved in December 16, 1971, amounting to US$22 million. The first Andong dam was a multipurpose that was approved in October 6, 1970 worth US$500,000). The second large dam the Bank supported was the Water Supply project in Kranji, Singapore, in December 23, 1970 amounting to US$ 8.3 million. ADB's major dam project, in terms of loan amount, was the Mindanao Power of the Philippines, a hydropower project approved in November 2, 1971, amounting to US$23.40 million. This is considered as the first major hydropower project extended by the Bank to its DMC's in the 1970s.

[20] ADB. 1995. Sector Synthesis of Post-evaluation Findings in the Irrigation and Rural Development Sector. Anneli Lagman, Bruce Aylward. "Survey of Multilateral Bank Practice on Financial and Economic Analysis of Large Dams." WCD Secretariat, South Africa. Prepared for Thematic Review III.1: Economic, financial and distributional analysis.

Table 11 listed the 29 large dams supported by the ADB.

Table 11: List of ADB-Funded Large Dams in Asia and Pacific Region			
Project Title	**Dam**	**Year**	**Country**
Hydropower Projects			
1. Second Mindanao	Agus 2	1972	Philippines
2. Garung Hydroelectric	Garung	1975	Indonesia
3. Fourth Mindanao Power	Agus 4	1976	Philippines
4. Trengganu Hydropower	Kenyir	1978	Malaysia
5. Sixth Mindanao Power	Pulangi	1979	Philippines
6. Sedawgyi Hydropower	Sedawgyi	1979	Myanmar
7. Samrangjin Pumped	Samrangjin	1980	South Korea
8. Batang Ai Hydropower	Batang Ai	1981	Malaysia
9. Power XVIII	Sengguruh	1983	Indonesia
10. Afulilo Hydroelectric	Afulilo	1986	West Samoa
11. Nam Song Hydropower	Song Lao	1992	Laos
12. Hunan Lingjintan	Lingjintan	1994	China
13. Theun-Hinboun Hydropower	Theun-Hinboun	1994	Laos
14. Fujian Mianhuatan Hydropower	Mianhuatan	1995	China
15. Nam Leuk Hydropower	Nam Leuk	1996	Laos
16. Kali Gandaki "A" Hydroelectric	Kali Gandaki	1996	Nepal
Irrigation Projects			
1. Sempor Dam & Irrigation	Sempor	1971	Indonesia
2. Kirindi Oya Irrigation and Settlement	Lunugamwehera	1977	Sri Lanka
3. Medium Scale Irrigation Package	Huai Mae On	1981	Thailand
4. Nusa Tenggara Agricultural Development	Pengga	1988	Indonesia
Water Supply			
1. Water Supply	Kramji	1970	Singapore
2. Manila Water Supply	Angat	1974	Philippines
3. Second Water Supply	Murai	1976	Singapore
4. Second Manila Water Supply	Angat	1978	Philippines
Multi-Purpose			
1. Andong Dam Multi-Purpose Development	Andong	1971	South Korea
2. Sedawgyi Multi-Purpose Dam and Irrigation	Sedawgyi	1976	Myanmar
3. Wadaslintang Multipurpose	Wadaslintang/Pejengkolan	1981	Indonesia
4. Perlis Agricultural Development	Timah Tasoh	1985	Malaysia
5. Zhejiang Shanxi Water Supply (Phase I)	Shanxi/Zhaoshandu	1997	China
Source: Survey of Multilateral Bank Practice on Financial and Economic Analysis of Large Dams. WCD Secretariat, South Africa			

E. DAMNING THE FUTURE

In March 31, 2005, after years of putting everything on hold, the World Bank's executive directors decided to support the construction of the US$1.3-billion 1,100 MW Nam Theun 2 (NT2) Hydropower Project in Laos by providing up to US$270 million in loans and risk guarantees. In April 4, the ADB's board of director followed suit and approved up to US$120 million in loans and risk guarantees. This approval signaled the return of these two multilateral development banks (MDB's) in financing large dams.

In May 4, 2005, nine international and seven Thai banks[21] have signed a pact to lend a combined US$1.58 billion[22] to build NT2. Part of the loans will be used for the resettlement of 6,200 affected people, and for environmental monitoring to protect the endangered elephants in the area.

In its project document (GMS Nam Theun 2 Hydropower Development Project), ADB allocated $120 million from its ordinary capital resources (OCR) for the construction of 1,100 MW hydropower generation plant. ADB also provides technical assistance amounting to US$1.7 million for the NT2 feasibility study. Included in the ADB NT2 project is the construction of a US$504.3 million 500 kilovolt (kV) Power Transmission Interconnection between Laos, Thailand and Viet Nam[23]. ADB committed an amount of US$900,000 for the 18-month feasibility study of this transmission line. The NT2 Hydroelectric Project is linked with the ADB's **Regional Power Interconnection and Trading Arrangements,** also known as the Mekong Power Grid Flagship Project. The electricity that the Electricity Generating Authority of Thailand (EGAT) will buy from NT2 will pass through the power transmission, part of the Mekong Grid.

[21]The nine international commercial banks include two French banks - BNP Paribas, Societe General - and Standard Chartered, ANZ of Australia, and ING, Fortis, BOTM, Calyon and KBC. Of the seven Thai commercial banks only the Bangkok Bank was made known on that day.

[22]The US$1.58 billion loans include US$130 million of bonding facilities and $450 million of equity commitments from its shareholders. Of the total, about $1.25 billion is to be used to construct NT2.

[23] Under the MoU, Laos shall export 3300 MW to Thailand (in addition to the present export of 490 MW over the existing 115 kV and 240 kV transmission lines) and 1000 MW to Vietnam during the next 10 years, depending on the competitive price on the power to be delivered. To support the power exports, a number of hydroelectric power plants are **expected to be developed** in Laos (in North of Vientiane in Laos, in the Nam Ngum and Nam Ngiep basins, in the middle Laos, in the Nam Theun basin and in Southern Laos in the Sekong basin).

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PART THREE

ADB POLICIES ON DAM-BUILDING AND NEW FRAMEWORKS FOR DECISION-MAKING

In a more integrated world, private entities—global corporations, multilateral banks and private commercial banks—with lesser or without any responsibility or accountability, freely engage in any investment and trade-related activities with most governments. These freedom to trade and invest, more often than not, were abused by these private entities to the detriment of people and environment. To check abuses from these profit-oriented corporations, scores of international standards or code of conducts were put forward and promoted. In the dam-building business, decision-making frameworks are established to serve as bases (for global engineering corporations, multilateral banks and private commercial banks) in financing and building dams.

The Asian Development Bank (ADB) has its own policies to deal with as far as financing dam project is concerned. Major private and public commercial banks have their own framework, the Equatorial Principles. However, what is considered as landmark is the World Commission on Dams Guidelines, the new framework for decision-making.

This Part will discuss different frameworks (or international standards or guidelines) for decision-making processes in relation to dam-building.

A. ADB's POLICIES AND DAM-BUILDING

The Asian Development Bank (ADB) have, at least, five policies[24]—environment, water, energy, indigenous peoples and involuntary resettlement—that that can relate with its own dam-building projects. This is as far as social and environmental impacts are concerned.

If and when ADB will finance a dam project, it has to deal with its own policies to **avoid**, **minimize** and **mitigate** any **social and environmental impacts**, such as on (1) **environment** (dam-building inundate and fragment rivers thus degrading riverine ecosystems, biodiversity, hydrology and its habitat), (2) **water** (dam-building fragments rivers, block up and divert waters), (3) **energy** (most of the dams supported by ADB are hydropower), (4) **indigenous peoples** (dam-building displaced indigenous peoples culturally and economically, their source of life and heritage are part and dependent with the river and its environment), and (5) **involuntary resettlement** (dam-building inundate hundreds of hectares, thus displacing peoples/communities from their traditional source of livelihoods, fishing and farming).

[24] The five policies are grounded on ADB's overarching poverty reduction objectives spelled out in "The Long-Term Strategic Framework of the Asian Development Bank (2001-2015)." ADB's strategic agenda is complemented by three crosscutting themes: (i) promoting the role of the private sector in development, (ii) supporting regional cooperation and integration for regional development, and (iii) addressing environmental sustainability.

1. Environment policy. This policy, while premised on the impressive economic growth of Asia, is also accompanied with pervasive, accelerating, and largely unabated resource depletion and environmental degradation. ADB has therefore recognized **the need to better integrate environmental considerations into all operations from the earliest stage**, moving upstream toward a more strategic and comprehensive approach beyond operational policies targeted only at environmental assessment of individual projects.

In case of **dam-building**, this means that ADB has to **integrate environmental considerations** in the dam project**.**

2. Water policy. This policy is premised on the importance of water in the region, from food production to potable water, and millions of poor people in the region that do not have access to clean and affordable water despite large investments in water supply systems since the 1980s.[25] ADB recognizes that between 1995 and 2005, the projected water demands for both domestic and industrial users for the Asian region are growing rapidly at the rates ranging from 70 to 345%.

In case of **dam-building**, consistent with its own environment policy, the revised paragraph 32 of ADB's water policy now reads: "… All such projects will need to be justified in the public interest **and stakeholders must be provided with the opportunity to comment on the justification with their views considered. The ADB will promote the informed participation of government, civil society, and other stakeholders in the country in an open and inclusive manner towards this end.** Where the risks are acceptable…" The term stakeholders include affected communities—indigenous peoples, local people—government and financiers (such as IFIs) of the project.

Originally, before the interim review revision, paragraph 32 of the water policy reads: "ADB will adopt a cautious approach to large water resource projects—particularly those involving dams and storage—**given the record of environmental and social hazards associated with such projects**. All such projects will **need to be justified in the public interest, and all government and non-government stakeholders** in the country must agree on the justification."

3. Energy policy. This policy is premised on the fact that many people of its developing member countries, most of them are poor, do not have access to energy.[26]

[25] About 750 million people in rural areas and another 100 million in urban areas still have no access to safe drinking water. Hygienic sanitation is needed for 1.75 billion people in rural areas, and 300 million in urban areas.

[26] Just over a billion people in the industrialized countries used nearly 60% of the world's commercial energy supply, while 5 billion people living in the developing countries consume the remaining 40%. The billion well-off people uses 25 times as much energy as the poorest billion, and about 1.6 billion people have no access to reliable modern forms of energy such as electricity, gas, and liquid fuels (Energy 200. Review of Energy Policy. ADB. 2003.

Many of these people live in the developing member countries (DMCs) of the Asian Development Bank (ADB), and most of them are poor. ADB's goal in the energy sector is to increase the availability of energy in a least-cost and environmentally friendly manner (cleaner production processes for energy need to be adopted to minimize environmental degradation) and to improve energy's access to people, particularly the poor at an affordable price.[27] With this policy, the ADB will assist its developing member countries in identifying and implementing energy projects at the same time **promoting environmental improvement** through the continued support for endues efficiency, renewable energy (such as hydropower and gas-based power generation projects), improvement in technical efficiencies, and switching to cleaner fuels.

In case of **dam-building**, ADB will assist hydroprojects because the Bank considers hydropower as clean and renewable.

4. Indigenous peoples policy. This policy focuses on the participation of indigenous peoples in development and the mitigation of undesired effects of development. ADB recognizes its responsibility to ensure equality of opportunity for indigenous peoples. ADB also ensures that its operations and assistance in its developing member countries (DMCs) do not negatively affect the welfare and interests of indigenous peoples. Any negative effect from ADB project, adequate measures must be taken to mitigate the affected indigenous peoples, or make certain that a compensation plan ensuring that project-affected people are as well off with the project as without it, is prepared and implemented.

5. Involuntary resettlement policy. The objective of this policy is to avoid or minimize resettlement, wherever feasible by the project. If displacement cannot be avoided, the affected people at least must be well off after resettlement as they would have been without the project. Addressing resettlement in Bank operations may entail some additional costs, but the benefits to the DMCs should outweigh the costs to the Bank. Good resettlement may be beneficial from economic, social and environmental considerations, and should contribute to improved project quality and impact.

In **dam-building**, like any infrastructure project, involuntary resettlement[28] should be an important consideration in project identification. For any project that requires relocating people, resettlement should be an integral part of project design and should be dealt with from the earliest stages of the project cycle.

[27] In pursuing this goal, ADB will undertake interventions in the energy sector that will support the overarching objective of poverty reduction. The operational priorities that will be particularly relevant to the energy sector are (i) environmental protection, (ii) good governance, (iii) private sector development, and (iv) regional and subregional cooperation.

[28] The three important elements of involuntary resettlement are (i) compensation for lost assets and loss of livelihood and income, (ii) assistance for relocation including provision of relocation sites with appropriate facilities and services, and (iii) assistance for rehabilitation to achieve at least the same level of well-being with **the project as** without it.

B. WCD NEW DECISION-MAKING FRAMEWORK

The traditional "balance sheet" approach of assessing costs and benefits of a dam project is an inadequate decision-making framework. Because of the rights-related issues and the potential risks associated with dam-building, WCD proposes an approach to be developed based on the recognition of rights[29] and assessment of risks[30] ("rights and risk" approach) as a tool for guiding future planning and decision-making. This **rights approach** are founded on **five core values** on (1) equity, (2) efficiency, (3) participatory decision-making, (4) sustainability and (5) accountability. These five core values are also aligned with the international framework of norms articulated in the UN Declaration of Human Rights that WCD cites as a powerful framework of internationally accepted standards.[31] "The notion of risk adds an important dimension to understanding how, and to what extent, a project may impact on such rights[32] (rights at risk)."

The decision-making framework promoted by WCD is organized within Seven Strategic Priority with corresponding principles or the set of 26 guidelines for good practices.

Figure 1: The WCD Policy Framework

Normative Development Framework		
Universal Declaration of Human Rights	United Nations Declaration on the Right to Development	Rio Declaration on Environment and Development

WCD Core Values and Shared Understanding
Core Values
1. Equity 2. Efficiency 3. Participatory Decision-Making 4. Sustainability 5. Accountability

Rights and Risks Approach
A Tool for Negotiated Decision-Making

Agenda for Implementation
Seven Strategic Priorities and 33 Policy Principles 26 WCD Criteria and Guidelines

[29] In the context of dam-building (large dams), various types of rights may be relevant, that include constitutional rights, customary rights, rights codified through legislations, property rights or the rights of developers and investors.

[30] In the context of dam-building, these are the project's potential risk to rights, or when the rights are at risk due to the dam project. The most vulnerable rights are the rights of affected people/communities/indigenous peoples.

[31] Considerable support exists for rights, particularly basic human rights, to be considered as a fundamental reference point in any debate on dams – starting with the adoption of the Universal Declaration of Human Rights in 1948 and the related covenants adopted thereafter, through to the Declaration on the Right to Development adopted by the General Assembly in 1986 and the Rio Principles agreed to at the UN Conference on Environment and Development in 1992 (WCD Report).

[32] Traditional practice is to restrict the definition of risk to the risk of the developer or corporate investor in terms of capital invested and expected returns. The Report of the World Commission on Dams. Page 207.

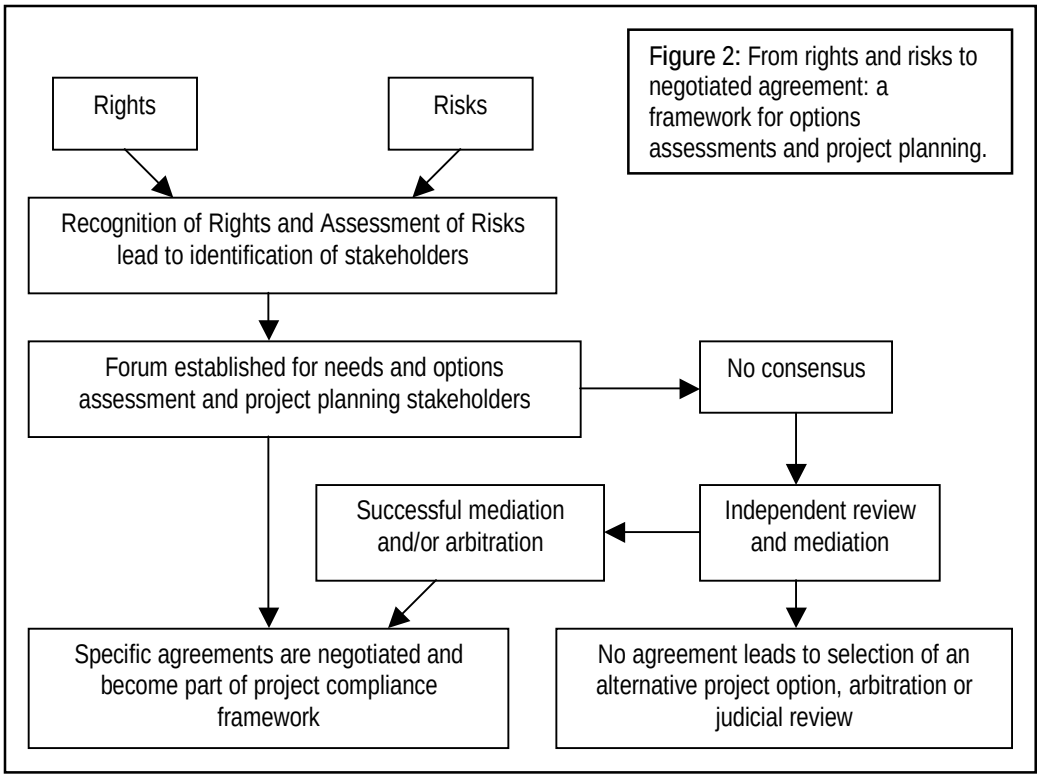

Figure 2: From rights and risks to negotiated agreement: a framework for options assessments and project planning.

C. ADB's RESPONSE TO WCD GUIDELINES

In a letter to the WCD chairperson Professor Kader Asmal, dated December 22, 2000, ADB president Mr Tadao Chino said that "ADB will re-examine its own procedures, including our environment and social development policies, and determine the extent to which the report's recommendations may necessitate changes in these procedures."

ADB admitted that the WCD Recommendations affect not only their hydropower, irrigation, water supply and flood mitigation projects but also all their infrastructure projects, including roads, railways, ports, water supply, sanitation and urban development. After the launching of WCD Report in November 2000, ADB took its first step in responding to the Report, by hosting an internal workshop on November 29, 2000 for ADB staff.[33] ADB made a follow-up, two-day regional workshop in Manila, Philippines, on from February 19-20, 2001 participated in by 70 people[34] from ADB's DMCs.

[33] One of the resource persons was Jeremy Bird of the WCD Secretariat.
[34] Participants are: utility managers, dam engineers, academics, and non-government organizations.

Below are the ADB's responses to each Policy Principles of the WCD **Seven Strategic Priorities**. The following texts are taken wholly from WCD Report and the ADB's Planned Responses to WCD[35]:

Strategic Priority 1: Gaining Public Acceptance

Public acceptance of key decisions is essential for equitable and sustainable water and energy resources development. Acceptance emerges from recognizing rights, addressing risks, and safeguarding the entitlements of all groups of affected people, particularly indigenous and tribal peoples, women and other vulnerable groups. Decision-making processes and mechanisms are used that enable informed participation by all groups of people, and result in the demonstrable acceptance of key decisions. Where projects affect indigenous and tribal peoples, such processes are guided by their free, prior and informed consent (FPIC).[36]

Policy Principles	ADB Responses
1. Recognition of rights and assessment of risks are the basis for the identification and inclusion of stakeholders in decision-making on energy and water resources development.	Rights and risks are determined through initial social assessments (ISA) that are done for all projects, and stakeholders are identified. Detailed social assessments are done if the need is indicated by the ISA. The recognition of rights varies from country to country. ADB abides by national policy and law in its assistance to DMCs as long as these are not in contravention of ADB's own policies.
2. Access to information, legal and other support is available to all stakeholders, particularly indigenous and tribal peoples, women and other vulnerable groups, to enable their informed participation in decision-making processes.	Public information centers have been established for major hydropower projects. Summary environmental impact assessments, and in some cases other important project documents, may be translated into the national language, though rarely if ever to tribal languages. Indigenous peoples development plans (IPDPs), as required by ADB's policy on indigenous peoples, may include specific support provisions. Gender considerations are being mainstreamed.
3. Demonstrable public acceptance of all key decisions is achieved through agreements negotiated in an open and transparent process conducted in good faith and with informed participation of all stakeholders.	Formal agreements are entered into with individuals or communities only in terms of resettlement and compensation, not in overall agreement to the project itself.
4. Decisions on projects affecting indigenous and tribal peoples are guided by their free, prior and informed consent achieved through formal and informal representative bodies.	All projects affecting indigenous peoples must have an IPDP, which includes formal and informal processes. The IPDP rarely involves substantive involvement by indigenous peoples in deciding whether a project is to proceed; this is seen as a matter of national sovereignty and thus the government's responsibility.

[35] ADB's Planned Responses to the World Commission on Dams. Strategic Priorities, Good Practices, and Institutional Responses. (http://www.adb.org)
[36] Among the guiding principles that WCD thematic report elaborated are that indigenous peoples and ethnic minorities should be involved from the beginning in planning and decision-making processes and that the principle of free, prior and informed consent (FPIC) should guide the building of dams that may affect indigenous peoples and ethnic minorities; Dams and Development: A New Framework for Decision-Making. The Report of the World Commission on Dams. An Overview. November 2000. (http://www.dams.org)

Strategic Priority 2: Comprehensive Options Assessment

Alternatives to dams often do exist. To explore these alternatives, needs for water, food and energy are assessed and objectives clearly defined. The appropriate development response is identified from a range of possible options. The selection is based on a comprehensive and participatory assessment of the full range of policy, institutional and technical options. In the assessment process, social and environmental aspects have the same significance as economic and financial factors. The options assessment process continues through all stages of planning, project development and operations.

Policy Principles	ADB Responses
1. Development needs and objectives are clearly formulated through an open and participatory process [37] before the identification and assessment of options for water and energy resource development.	Normally this is considered the government's responsibility. However, ADB assists its developing member countries (DMCs) through preparation of poverty reduction strategies and targeted assistance such as in the development of integrated river basin planning, studies of energy alternatives, and capacity building. Also, ADB is assisting its DMCs to explore development options.
2. Planning approaches that take into account the full range of development objectives are used to assess all policy, institutional, management, and technical options before the decision is made to proceed with any program or project.	Same as above.
3. Social and environmental aspects are given the same significance as technical, economic and financial factors in assessing options.	All hydropower projects as well as other major infrastructure projects are required under ADB's environmental impact assessment (EIA) guidelines to explore social and environmental alternatives. ADB's draft revised environmental policy and guidelines include provision for testing and applying strategic environmental assessment.
4. Increasing the effectiveness and sustainability of existing water, irrigation and energy systems are given priority in the options assessment process.	Demand-side management of the irrigation and energy sectors has been supported by ADB for several years, and these issues are considered in the design and approval process of ADB-supported projects.
5. If a dam is selected through such a comprehensive options assessment process, social and environmental principles are applied in the review and selection of options throughout the detailed planning, design, construction, and operation phases.	Social and environmental principles are applied through social and environmental assessments and through the implementation of environmental management plans and social development strategies throughout the project cycle.

[37] This strategic priority has move from a traditional top-down, technology-focused approach to advocate significant. International River Network (IRN).

Strategic Priority 3: Addressing Existing Dams

Opportunities exist to optimize benefits from many existing dams, address outstanding social issues and strengthen environmental mitigation and restoration measures. Dams and the context in which they operate are not seen as static over time. Benefits and impacts may be transformed by changes in water use priorities, physical and land use changes in the river basin, technological developments, and changes in public policy expressed in environment, safety, economic and technical regulations. Management and operation practices must adapt continuously to changing circumstances over the project's life and must address outstanding social issues.

Policy Principles	ADB Responses
1. Development needs and objectives are clearly formulated through an open and participatory process before the identification and assessment of options for water and energy resource development.	Normally this is considered the government's responsibility. However, ADB assists its developing member countries (DMCs) through preparation of poverty reduction strategies and targeted assistance such as in the development of integrated river basin planning, studies of energy alternatives, and capacity building. Also, ADB is assisting its DMCs to explore development options.
2. Planning approaches that take into account the full range of development objectives are used to assess all policy, institutional, management, and technical options before the decision is made to proceed with any program or project.	Same as above.
3. Social and environmental aspects are given the same significance as technical, economic and financial factors in assessing options.	All hydropower projects as well as other major infrastructure projects are required under ADB's environmental impact assessment (EIA) guidelines to explore social and environmental alternatives. ADB's draft revised environmental policy and guidelines include provision for testing and applying strategic environmental assessment.

Policy Principles	ADB Responses
4. The effectiveness of existing environmental mitigation measures is assessed and unanticipated impacts identified; opportunities for mitigation, restoration and enhancement are recognized, identified and acted on.	This is done systematically during post-project evaluation, normally three years after completion of construction for large infrastructure projects. Such assessments and recommendations may be contained in environmental management plans that are prepared for the operational stage of the project. This process has been systemized for the Theun Hinboun Hydropower Project.
5. All large dams have formalized operating agreements with time-bound license periods; where re-planning or re-licensing processes indicate that major physical changes to facilities or decommissioning may be advantageous, a full feasibility study and environmental and social impact assessment is undertaken.	Operating agreements with time-bound concession periods are finalized at commissioning or even earlier but re-licensing processes are rarely applied. The private sector investor would look for a long-term predictable financial scenario to minimize risk.

Strategic Priority 4: Sustaining Rivers and Livelihoods

Rivers, watersheds and aquatic ecosystems are the biological engines of the planet. They are the basis for life and the livelihoods of local communities. Dams transform landscapes and create risks of irreversible impacts. Understanding, protecting and restoring ecosystems at river-basin level is essential to foster equitable human development and the welfare of all species. Options assessment and decision-making around river development prioritizes the avoidance of impacts, followed by the minimization and mitigation of harm to the health and integrity of the river system. Avoiding impacts through good site selection and project design is a priority. Releasing tailor-made environmental flows can help maintain downstream ecosystems and the communities that depend on them.

Policy Principles	ADB Responses
1. A basin-wide understanding of the ecosystem's functions, values and requirements, and how community livelihoods depend on and influence them, is required before decisions on development options are made.	Although not a formal requirement, basin-wide studies have been done for recent projects for possible support by ADB (for example, the Se Kong, Se San and Nam Theun River Basins Hydropower Study [RETA 5697-REG], and the Nam Ngum River Basin Development Study [TA 3544-LAO]. ADB is introducing or strengthening national capacity in river basin management in countries such as Peoples' Republic of China, Lao PDR, Sri Lanka, and Viet Nam.
2. Decisions value ecosystems, social and health issues as in integral part of project and river basin development and prioritize avoidance of impacts in accordance with a precautionary approach.	The integrity of ecosystems and protection of or improvement in social and health conditions are integral parts of project design for ADB-supported projects.

Policy Principles	ADB Responses
3. A national policy is developed for maintaining selected rivers with high ecosystem functions and values in their natural state. When reviewing alternative locations for dams on undeveloped rivers, priority is given to locations on tributaries.	ADB is yet to provide such assistance to its DMCs. However, under Loan 1867-LAO: Environment and Social Program Loan (approved for $20 million on 6 December 2001), one component is an evaluation of the national energy sector development plan for the adequacy of its attention to social and environmental concerns and revision of the plan based on the evaluation. It is possible that rivers or portions of rivers may be identified for reservation from development.
4. Project options are selected that avoid significant impacts on threatened and endangered species. When impacts cannot be avoided, viable compensation measures are put in place that will result in a net gain for the species within the region.	Serious consideration is given to impacts on threatened and endangered species, including special studies where these are needed prior to making a decision on project support. In the Lao PDR and Nepal, for example, this has included provisions for strengthening existing protection capacity (Nam Leuk hydropower plant) or for establishing new protected areas (Kali Gandaki A hydropower plant). Compensation measures will be taken that will minimize net loss of fish populations, such as in the case of endangered fish species in the Peoples' Republic of China.
5. Large dams provide for releasing environmental flows to help maintain downstream ecosystem integrity and community livelihoods and are designed, modified and operated accordingly.	The release of environmental flows has been a topic of investigation in more recent ADB-supported projects, though this is far from a precise science. Studies are being undertaken in an ADB-supported project in Lao PDR to more precisely determine appropriate environmental flows for a dam currently under operation.

Strategic Priority 5: Recognizing Entitlements and Sharing Benefits

Joint negotiations with adversely affected people result in mutually agreed and legally enforceable mitigation and development provisions. These provisions recognize entitlements that improve livelihoods and quality of life, and affected people are beneficiaries of the project. Successful mitigation, resettlement and development are fundamental commitments and responsibilities of the State and the developer. They bear the onus to satisfy all affected people that moving from their current context and resources will improve their livelihoods. Accountability of responsible parties to agreed mitigation, resettlement and development provisions is ensured through legal means, such as contracts, and through accessible legal recourse at national and international levels.

Policy Principles	ADB Responses
1. Recognition of rights and assessment of risks is the basis for identification and inclusion of adversely affected stakeholders in joint negotiations on mitigation, resettlement and development related decision-making.	The recognition of rights varies from country to country. ADB abides by national policy and law in its assistance to DMCs as long as these are not in contravention of ADB's own policies. Environmental risk assessment forms an integral part of the appraisal process for all disaster mitigation projects. The draft revised environmental policy and guidelines include specific reference to undertaking environmental risk assessment as part of the EIA process when required.
2. Impact assessment includes all people in the reservoir, upstream, downstream and in catchment areas whose properties, livelihoods and non-material resources are affected. It also includes those affected by dam related infrastructure such as canals, transmission lines and resettlement developments.	ADB's environmental impact assessment procedures require that all people, whether affected by the project directly or indirectly, be accounted for during the environmental/resettlement assessment, including IPDPs where appropriate.
3. All recognized adversely affected people negotiate mutually agreed, formal and legally enforceable mitigation, resettlement and development entitlements.	ADB's resettlement policy and guidelines explicitly require agreed, formal, monitorable, and binding compensation measures.
4. Adversely affected people are recognized as first among the beneficiaries of the projects. Mutually agreed and legally protected benefit sharing mechanisms are negotiated to ensure implementation.	ADB's policy is that project affected people should be at least as well-off as they would have been in the absence of the project. The means to achieve this may be derived from the project or from other sources. In the case of dams, ADB-supported projects include provision for special consideration of adversely affected people. This often includes provisions for new social services (such as medical clinics, schools, rural electrification), vocational training that beneficiaries can use both in relation to project-related employment and in relation to the general labor market once project construction is completed, and preferential hiring during project construction. ADB has included a surcharge on project revenues in the Lao PDR (Nam Leuk Hydropower Project) to support protection of biological resources in a protected area on which local people depend for subsistence. Shared benefits to adversely affected people have to be clearly defined at the outset to minimize risks viewed from the part of the investor.

Strategic Priority 6: Ensuring Compliance

Ensuring public trust and confidence requires that governments, developers, regulators and operators meet all commitments made for the planning, implementation and operation of dams. Compliance with applicable regulations, with criteria and guidelines, and with project-specific negotiated agreements is secured at all critical stages in project planning and implementation. A set of mutually reinforcing incentives and mechanisms is required for social, environmental and technical measures. These should involve an appropriate mix of regulatory and non-regulatory measures, incorporating incentives and sanctions. Regulatory and compliance frameworks use incentives and sanctions to ensure effectiveness where flexibility is needed to accommodate changing circumstances.

Policy Principles	ADB Responses
1. A clear, consistent and common set of criteria and guidelines to ensure compliance is adopted by sponsoring, contracting and financing institutions and compliance is subject to independent and transparent review.	Third-party monitoring during design and construction has become a regular feature of major infrastructure projects supported by ADB. Compliance measures are monitored throughout the construction period. This would normally include at least two annual review missions by ADB staff.
2. A Compliance Plan is prepared for each project prior to commencement, spelling out how compliance will be achieved with relevant criteria and guidelines and specifying binding arrangements for project-specific technical, social and environmental commitments.	A plan for achieving compliance is built into resettlement and environmental management plans and IPDPs. ADB has strict technical criteria and guidelines for compliance with technical aspects. More attention is being placed on incorporating specific social and environmental compliance requirements as clauses in contract documents.
3. Costs for establishing compliance mechanisms and related institutional capacity, and their effective applications, are built into the project budget.	In terms of social and environmental aspects, costs are built into the project budget for institutional mechanisms such as resettlement committees, environmental units, and third-party monitoring. An assessment of institutional capacity for implementing environmental management programs is a part of ADB's environmental impact assessment process. The scope of performance bonds is being enlarged to cover environmental clauses in contract documents of major works contracts.
4. Corrupt practices are avoided through enforcement of legislation, voluntary integrity pacts, debarment and other instruments.	ADB is implementing its Governance Policy, which covers corrupt practices.
5. Incentives that reward project proponents for abiding by criteria and guidelines are developed by public and financial institutions.	Such incentives are not offered by ADB because project proponents are expected to abide by criteria and guidelines as identified in project documents. Penalties are also included in these documents to compensate the client in case of violation of criteria and guidelines. Where practicable, mitigation measures and livelihood restoration components are included in contract documents and paid for when accomplished. ADB has adopted performance-based lending as a policy, which implies that lending can be made a condition of DMC compliance with ADB policies.

Strategic Priority 7: Sharing Rivers for Peace, Development and Security

Storage and diversion of water on transboundary rivers has been a source of considerable tension between countries and within countries. As specific interventions for diverting water, dams require constructive co-operation. Consequently, the use and management of resources increasingly becomes the subject of agreement between States to promote mutual self-interest for regional co-operation and peaceful collaboration. This leads to a shift in focus from the narrow approach of allocating a finite resource to the sharing of rivers and their associated benefits in which States are innovative in defining the scope of issues for discussion. External financing agencies support the principles of good faith negotiations between riparian States.

Policy Principles	ADB Responses
1. National water policies make specific provision for basin agreements in shared river basins. Agreements are negotiated on the basis of good faith among riparian States. They are based on principles of equitable and reasonable utilization, no significant harm, prior informant and the Commission's strategic priorities.	ADB follows and supports initiatives by subregional organizations, such as the Mekong River Commission, in matters relating to cross-border management of water resources.
2. Riparian States go beyond looking at water as a finite commodity to be divided and embrace an approach that equitably allocates not the water, but the benefits that can be derived from it. Where appropriate, negotiations include benefits outside the river basin and other sectors of mutual interest.	ADB's new Water Policy incorporates the principle of equity and recognizes the need to look at a wide range of potential benefits.
3. Dams on shared rivers are not built in cases where riparian States raise an objection that is upheld by an independent panel. Intractable disputes between countries are resolved through various means of dispute resolution, including, in the last instance, the International Court of Justice.	ADB follows and supports initiatives by subregional organizations, such as the Mekong River Commission, in matters relating to cross-border management of water resources. These principles are also contained in ADB's Water Policy.
4. For the development of projects on rivers shared between political units within countries, the necessary legislative provision is made at national and subnational levels to embody the Commission's strategic priorities of "gaining public acceptance", "recognizing entitlements", and "sustaining rivers and livelihoods".	ADB has not supported dams where objections are raised by subnational entities.
5. Where a government agency plans or facilitates the construction of a dam on a shared river in contravention of the principle of good faith negotiations between riparians, external financing bodies withdraw their support for projects and programs promoted by that agency.	ADB has not faced such cases but if they would appear in the future, ADB would seek assistance of riparian river commissions to resolve disputes before taking action.

WCD goes beyond stating and enumerating strategic priorities and policy principles. WCD offers 26 **criteria and guidelines for good practices** based from the seven (7) strategic priorities and policy principles to allow government officials, developers and affected people alike to assess whether decisions taken, agreements signed and laws promulgated have been complied with.

Below are **Guidelines for Good Practices** and the corresponding responses of ADB.

Criteria and Guidelines for Good Practices	
Strategic Priority 1: Gaining Public Acceptance	**ADB Responses**
1. Stakeholder Analysis	**YES**, as part of social assessments including establishment of stakeholder forums.
2. Negotiated Decision-Making Process	Projects are not "negotiated" with local people except through government. ADB's policies (as with WCD guidelines) do not require unanimous consent of those who may be required to be resettled or of affected indigenous peoples. The approved Board paper that established ADB's Policy on Involuntary Resettlement, begins by explaining the "involuntary" aspect of resettlement: "That people should be at the center of development is increasingly recognized. However, there may be instances where a development intervention such as a road or power generation project should proceed for the greater benefit of society, in spite of its potential adverse effects on some people" ADB would, however, ensure that our existing mechanisms are adequate to protect the important interests of even a few persons who may be adversely affected. This could be in the form of enhanced alternative livelihood mitigation and rural development projects.
3. Free, Prior and Informed Consent	This is left to government, but ADB increasingly supports mediation by a mutually accepted third party, respected for their independence, to achieve informed consent.

Criteria and Guidelines for Good Practices	
Strategic Priority 2: Comprehensive Options Assessment	**ADB Responses**
4. Strategic Impact Assessment for Environmental, Social, Health and Cultural Heritage Issues -	**Yes**, in revised environmental guidelines.
5. Project-Level Impact Assessment for Environmental, Social, Health and Cultural Heritage Issues	**Yes**
6. Multi-Criteria Analysis	**Yes**. A recent study of 31 potential hydropower plant sites on tributaries to the Mekong River used a multi-criteria analysis to rank the projects. Non-technical and non-economic parameters carried more than 50% of the possible score.
7. Life Cycle Assessment	**Yes**. Replacement costs of project components are included for dam projects and their alternatives. Final decommissioning costs of dams are negligible when discounted to present values. Decommissioning and potential compensation should be agreed between government, financiers, and developers.
8. Greenhouse Gas Emissions	Limited due to only recent awareness of potential problems with reservoirs and scarce data, but has been dealt with for thermal projects in the People's Republic of China. Further research is required on emissions from reservoirs compared to alternative options, including thermal power plant emissions and heated water discharges to recipient waters, which may damage aquatic resources. ADB will support such research.
9. Distribution Analysis of Projects	**Yes**, for future projects
10. Valuation of Social and Environmental Impacts	**Yes**
11. Improving Economic Risk Assessment	**Yes**, for future projects (already done for the Ghazi-Barotha Hydropower Project in Pakistan).

Criteria and Guidelines for Good Practices	
Strategic Priority 3: Addressing Existing Dams	**ADB Responses**
12. Ensuring Operating Rules Reflect Social and Environmental Concerns	Initially done as a part of the Loan Agreement through assurances but not normally on a long-term basis (left to government). Funds for post-completion measures have recently been made available to address unmitigated impacts (Theun Hinboun and Nam Leuk Hydropower Projects, and Nam Song diversion dam, all in the Lao PDR; Ghazi Barotha Hydropower Project in Pakistan which specifies additional livelihood enhancement measures for affectees of Tarbela Dam; and Kali Gandaki A Hydropower Project in Nepal).
13. Improving Reservoir Operations	Would be left to the operator after construction but in line with agreed operation guidelines with monitoring by government, but see 12 above.
Criteria and Guidelines for Good Practices	
Strategic Priority 4: Sustaining Rivers and Livelihoods	**ADB Responses**
14. Baseline Ecosystem Surveys	**Yes**
15. Environmental Flow Assessment	The release of environmental flows has been a topic of investigation in more recent ADB-supported projects, though this is far from a precise science. Studies intended to be done through international research with ADB involvement.
16. Maintaining Productive Fisheries	**Yes**, in the form of fish ponds and reservoir culture, and possible fish transporters/bypasses or ladders if found attractive to the migrating fish population.
Strategic Priority 5: Recognizing Entitlements and Sharing Benefits	**ADB Responses**
17. Baseline Social Condition	**Yes**
18. Impoverishment Risk Analysis	**Yes**, through social assessment and poverty assessment.
19. Implementation of the Mitigation, Resettlement and Development Action Plan	**Yes**
20. Project Benefit-Sharing Mechanisms	ADB's policy is that project affected people should be at least as well-off as they would have been in the absence of the project. The means to achieve this may be derived from the project or from other sources (see also under B5. Strategic Priorities No. 5, last paragraph).

Criteria and Guidelines for Good Practices	
Strategic Priority 3: Addressing Existing Dams	**ADB Responses**
12. Ensuring Operating Rules Reflect Social and Environmental Concerns	Initially done as a part of the Loan Agreement through assurances but not normally on a long-term basis (left to government). Funds for post-completion measures have recently been made available to address unmitigated impacts (Theun Hinboun and Nam Leuk Hydropower Projects, and Nam Song diversion dam, all in the Lao PDR; Ghazi Barotha Hydropower Project in Pakistan which specifies additional livelihood enhancement measures for affectees of Tarbela Dam; and Kali Gandaki A Hydropower Project in Nepal).
13. Improving Reservoir Operations	Would be left to the operator after construction but in line with agreed operation guidelines with monitoring by government, but see 12 above.
Criteria and Guidelines for Good Practices	
Strategic Priority 4: Sustaining Rivers and Livelihoods	**ADB Responses**
14. Baseline Ecosystem Surveys	**Yes**
15. Environmental Flow Assessment	The release of environmental flows has been a topic of investigation in more recent ADB-supported projects, though this is far from a precise science. Studies intended to be done through international research with ADB involvement.
16. Maintaining Productive Fisheries	**Yes**, in the form of fish ponds and reservoir culture, and possible fish transporters/bypasses or ladders if found attractive to the migrating fish population.
Strategic Priority 5: Recognizing Entitlements and Sharing Benefits	**ADB Responses**
17. Baseline Social Condition	**Yes**
18. Impoverishment Risk Analysis	**Yes**, through social assessment and poverty assessment.
19. Implementation of the Mitigation, Resettlement and Development Action Plan	**Yes**
20. Project Benefit-Sharing Mechanisms	ADB's policy is that project affected people should be at least as well-off as they would have been in the absence of the project. The means to achieve this may be derived from the project or from other sources (see also under B5. Strategic Priorities No. 5, last paragraph).

All in all, out of 26 WCD Guidelines and Criteria for Good Practices, ADB conforms with 17, partially conforms with three (3), and not "currently" conforming with six (6) as they are not incorporated in ADB Guidelines and/or are not in accordance with DMC policy/ practice.

Crucial among the guidelines where ADB is not "currently" conforming are the following: (1) Free, prior and informed consent (under guideline 3), and (2) Negotiated decision-making process (under guideline 2), where the ADB left these two very important tasks to the borrower-government, as owner. On the part of the private sector, they would need definite financial closure in a fixed time span.

The other two important guidelines where ADB does not conform are the following: (1) Ensuring operating rules reflect social and environmental concerns, and (2) Improving reservoir operation, where ADB only considers these after the loan completion, unless it is stipulated in the loan agreement.

D. OTHER INSTITUTIONAL RESPONSES TO WCD GUIDELINES

WCD Guidelines also enumerated institutional guidelines applicable for bilateral agencies (such as the Japanese Bank for International Cooperation, and other bilateral banks in US and Europe) and multilateral development banks (ADB, WB).

Below are the responses of the ADB:

Institutional Responses—Bilateral Aid Agencies and Multilateral Development Banks	ADB Responses
1. Develop programs to help countries, especially those with a significant existing or potential dam population, formulate a response to the Commission's report and find ways to implement its recommendations.	ADB has already assisted the Commission in distributing copies of the Commission's report to selected national agencies. ADB has supported two regional dissemination meetings in the Asia Region to discuss the report and its implementation. It also is holding internal discussions of other ways and means for ADB to support the Commission's findings.
2. Ensure that any dam options for which financing is approved emerge from an agreed process of ranking alternatives and respect the Commission's guidelines.	ADB ranks alternatives on a least-cost basis. More attention to the social and environmental considerations in least-cost solutions is a task, which ADB is attempting to address. ADB supports the Commission's guidelines and intends to consider them in all future projects.

Institutional Responses—Bilateral Aid Agencies and Multilateral Development Banks	ADB Responses
3. Accelerate the shift from project-to sector-based finance, especially through increasing financial and technical support for effective, transparent and participatory needs and options assessment, and the financing of non-structural alternatives.	ADB has long provided sector financing. It is providing assistance in several countries to strengthen participatory processes and has strengthened its own capacities in this field over the past several years. ADB has also emphasized non-tructural alternatives in its lending programs. ADB plans to continue these efforts in the future.
4. Review the portfolio of past projects to identify those that may have under-performed or present unresolved issues and share in addressing the financial burden of such projects for borrower countries. This may include, for example, canceling the outstanding debt related to them, converting debt repayment into development assistance targeting affected areas, or providing new support to help borrower countries address unresolved economic, social and environmental problems.	ADB has no current policy to deal with such cases.
5. Review internal processes and operational policies in relation to the Commission's recommendations to determine changes needed in the selection of projects for lending portfolios; the appraisal process; and implementation, monitoring and evaluation.	The Commission's recommendations have been reviewed in relation to their application to the ADB's revised environmental guidelines and social policies. A similar review has been carried out for ADB's Infrastructure and Agriculture Departments, which are responsible for the energy, water supply, flood control and irrigation sectors. Further review will await consultation with developing member countries through ADB-organized workshops in these countries. Subject to government concurrence, NGOs will be invited to these workshops.

Aside from the Asian Development Bank (ADB), two more banks—the World Bank and the African Development Bank—adopted the new decision-making framework recommended by the WCD. They will engage their respective stakeholders, similar with the ADB, in reviewing WCD's findings and recommendations. On the other hand, the Dams and Development Project (DDP) also worked along that line but focused more on following up the businesses that were left from WCD.

The African Development Bank (AfDB)[38] has welcomed the Commission's report as "a major milestone in the assessment of economic technical and environmental performance of large dams." In response to WCD Report, AfDB announced on January 26, 2001 that it was planning to incorporate new criteria and guidelines in the development of the Bank's technical guidelines for its policy on Intergrated Water Resource Management.

The World Bank, on its part, consulted its member states regarding the WCD Report in preparation for a full discussion on the report before its Committee on Development Effectiveness. The WCD report is expected to inform the World Bank's new Water Sector Strategy as well as the review of its guidelines on resettlement and displacement.

Following the launching of the World Commission on Dams (WCD) Report in November 2000, it also ended the Commission's existence. The **Dams and Development Forum (DDP)**[39], a project of the United Nations Environment Program (UNEP)[40], was formed to respond to a call from a wide range of stakeholders for an entity to support and guide those countries and regions that request assistance in disseminating and analyzing the WCDs recommendations and determining appropriate responses and actions relevant to prevailing national contexts.

DDP is not meant to implement the WCD Recommendations. The aim of DDP is to promote a dialogue on improving decision-making, planning and management of dams and their alternatives based on the World Commission on Dams (WCD) core values and strategic priorities. The objectives of the DDP are the following:

1. Support country-level, regional and global dialogues on the WCD report and the issues it addresses with the aim of engaging all stakeholders with emphasis on those not currently involved;
2. Strengthen interaction and networking among participants in the dams debate;
3. Support the widespread dissemination of the WCD report and the report of the Third WCD Forum, and make available other stakeholders' responses; and
4. Facilitate the flow of information and advice concerning initiatives relevant to dams and development.

[38] The AfDB also participated in the final meeting of the WCD Forum that was held in Cape Town on 25 - 27 February 2001.
[39] DDP comprises close to 115 organizations representing a broad range of constituencies through thirteen stakeholder categories. Membership of the Forum is on invitation by the Steering and meets once a year.
[40] During the Third WCD Forum meeting UNEP was identified by stakeholders as a suitable independent and impartial body to coordinate the follow-on activity. The mandate of the DDP excludes it from taking positions or making judgements on individual projects or associated practices.

E. THE EQUATOR PRINCIPLES – THE FINANCE SECTOR GUIDELINES

On 4 June 2003, responding to the growing international pressure, 10 major commercial banks,[41] along with the IFC (of World Bank Group), signed up to a new set of guidelines—the **Equator Principles (EPs).** This new set of guidelines is designed to promote responsible environmental and social practices in the project finance sector. Equator Principles is the first collective norms addressing environmental and social issues in the finance sector. The major commercial banks presented a united approach in attempting to mitigate environmental and social risk associated with financing projects in the world's most fragile ecosystems.

The Equator Principles are **voluntary guidelines**[42] based on an external benchmark of the World Bank and IFC sector-specific pollution abatement guidelines and IFC safeguard policies. This aims to provide a common framework for the project finance industry or lenders to assess and manage the environmental and social issues that arise from the development of **energy and infrastructure projects**. The guidelines cover projects in all industry sectors and will have an effect on the future financing of **hydropower projects**.

In the Equator Principles' preamble, it contains a very key policy statement — that **financial institutions will not provide loans to customers which are unable to or do not follow the financial institutions' environmental policies**.

With the endorsement of such a significant group of lenders, the Equator Principles are set to become **an important part of both the lender due diligence process and the borrower compliance regime for many project loans**. The institutions that have adopted the guidelines will apply them to new projects for which they provide project financing and which have a total capital cost of US$50 million or more.

Lenders will classify new projects according to the environmental and social risks that they pose. If a project is classified as posing a high or medium level of risk, the lenders will require the borrower to provide a satisfactory **Environmental Assessment**, assessing those risks by reference to local laws, and World Bank and IFC guidelines. For a project that poses a high level of risk, or, in certain circumstances, a project that poses a medium level of risk, the lenders will require the borrower to prepare an **Environmental Management Plan**, setting out how the environmental and social risks identified in the assessment will be mitigated, monitored and managed.

[41] ABN AMRO, Barclays, Citigroup, Credit Lyonnais, Credit Suisse Group, HVB Group, Rabobank, Royal Bank of Scotland, WestLB and Westpac. Other commercial banks have signed up subsequently. At the 1st anniversary (2004), 23 banks and two public financial institutions, the Danish Export Credit Agency (EKF), and the European Investment Bank (EIB) have signed on to the Equator Principles.

[42] Financial institutions do not sign an agreement. Each financial institution that adopts the principles will individually declare that it has or will put in place internal policies and processes that are consistent with the Equator Principles.

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PART FOUR

DAM'S IMPACT AND EFFECTIVENESS

"Dams have made an important and significant contribution to human development, and the benefits derived from them have been considerable.

In too many cases an unacceptable and often unnecessary price has been paid to secure those benefits, especially in social and environmental terms, by people displaced, by communities downstream, by taxpayers and by the natural environment."

— WCD Report, November 2000

A. CONFLICTING POLES

Before—and even after—the WCD Report came out in November 2000, the debates already exist between two poles of those who stress the role of dams in **generating cheap and clean electricity, preventing floods** and **supplying water** for drinking and irrigation, and those who see those dams as **social and ecological disasters**.

The contributions of dams to human development cannot be ignored. The more than 45,000 dams around the world helped many communities and countries' economies in utilizing and harnessing water resources from half of the world's dammed rivers primarily for food production, energy generation, flood control and other domestic use. Dams supported 30-40% of the entire irrigated area of the world and thus supported 12-16% global food production. Hydropower provides about 19% (2, 650 TWh[43]/yr) to more than half of 63 countries' electricity supply. Around 12% of all dams supplies water for drinking and sanitation. The dams of 75 countries have a flood control function to safeguard nearby communities.

But, the abovementioned benefits from dams are just one side of the whole dam-building stories.

On the other side are the social and environmental impacts. These impacts, from the words of World Commission of Dams (WCD)[44], are the "unnecessary price paid to secure those benefits, especially in social and environmental terms, by people displaced, by communities downstream, by taxpayers and by the natural environment." The extent and scale of the dam impacts vary depending on location, size and other dam characteristics such as inundated area, and population density in the river basin. The impact has a cultural dimension, especially to displaced indigenous people.

[43] **Terawatt hour** (**TW·h**) is a unit for measuring energy. It corresponds to 1,000,000,000 kW·h (kilowatt hours). It is the amount of energy that would be produced by a 1,000,000 MW generator over a period of one hour, or a 114 MW generator over a period of approximately one year. The terawatt hour is commonly used for large amounts of electrical energy, since it may be easier to understand in a practical context than the proper SI unit for energy, the joule, which is a watt second (W·s).*(Wikipedia)*

[44] The World Commission on Dams (WCD) was established by the World Bank and IUCN – The World Conservation Union – in May 1998 in response to the growing opposition to large dams. It composed of governments, NGOs, academe and business experts on large dams. The WCD guidelines look for future dam-building less destructive. According to the International River Networks, the WCD report is the product of numerous political negotiations and compromises. While there are plenty of inclusions, omissions and compromises in the report for NGOs and affected people to criticise, *Dams and Development* is on the whole a strongly worded and coherent report.

The issues and debates associated with dam-building are not limited to the design of the dam itself, the way it was constructed or built, as well as how the dam is operated. The issues and debates of dams go beyond from these engineering aspects to **the social and environmental dimensions** of dam-building. At the heart of these debates, according to the WCD, are the issues of **equity**, **governance**, **justice** and **power.** These are the issues that underlie the many intractable problems faced by humanity.

B. DAM'S IMPACTS TO PEOPLE AND COMMUNITIES

1. Temporal Employment versus Permanent Displacement. Dam-building provides employment to local people. However, at the same time, a dam project also displaces local people from their homes and traditional livelihood. While employment generated from dam-building is transient or temporal in nature, the deprivation of local people from their sources of livelihood, on the other hand, is perpetual.

During the construction phase of the dam project, a huge number of unskilled workers and a smaller number of skilled workers were hired. The Tarbela dam of Pakistan, an ADB-funded hydropower dam, employed 15,000 workers during its peak period of construction.[45] Kariba (Zambezi River, Zambia and Zimbabwe) and Grand Coulee (Columbia River Basin, USA) dams employed between 10,000 – 15,000 workers each. In Kali Gandaki, an ADB-funded hydropower project in Nepal, employment for affected local people was part of the arrangement. However, employment generated is temporal and short-lived. Affected indigenous peoples, such as the Botes in Nepal and other local people, most of them are unskilled enough for the construction jobs.

2. Dams deprived and displaced people. The inundation of land for the reservoir submerged communities (some of these are communities of indigenous people) and altered the riverine ecosystems (upstream and downstream) thus affecting the resources available for land-and-riverine-based productive and economic activities where affected people depend their traditional livelihoods (from agricultural production, fishing, livestock grazing, fuelwood gathering and collection of forest products).

There are about 40-80 million people who have been forcibly evicted or displaced from their homes to make way for dams. The impacts of dam-building have been particularly devastating in Asia, Africa and Latin America. Large dams in India and China alone (both in Asian region), could have displaced between 26-58 million people between 1950 and 1990.[46] With the construction of the world's largest dam, the Three Gorges in China, the level of displacement has increased substantially.

[45]The Tarbela dam in Pakistan consists of 6 project loans from 1974 to 1984 periods.

[46] China and India, the world's two most populous countries, have built around 57% of the world's large dams, and accounted for the largest number of displaced people. China officially recognized, in the late 1980s, some 10.2 million people as 'reservoir resettlers.' But, other sources estimated a substantially higher figure. Large dams in the Yangtze basin alone have relocated at least 10 million people. In India, displaced people due to large dams vary from 16 to 38 million people.

Most of the physical displacements due to dam-building are involuntary and involve coercion and force, and in few cases even caused the lives of people. Millions more have lost their lands, livelihoods and access to natural resources.

The timing of these social impacts varies, depending on the proximate cause. In the case of loss of home and livelihood due to the filling of a reservoir, the social impacts are immediate. The implications for downstream livelihoods, however, are palpable only after the completion of the dam. The scale and extent of impacts will vary depending on location, size and other dam characteristics such as inundated area, and population density in the river basin. And in many cases in densely populated tropics large dams will lead to both physical and livelihood displacement. For example, the Urrá 1 dam on the Upper Sinú River in Colombia displaced 12,000 people but also severely affected more than 60,000 fishermen in the lower Sinú, where the fish population drastically diminished as a result of the dam. The damming of the upper reaches of Mekong River affecting the livelihood (fisheries and agriculture) of the downstream people in Cambodia, Thailand and Vietnam.

3. Resettlement focused only on physical relocation. The resettlement programs have predominantly focused on the process of physical relocation rather than restoring the livelihoods of displaced people. In the case of 10 million Chinese resettled at least 46% are still in 'extreme poverty.' In the case of India, 75% of the displaced people have not been rehabilitated and are impoverished.

The absence or the lack of economic and social development dimension of resettlement program, such as livelihood opportunities forces affected people to abandon resettlement sites and migrate.[47] One example is the resettlement site provided to affected people from an ADB-funded dam, the Tarbela dam of Pakistan. Allotted agricultural land was of poor quality and basic services such as electricity,[48] health facilities and schools were not provided.

4. No lands, no titles, no compensation. Not all affected people were adequately compensated. There were those who were excluded due to technicalities (definition on the categorization of people to be affected by dams). The WCD Case Studies show that, at the time of the dam design, communities situated downstream, those without land or legal title, indigenous people and those affected by project infrastructure (and not just the reservoir) were not considered as affected people.

5. Dams displaced indigenous people. The impacts of dam-building not only fragmented the riverine ecosystems, but also physically displaced and deprived indigenous people from the river systems where they depend on their traditional livelihoods. On a deeper insight, their physical displacement from the river system also alters their cultural way of life. Indigenous people are victims of no lands-no titles-no compensation resettlement practices. In one of ADB-funded dams, the Tarbela hydropower project in Pakistan, only those affected

[47] Similar experiences are recorded from other resettlement sites at Tucurui, Sirindhorn dam in Thailand, and Akosombo in Ghana. In northeast Thailand, 15,000 farming families were left without lands as a result of failed resettlement schemes between 1960 and 1970.

[48] Electricity was only provided after 25 years.

people with legal title were compensated for the loss of their lands and livelihoods.[49] The same happened in another ADB-funded dam project, the Kali Gandaki Hydroelectric project in Nepal. With such criteria for eligibility, indigenous peoples and ethnic minorities suffered disproportionately as they "lacked" citizenship, tenancy or land tenure papers.

The newly completed Batang Ai Hydropower Project in Malaysia displaced 3,600 Iban people in Sarawak.[50]

For those **resettled indigenous people**, 72% of the 32,000 displaced people from the Kedung Ombo dam in Indonesia were **worse** off after they were resettled.[51] The displaced 800 ethnic minority Nya Heun families from Houay Ho dam in Laos are suffering from severe lack of food, shortage of arable land and insufficient clean water.

The Mamberano dam, a megahydropower project, threatens Indonesia's nomadic tribes. According to a report in the Indonesian language newspaper, *Kompas*, West Papua's governor JP Salossa, said that loans from the World Bank and the Asian Development Bank (ADB) would fund the US$ 6 billion hydro-electric project, whose 3 units would generate 10,000 Megawatts. However, the World Bank and ADB denied it.

In the Philippines, 10,000 indigenous peoples (Dumagat and Remontado) and upland settlers in Sierra Madre mountain range are bound to be displaced and eight barangays (villages) (10,000 hectares) within the boundary of Rizal and Quezon provinces will be submerged by the ADB-funded US$1-billion Laiban Dam. The reservoir in General Nakar and Infanta, Quezon Province, will further displace people.

6. The control and the unscheduled releases of waters from dams threaten the lives of people living near the banks. The unannounced releases of water from the Yali Falls Dam's reservoir in Se San River of Vietnam caused the lives of 39 Cambodians. In April 2005, at least 62 Hindu pilgrims were killed when the water from the Indira Sagar dam of the state-run Narmada Hydroelectric Development Corporation was released without warning during a religious ceremony (Bhootdi Aamavasya or Moonless Night) attended by an estimated 300,000 Hindus who congregated to bathe downstream from the dam on the banks of Narmada river near Dewas. The Indira Sagar has a full reservoir level of 262.13m and is part of more than 3,000 dams being built across Narmada river and its tributaries as part of the Narmada Valley hydroproject.

[49] In the WCD Case Studies other dam projects who exclude some affected people due to inadequate categorization are the Grand Coulee, Aslantas and Tucurui.
[50] Loan No. 521-MAL for US$ 40.4 million, approved on 17 September 1981.
[51] Based from a monitoring study in 1993.

C. DAM'S IMPACTS TO ENVIRONMENT

1. Dams impact to the rivers hydrology[52] **and ecosystems**. Dams alter, fragment and degrade riverine ecosystems and losses biodiversity, both in the upstream and downstream. The unscheduled releases or discharges of water from dam's reservoir result in sudden changes in water climate disrupting seasonal migration patterns for fish and wildlife and destroying plant life.

The blocking of dams of the silt rich in nutrients is depriving fishes, and also not finding its way downstream for agriculture in the river basin. All these alteration and blocking during and after construction of dams, affect resources available for land-and-riverine-based productive activities, such as agriculture and fisheries. The damming of Mekong River, for example, endangered the 1,200 fish and other mammals and another 215 species in the Tonle Sap, in Cambodia.

The inundation of land for the reservoir submerged communities (some of these are communities of indigenous people) and altered the riverine ecosystems (upstream and downstream) thus affecting the resources available for land-and-riverine-based productive and economic activities where affected people depends their traditional livelihoods (from agricultural production, fishing, livestock grazing, fuelwood gathering and collection of forest products.

2. Dams emit greenhouse gases. Proponents of dam-building put forward the notion that hydropower dam is clean. It is carbon-free unlike power plants that are emitting greenhouse gases. Prof. Raymond Lafitte, president of International Hydropower Association (IHA) said that by increasing the number of dams for hydropower, together with the existing installed capacity,[53] will make a substantial contribution in avoiding emissions of greenhouse gases and related climate-change issues.

On the contrary, environmentalists said that any large dam, including hydropower dams, is not clean and cannot be considered as environmentally benign. Large dams' reservoirs **emit greenhouse gases** due to the rotting of flooded organic matters. These are the flooded vegetation and soils, the plants that grow in the reservoir, and the detritus that flow into the reservoir from the upstream. The greenhouse gases are emitted continuously from the surface of the reservoir, in sudden pulses when gases bubble up from the reservoir bottom and when water is discharged through hydro turbines and dams spillways.[54]

[52] **Hydrology** (earth science) is the study of the occurrence, distribution, and movement of water on, in, and above the earth. The cycle of movement of water between land (terrasphere), ocean (oceanosphere), and air (atmosphere) is termed the hydrologic cycle or water cycle. **Hydrologic cycle** refers to the change of states of water between liquid, solid and gas. Also, the hydrological cycle (or water cycle) refers to the continuous exchange of water within the hydrosphere, for instance: between the atmosphere, land, surface water, groundwater, and plants. It may be divided into four main phases: (1) evaporation, precipitation, infiltration, and run-off. (Wikipedia)

[53] Existing capacity is estimated to around 700 GW.

[54] The science of quantifying reservoir emissions is still young, however, and filled with uncertainties which are the subject of a heated scientific – and political – debate. The controversies include determining the best methods for measuring emissions from reservoir surfaces, how to account for sources and sinks of gases in the watershed before a dam was built, the magnitude of emissions generated when water is discharged from the dam, and how to compare hydropower emissions with those from fossil fuels. *Gross* reservoir emissions are those measured directly at the reservoir surface and dam. But the actual impact of a dam on the global climate depends on *net* emissions. These are calculated by factoring in preexisting sources and sinks of greenhouse gases in the watershed and how the dam has altered these. There are few other attempts made to measure turbine and spillway emissions.

The World Wide Fund (WWF), an international conservation organization, has produced detailed evidence challenging the notion that hydropower is environmentally benign. It cited the problems of eutrophication[55], sedimentation, landslides and the production of carbon dioxide and methane, both of which are greenhouse gases, due to the decomposition of peat and forest biomass.[56]

Canadian scientists have made a preliminary estimate that reservoirs worldwide release up to 70 million tons of methane and around a billion tons of CO2 each year. This is equivalent to four percent of CO2 emissions from other sources linked to human activities and about one-fifth of total human-related methane emissions.

In some cases, reservoirs may have a greater impact on global warming than similar-sized gas-fired power stations. Researchers discovered massive methane emissions from water released from the *Petit Saut Dam* in French Guyana. The massive emission is much as a can of fizzy drink suddenly froths up when it is opened and depressurized. The dam's turbine and spillway emissions were much greater than the total volume of methane released from the surface of the reservoir. If the *Petit Saut* data is representative of other dams, researchers may have substantially underestimated actual emissions.

Table 12: Global Warming Impact of Various Electricity Options

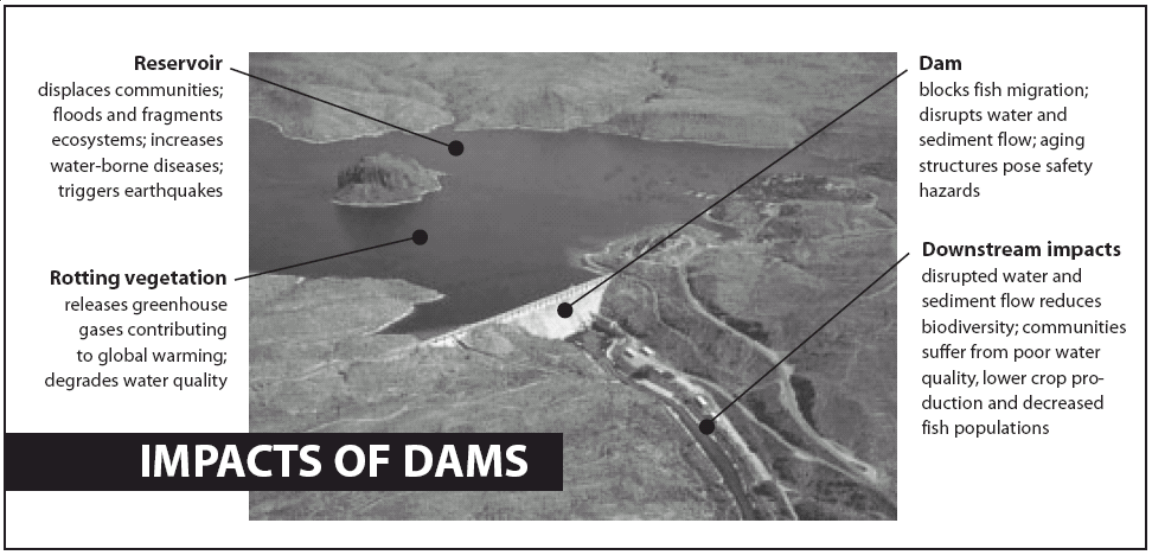
Power Plant Type	Emissions (g CO2-eq/kWh)
Hydro (tropical)	200 - 3,000 ***[1]***
Hydro (temperate/boreal)	10 – 200 ***[1]***
Coal (modern plant)	790 – 1,200
Heavy oil	690 – 730
Diesel	555 – 880
Combined cycle natural gas	460 – 760
Natural gas cogeneration	300
[1] Represents gross emissions and does not include emissions produced when water is released from the reservoir.	
Source: International River Network	

3. Dams breed waterborne diseases. Dams' reservoirs can also become breeding grounds for waterborne diseases such as malaria, *leishmaniasis* and *schistosomiasis*. Emissions of carbon dioxide and methane are particularly high from reservoirs in the lowland tropics.

Ironically, the dam proponents were able to find justification from the mess they have created—global warming. According to Patrick McCully "the dam industry is pushing hard for hydro to be eligible for global warming-related subsidies, especially under international schemes such as the Kyoto Protocol Clean Development Mechanism (CDM)[57], subsidies

[55] The growth stimulated by excessive nutrients leads to deterioration in water quality.
[56] "Hydropower threatened by deluge of objections." Financial Times (November 2, 1999).
[57] The Clean Development Mechanism (CDM), defined in Article 12 of the Kyoto Protocol to the United Framework Convention on Climate Change, is a flexible financing instrument that enables developing countries to benefit from reductions of emissions of harmful greenhouse gases (GHGs) and promote sustainable development. A typical CDM project produces a marketable commodity, namely emissions reduction (ER) credits. The sale of ER credits to developed countries and companies with ER targets can help generate additional revenue for a CDM project in the developing country.

which it believes could render hydro economically viable." Under the CDM, Northern countries will help fund projects in the South which reduce greenhouse gas emissions. The Northern countries will then be able to count the avoided greenhouse gases from these CDM projects towards their Kyoto Protocol-mandated emission reductions.[58] The Asian Development Bank established their own CDM facility to provide opportunities to developing member countries to access additional financial resources through efficient emissions reduction for the promotion of sustainable development.



Source: Dammed Rivers, Damned Lives, International River Network

D. DAMS ARE LESS EFFECTIVE THAN EXPECTED

1. Dams have had poor economic performance. WCD found that on the average, large dams have been at best only marginally economically viable. The average cost overrun of dams is 56%. This means that when a dam is predicted to cost US$1 billion, it ends up costing US$1.56 billion. Half of the dams surveyed had a construction delay of one year or more. If these factors had been taken into account at the time of decision-making, many alternatives would have been more economically viable.

2. Dam's hydropower is not cheap and reliable. Hydroelectricity can be cheap to produce once a dam is built, because the proponents argued, the "fuel" (water from the river) is renewable and is not subjected to fluctuations in market conditions. According to Prof. Raymond Lafitte, president of the International Hydropower Association (IHA), hydro can also represent energy independence for many countries, and the operating costs of hydropower dams are lower compared to fossil fuel plants.

[58] McCully, Patrick. Expensive and Dirty Power: Why Dams are Uneconomic and not Part of the Solution to Global Warming.

But dams are hugely expensive to build. It runs billions of dollars, and they are prone to cost overruns—where their actual costs are usually far higher than estimated. WCD discovered that average dams end up costing 56% more. This is because economic feasibility studies by the dam designers typically overestimate how much power their projects will produce. Take the case of Nam Theun 2[59], as an example of overestimation, where the projected economic return was based on a plant factor or operating efficiency of 81%, although the average plant factor for dams in the US is under 50%. Fifty-five percent of the hydropower projects studied by WCD generated less power than planners promised.

Dam designers also often fail to factor in the impact of droughts where the output (power generation) is affected due to low water level. Global climate change will increase the variability of rainfall and it is unpredictable. Climate change is expected to increase the frequency and severity of droughts, making hydropower generation more undependable and unreliable source of energy. When all these factors are considered, hydropower—because it depends on the vagaries of the hydrological cycle—is a very costly form of power generation. Many hydropower-dependent countries (such as Brazil, Norway, Ghana, Sri Lanka, Ecuador and Vietnam) are now suffering from serious power shortages due to droughts.

Another factor to consider is the high cost associated to de-commission a dam that is no longer functional (because of age or situation). The reservoirs of old dams lose storage capacity to sedimentation. While the rate varies widely, in many cases sedimentation seriously diminishes the capacity of dams to generate power. Annually, up to 1% of world reservoir volume is lost to sedimentation.

3. Dams are not assurance for effective flood control. Dams can stop regular annual floods but often fail to hold back exceptionally large floods. Because dams provide a false sense of security, they can lead to increased development of floodplains. When a large flood occurs, damages are frequently far greater than they would have been without the dam. Between 1960 and 1985, the US government spent US$38 billion on flood control, mostly on dams. Yet average annual flood damage continued to increase – more than double. Dams can also worsen flooding by reducing the capacity of the riverbed downstream. They can also cause serious floods when reservoir operators make sudden releases during extreme storms or, in the worst cases, when dams break. Climate change is expected to increase the severity of floods, with serious implications on dam safety.

In February 2005, the 150m-long Shadikor dam, though built for irrigation in Baluchistan Province of Pakistan, breached after a heavy torrential rains resulting to flooding. On that day, the reported fatalities, as a result of from the Shadikor dam burst alone, were at least 135, with hundreds still missing.

[59] The Nam Theun 2 project is run by the Nam Theun 2 Power Company Limited (NTPC), which is owned by a consortium comprising EDF International of France (35%), the government of Laos (25%), the Electricity Generating Public Company Ltd of Thailand (25%), and the Italian-Thai Development Public Company Ltd (15%). The World Bank and the ADB are providing loans and political risk guarantees amounting to US$270 million and US$120 million, respectively, for the project, due to be completed in 2009. At 1,070 megawatts, it would divert 93% of the Nam Theun River's flow into the adjacent Xe Bang Fai River basin, generating power for Thailand's electrical grid. It would also submerge nearly 40% of the Nakai Plateau beneath a 450-square-kilometre reservoir.

4. Dams for irrigation are not assurance to reduce hunger. The benefits of large dam-and-canal irrigation schemes have been seriously overrated. These schemes are invariably mismanaged and wasted huge amounts of water. They frequently destroy huge tracts of formerly fertile lands through salinization and water clogging. The construction of reservoirs and canals itself consumes large amounts of fertile land. Many large irrigation schemes have displaced small landholders and replaced traditional farming systems, increasing landlessness and rural hunger.

Advocates of large dams posit that producing more crops will reduce malnutrition. However, people go hungry because they cannot afford food, not because the world does not produce enough. Malnutrition continues in countries like India, Pakistan and the US, which have produced surplus food grains for years.

WCD found out that large dams designed to deliver irrigation services have typically fallen short of physical targets, did not recover their costs and have been less profitable in economic terms than expected.

5. Dams for water supply did not reach targets. According to the findings of WCD, dams that were built for the supply of potable water and other domestic and commercial uses did not reach its intended targets. Only 30% of the targeted 100% supply was utilized by the intended beneficiaries.

E. DAMS CONTRIBUTED TO NATION'S DEBT BURDEN

The huge amount of money—hundreds of millions US dollars needed to construct a dam, leave countries without any other option but to turn to multilateral banks (such as World Bank and ADB), bilateral banks (such as the Japanese Bank for International Cooperation) and other big commercial banks for loans. The dam-building industry is an astounding US$40-billion per annum industry. ADB alone, from 1971 – 2003, extended a total of US$4.386 billion amount of loans to 86 projects on water sector with dam components. Despite the underperformance of most dams, the taxpayers—including the poor—are not excluded in debt payment. In fact, in a regressive tax system for most developing countries, the tax (direct and indirect forms) is already considered as an additional burden to the poor.

The failure of other dams to meet the expectations, to address the needs of the people, leaving the people bleeding more by paying higher taxes or raising the rates of electricity, to pay for the government's ambitious dam.

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PART FOUR-02

THE CASES OF THREE DAMS

This Part will tackle three cases of ADB-funded dams—Theun-Hinboun hydropower project in Laos, the Nam Leuk hydropower project in Laos, and the Kali Gandaki hydropower project in Nepal.

The three cases are presented basically in three important areas — the background and description of the project, some issues and concerns before the dam was constructed, and lastly, the project's social and environmental impacts. This section attempts to look at patterns as well as commonalities on key areas such as the information disclosure, the consultation part, the impacts, and the compensation and mitigation issues.

A. THE CASE OF THEUN-HINBOUN HYDROPOWER IN LAOS

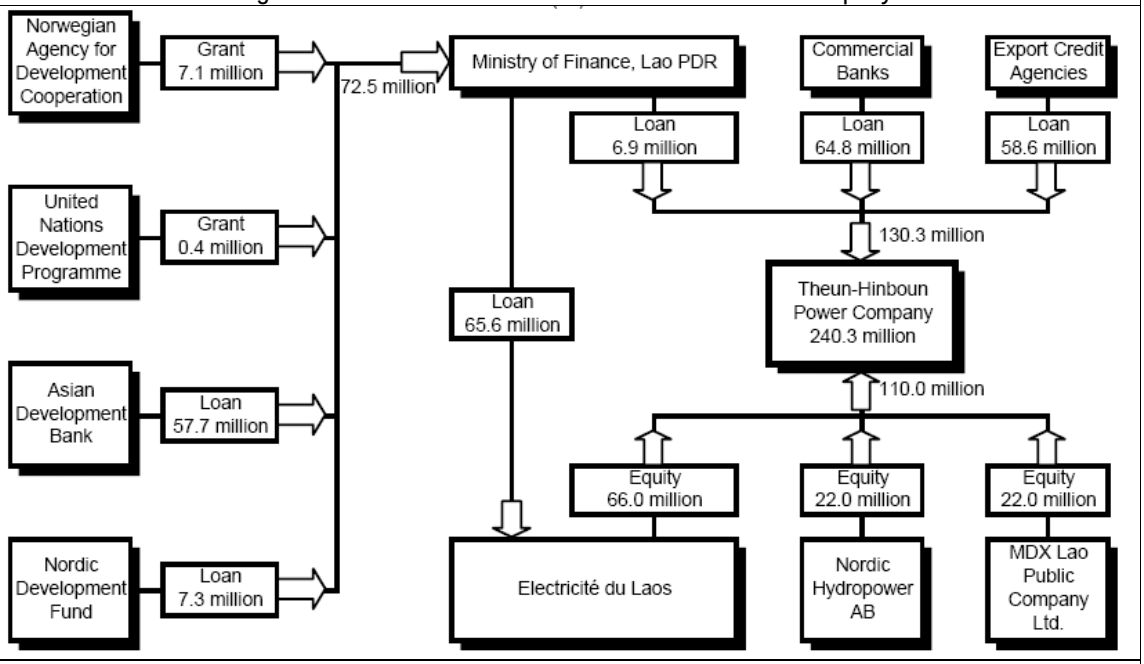
The Nam-Theun-Hinboun project is a classic example of how financiers and project proponents attempted to cover up issues related to social and environmental impacts attributed to the hydropower dam project.

1. Project Background and Description

The Nam Theun-Hinboun dam is a US$280-million hydropower project, launched in 1994, completed and officially opened in 1998. The hydropower project is a 210 MW run-of-river[60] dam constructed with an aim to support economic growth in Laos by enhancing foreign exchange earnings through the export of its generated electric power to its neighboring country of Thailand.[61] The project diverts water from the Theun-Kading River[62] through a tunnel to a 210-MW power plant before release into the Hai/Hinboun river basin. This is the first of several large hydropower projects planned in the Theun-Kading River Basin in Laos. In November 8, 1994, despite the concerns raised by groups in Thailand, Norway and other ADB-donor countries, the Asian Development Bank (ADB) approved a loan (sourcing from Asian Development Fund [ADF]) amounting to US$60 million to Laos government to partially finance its 60% equity in the Theun-Hinboun hydropower project through its state owned power utility *Electricity du Laos (EdL).* **(Figure 3)**

[60] A run-of-river dam is using the strong flow of water to generate electricity.
[61] Under the 1993 Memorandum of Understanding (MoU) between Thailand and Laos, Laos agreed to sell 1,500MW of electricity to Thailand by year 2000. Though the Memorandum of Understanding for the development of Theun Hinboun was signed in June 1993, soon after that of Nam Theun 2 Hydropower project, and it is constructed much earlier than the Nam Theun 2, it is because it is a smaller project and in its feasibility study it said that impacts are minimal.
[62] The river is one of the Mekong's largest tributaries.

Figure 3: Financial Structure of Theun-Hinboun Power Company

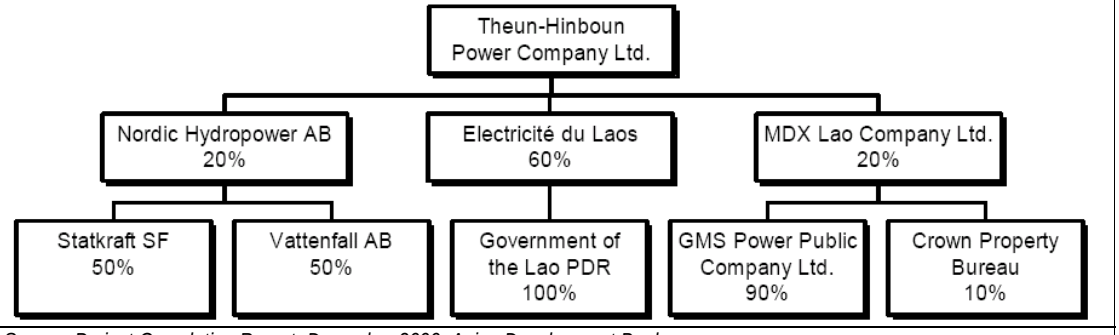


Source: Project Completion Report, December 2000, Asian Development Bank

Theun Hinboun proceeded at a much faster pace than Nam Theun 2 Hydropower project because it is a much smaller project whose original feasibility studies (now discredited) predicted **minimal impacts** due to the narrow confines of the reservoir within the steep banks of the Nam Theun (as opposed to the flooding of a plateau located partly in a National Biodiversity Conservation Area at Nam Theun 2 Hydropower).

ADB, and a consortium composed of other public and private interests, including the governments of Japan, Norway, Australia, and the Theun-Hinboun Hydropower Company (THHC) financed the US$280-million project. The owner of Theun-Hinboun Hydropower Project is the Theun-Hinboun Power Company Ltd. (THPC), a Laos-registered company established for this purpose. The Theun-Hinboun Power Company Ltd. (THPC) is a joint venture (JV) between *Electrisite du Laos (EdL)* (60%), MDX/GMS-Thailand (20%), and Nordic Hydropower[63] (20%). **(Figure 4)**

Figure 4: Ownership Structure of Theun-Hinboun Power Company



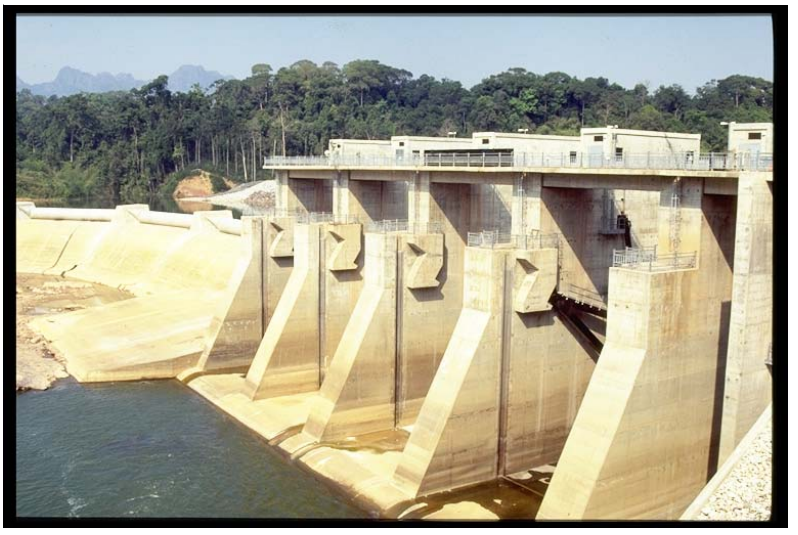
Source: Project Completion Report, December 2000, Asian Development Bank

[63] This is jointly owned by Vattengall AB of Sweden and Statkraft AS of Norway.

The Theun-Hinboun Project is located about 100 kilometers upstream of the confluence with the Mekong River on the border between Borikhamxai and Khammouan provinces. In this area, a narrow mountain ridge separates the Nam Theun basin from the lower Nam Hinboun. The project site is ideally suited to the establishment of a run-of-river hydropower station through inter-basin or transbasin diversion of water for about 10 km from the Nam Theun to the Nam Hai, utilizing a difference in elevation of about 240 meters for the production of electric energy. The Project diverts 110m^3/sec of river flow from the Nam Theun basin into the Nam Hinboun basin[64] through a 5.2km headrace tunnel into a power station lying some 240m below the level of the reservoir created by the dam on the Nam Theun river. The intake is located in Borikhamxai Province on the Nam Theun, which is one of the largest tributaries of the Mekong in Laos, with a total catchment area of about 14,650 km. The powerhouse and the tailrace canal are located in Khammouan Province.[65]

The establishment of THPC represented a new policy direction in the power sub-sector of Laos. For the first time, the Government of Laos formed a joint venture (JV) with the private sector for financing, constructing and operating a power plant. Because there was no legal framework allowing the establishment of such type of a joint venture, ADB, in 1994, provided a small scale technical assistance (TA)[66] to the Laos government amounting to US$100,000 for the establishment of a required legislation.

Theun-Hinboun is a Build-Operate-Owned-and-Transfer scheme run by the THPC with a 30-year license. This means that the private sector will build the dam on their own financing, operate, maintain and manage the facility for a 30-year concession period; and afterwards transfer the ownership to the government.[67] The projected average rate of return, claimed by the developers, is approximately 26% over the 30-year concession period.



[64] This combination gives the project its name—Theun-Hinboun.
[65]Most of the description is based from the Project Completion Report on the Theun-Hinboun Hydropower Project (Loan 1329 – LAO [SEF) in the Lao People's Democratic Republic. ADB. (December 2000).
[66]TA 2054-LAO: Theun-Hinboun Power Legal Advisor, for US$100,000, approved on 4 January 1994, for a five-month legal adviser to assist in structuring legal agreements.
[67]This means the private sector would invest the capital and absorb the risks, with virtually no drain on the public purse. However, most of the financing is either public or publicly guaranteed. Less than half of the total investment in the project involves non-publicly guaranteed private financing (IRN, 1999).

2. Issues and Concerns at that time

The dam was approved despite concerns raised by groups in Thailand, Norway and other ADB-donor countries. Primarily, the concern was that the project proponents had failed to safeguard the interests of Lao citizens. Issues and concerns include: (1) Poor decision-making process, (2) Inadequate environmental impact assessment, (3) Conflicts of interest, and (4) Potential for severe environmental and socio-economic impacts. These issues and concerns have been consistently downplayed or ignored by ADB and the project developers.

Below are some of the concerns raised by non-government organizations and civil society organizations in relations to the Theun-Hinboun project:

2.1 Peoples' dependency on the river. The lives of the villagers (close to 6,000 people of 25 villages near the project site and thousands more in the downstream areas) intertwine with the cycles of the river's ecosystem. These rural villagers of Laos who rely on wild fisheries as their major income and protein resource, are considered so vulnerable to the effects of the Theun-Hinboun Project. The construction of dam, and its impact to the riverine ecosystems, will invariably lead to significant reduction in food and income for the villagers.

2.2 The lack of consultations and the totalitarian state. In 1996, the Norwegian organization FIVAS, which had been monitoring Norwegian involvement in the project since 1993, published a 28-page report[68] documenting many concerns related to the dam project, including the lack of consultation with local and affected people. In a close and totalitarian communist-state like Laos, it is very difficult to expect any open opposition against the project from non-government organizations or from affected communities.

2.3 No direct compensation, developers not liable. In the initial agreement, brokered by ADB, it limits THPC's total financial responsibility for all mitigation and compensation only to US$1 million. No meaningful direct compensation for the affected villagers was included and no provisions to hold the project developers or financiers liable for future problems. The entire amount was spent largely for consultancy, project infrastructure, government training, and other similar activities. This was changed only following the discovery and THPC's admission and acknowledgment of the project's impacts.

3. Impacts

The Theun-Hinboun project made an impact on the livelihood of the villagers in the project area—whether downstream areas (Nam Kading and Hai/Hinboun) or along the

[68] The report was based on a study tour to the project area

headpond—who are dependent on the riverine ecosystems. Around 25,000 people or more than 3,000 families in at least 57 affected villages were harmed due to flooding during dry season river bank gardens, declines in fisheries, loss of drinking water sources, riverbank erosion and downstream sedimentation. Such impacts were denied until the THPC's Mitigation of Compensation Program (MCP) release in 2000, acknowledging the impacts. Despite of the acknowledgement, people were suffering from income losses due to delays in providing mitigation and compensation. Ironically, most of the affected villages by the hydropower project are still without electricity.

3.1 Decline in fish catch. The villagers reported substantial declines in fish catches, ranges from 30 - 90%. In the downstream Nam Theun, river levels are reported to be lower than normal, while in the Nam Hinboun, downstream of the discharge channels from the power station, the river flow and turbidity has increased dramatically. This is due to the closure of the dam and the diversion of water out of the Nam Kading. Both of these caused the reduction of fish catches, as claimed by the communities. Furthermore, the deep water has forced local fishermen to purchase expensive new nets so they could catch the fish. Sadly, the decline of fish catches further traps the people in the viscious cycle of poverty.

Many fisherfolks had given up fishing because it has become a waste of time. Fishing takes all day to catch just enough fish for a single meal. Now, they have resorted to gathering more non-timber forest products for income.

In the THPC's Mitigation and Compensation Program (MCP) document—released in the year 2000, after acknowledging that there is an impact—it listed over 3,000 households (589 along the headpond and 2,475 in the Hai/Hinboun river basins) suffering from "seriously impaired" fisheries and an additional 1,372 households in the Nam Kading river basin suffering from "slightly impaired" fisheries. Also, the MCP acknowledged the "very severe damage" to fish migration routes and "severe damage" to 32.5 km (plus "mild damage" to 64.2 km) of aquatic and riverbank/island habitats and wild populations along the Kading River (in the Nam Kading National Biodiversity Conservation Area).

3.2 Loss of riverbank gardens. The flooding of the riverbanks due to Theun-Hinboun dam resulted in the loss of riverbank vegetable gardens. *Many of the vegetables harvested from the garden support each household needs—some for household consumption and some for selling. From selling, they earn as much as 200,000 to 300,000 kip a year per family. Now, the dam is depriving the riverbank people of their source of living and causing them difficulties.*

3.3 Loss of drinking water sources. *Before the dam was closed, the people got their drinking water from the springs down in the riverbank during dry season. In the rainy season, the people got their drinking water from the nearby streams which were still flowing at that time. Now the natural springs, where they get their potable water from, are all flooded with muddy river water.*

The increased turbidity has affected supplies of potable water, including those in the reservoir area. *People have to fetch potable water somewhere distant from their original source.*

3.4 Transportation difficulties. *Small streams of water have backed up and now surrounding the villages. Transportation has become difficult because of the situation. To build bridges across the streams is also difficult because it is quite wide.*

3.5 Displacement with no adequate mitigation and assistance. Researcher, Bruce Shoemaker[69], found that those affected by the project were receiving no direct compensation for their losses and there were no plans to provide them with any such compensation in the future. In some areas, villagers were forced to relocate, but did not feel they were receiving adequate assistance with this process—more of a relocation than a resettlement. The total US$260 million dollar project cost—which includes US$2.59 million for a mitigation program—a total of only US$50,000 has been allocated for all resettlement and compensation costs for affected local people. The amount is way below the US$3.6-million estimate of some environmental groups.

In fact, 67% of the total mitigation budget went to a re-regulating pond and modifications allowing for a downstream flow in the Theun River, costs which arguably should have been included as part of the project's basic infrastructure from the start. According to the staff of the Environmental Management Committee Office of the THPC, which implements the mitigation program, most of the US$50,000 available for resettlement and compensation were spent on purchased land for the transmission line towers. Most of the other line items had also been expended or committed, in effect, there was no prospect of reassigning any of the current mitigation budgets to increase compensation for affected villagers.[70]

Resettlements resulted in changes in social context, lifestyle and agricultural practices. Resettled groups were reported to suffer from declining nutritional intake, rising sickness and mortality rates, loss of language and culture.[71]

The third-party review panel discovered that the poorest sector of the impacted communities, including villages located above the headpond, and those heavily reliant on living aquatic resources for their livelihoods and diets, have not been adequately included in project activities and have not received any assistance from THPC.

[69] The researcher interviewed 60 people in 10 villages on a three day visit to the project area in early March 1998. These interviews encompassed a wide cross section of people in the area including women, men, young people, fish market stall owners, shop owners, fishermen, village headmen, boat pilots, and others.
[70] Hsun-Yi-Hsieh case study ("The Nam Theun-Hinboun Hydropower Project of Laos," University of Michigan), quoting the International Riuver Network (IRN, 1999).
[71] Community Aid Abroad - Oxfam Australia (1998).

4. A cover up or simple downplaying?

The Asian Development Bank (ADB) and other proponents downplayed the social and environmental impacts raised by environmental groups. At the time of its official opening in April 1998, ADB praised Theun-Hinboun as a "model project" with "little for the environmental lobby to criticize."

When Bruce Shoemaker, an independent researcher, went to the affected areas and talked to the villagers, he discovered that the conditions of the people were far worse than what ADB and other proponents claimed.[72] Other independent visitors followed suit and confirmed the impacts. THPC and ADB initially refused to acknowledge the occurrence of these impacts, and attempted to discredit the accounts. There was even a point where an ADB mission was launched to track down and make the informants refute their statements.

Desperately, the THPC hired Terry Warren, a fisheries expert with extensive experience in Laos, to look into the allegations of fishery damage. But, Warren only confirmed the reports of serious impacts on fisheries over a wide area in the Theun-Kading and Hai-Hinboun river basins. The Warren's report[73]was not released by the THPC and ADB despite repeated request. In November 1998, while Warren's field work was underway, a follow-up ADB mission was launched and similarly confronted with overwhelming evidence of serious livelihood adverse impacts. As a result, ADB publicly acknowledged, for the first time, that local people were being seriously harmed by the project. The mission also resulted in the admission that the impact area was much larger than previously acknowledged. It included the lower Nam Kading and the lower Nam Hinboun all the way to their confluences with the Mekong.

5. The Mitigation and Compensation Program

In September 2000, after almost three years of building evidence of serious livelihood impacts, the Theun-Hinboun Power Company (THPC) released its Mitigation and Compensation Program (MCP) Report. This was part of the company's obligations under its loan and concession agreements with ADB and the Laos government.

The MCP Report outlines a ten-year US$2.74 - US$4.65 million program, to be implemented by the restructured Environmental Management Division (EMD) of the THPC. The report outlines the environmental and social impacts-and proposed mitigation and compensation measures-for the lower Kading River area, the "Headpond" area, and the downstream Hai/Hinboun rivers. In the report the THPC acknowledges a more realistic estimate of the extent of the project's environmental and socio-economic impacts, providing

[72] These impacts were first reported in the *Trouble on the Theun-Hinboun* report (International Rivers Network, April, 1998).
[73] Warren's report was completed in June, 1999.

estimates of impacts to fisheries, water supply, gardens and boat and walking access for thousands of households. Severe damage to fish migration routes and aquatic and riverbank/ island habitats and wild fish populations along the Kading River (in the Nam Kading National Biodiversity Conservation Area) is also acknowledged.[74]

The MCP document lists over 3,000 households (589 along the headpond and 2,475 in the Hai/Hinboun river basins) suffering from "seriously impaired" fisheries and an additional 1,372 households in the Nam Kading river basin suffering from "slightly impaired" fisheries.

Part of the THPC compensation and mitigation plan is a third-party review to be conducted every two years to examine the effectiveness of its program and issue recommendations for improvement.

For the past four years, the Lao-based Theun-Hinboun Power Company (THPC) has invested significant resources to mitigate and compensate for the impacts of the Theun-Hinboun hydropower project in central Laos. While the company has made "good progress," according to a third-party review panel, there are serious concerns over the effectiveness and long-term sustainability of its program to restore affected people's livelihoods. Not to mention the series of delays in the implementation, poor process and apparent stalling by the THPC.

David Blake, member of the third-party review panel wrote, "(t)he findings of the Theun–Hinboun Mitigation and Compensation Program Review panel underscore the serious difficulties inherent in trying to replace former natural resources and river–based livelihoods with agricultural–based livelihoods in a limited time frame. This is a long term and tricky task even for conventional development projects, but is made all the more difficult where the aquatic resource base has been severely depleted by massive environmental changes wrought by a trans–basin diversion of water between river basins with different base characteristics. Even with the high level of commitment shown by EMD staff and significant financial resources made available to the program, there were still signs of exclusion of many of the poorest and most vulnerable community members from core program activities designed to mitigate and compensate for their loss of livelihood. At the same time, it was noted that a participatory living aquatic resources co–management program which might provide more long term benefits for the poorest sectors, had been slow in coming, after a series of conflicting fishery studies over the years."

[74] Shoemaker, Bruce.

Below are some concerns raised by the third party review panel over the implementation of the THPC's compensation program:[75]

THPC has not yet implemented fisheries mitigation activities and never fully acknowledged the extent and severity of the living aquatic resource impacts. The poorest sector of the impacted communities (including villages located above the headpond), and those heavily reliant on living aquatic resources for their livelihoods and diets have not been adequately included in project activities, and not received any assistance from THPC.

THPC, still stubbornly clings to the belief that they can be mitigated using technical solutions (e.g., construction of a fish ladder, larger re–regulation pond, erosion protection, etc.) or compensated for using other production–based livelihood options, euphemistically named "protein replacement" options.

THPC's strategy of promoting a high–input, chemical fertilizer–based farming system only favors the wealthier community-members not the resource–poor farmers. It has the potential negative impacts on aquatic ecology by polluting surface and ground water, thus further degrading the very resource base on which the poorest sectors are most reliant.

While the first year's irrigated crop in many villages provided good yields, there were strong indications that problems with pests and disease occurred during the second year. Reports after the end of the 2004 dry season rice harvest confirmed a slump in rice yields from 2003 and economic losses incurred by farmers, which eventually had to be covered by THPC.

The panel also noted problems with pump breakdowns and reluctance of farmers, often the poorest ones, to participate in the program due to concerns about the risks of dry–season rice production.

The THPC was spreading itself too thinly on the ground before villagers have accepted and can deal with risks associated with this new livelihood activity. Given these problems, the future effectiveness and long–term sustainability of this model of compensation assistance must surely be in doubt now.

THPC's strategy of encouraging villagers to grow fruits and vegetables for sale in local markets to generate income has had limited success. The panel found that "many if not most of the farmers involved in the household garden activities are not yet able to make the major developmental leap to supplying for markets."

[75] This part is taken from David Blake's article: Future in Doubt, published by the World Rivers Review, February 2005.

THPC's strategy for improved livestock management (working with villages to improve livestock management through penning of animals, vaccinations, training of volunteers and other interventions), while considered "generally sound," the review panel reported that the benefits will take "some time, likely many years, to reach the majority of households." The present efforts are not reaching most animals, and owners are "enduring economic losses" from annual livestock mortality and disease. Villagers frequently requested greater efforts to provide regular veterinary care for livestock.

B. THE CASE OF NAM LEUK DAM IN LAOS

The Nam Leuk project, a dam inside a conservation area, is also an example of how financiers and project proponents attempt to cover up issues related to social and environmental impacts that are attributed to the hydropower dam project.

1. Project Background and Description

Nam Leuk is a US$112.6-million[76] 60MW rock-fill hydropower dam project in Laos (one of the poorest countries in the world) funded by the Asian Development Bank (ADB) on concessionary term amounting to US$52-million, soft loan (co-financing) from the Overseas Economic Cooperation Fund (OECF) of Japan amounting to US$38.5 million, and US$22.1 million from Laos Government and *Electricité du Lao (EdL),* the executing agency. The project was approved in September 10, 1996, completed in 1999, and started its utilization in 2000. The loan is interest free, with an annual service charge of 1%, repayable over 40 years, including a 10-year grace period.

The project will divert the water from the Nam Leuk reservoir through a 60-MW powerhouse before releasing the water into the downstream Nam Xan River. The hydropower project was constructed to (1) support development of the Lao power sector, (2) generate power for domestic use and export to Thailand, (3) strengthen the capabilities of *Electricité du Laos (EdL)* to prepare, design, and implement environmentally sustainable projects, and (4) strengthen management and protection of the Phou Khao Khouay Conservation Area, also known as "PKK Park".[77]

The hydropower project is located inside the PKK Park, between Vientiane Province, Bolikhamxay Province, and Saysomboun Special Area. According to the loan agreement with the ADB, 1% of revenues from sales of power to Thailand will be used to protect PKK Park. The *Electricite du Laos (EdL)* in 2003 confirmed that 1% of total revenues will be used for the protection of PKK Park.

[76] Of which the US$90.5 million (80%) is the foreign exchange cost and US$22.1 million equivalent (20%) is the local currency cost.
[77] These four objectives are based from the excerpts from *Project Performance Audit Report on the Nam Leuk Hydropower Project in the Lao PDR*, ADB, Operations Evaluation Department (2004).

2. Issues and Concerns at that time

2.1 The Nam Leuk hydropower project is located inside a conservation area. The Nam Leuk hydropower is the first ADB-supported project in Laos (to construct a dam and reservoir) inside a protected area, in the PKK Park. The Phou Khao Khouay National Biodiversity Conservation Area (NBCA) is one of the countries' most important protected areas because it is home to many rare and endangered wildlife species, including tigers, elephants, gibbons, and a wide diversity of other species, as well as a diverse array of fish species.

2.2 Downplaying social and environmental impacts. The usual attitude by dam proponents to downplay social and environmental impacts is worth to be concerned. ADB denies that there are any ongoing problems caused by the Nam Leuk dam project. Mr. Edvard Baardsen, ADB deputy head of Mission, said in October 2000, that ADB considered the social and environmental impacts of Nam Leuk and these has already been resolved.[78] In its 2002 project completion report on Nam Leuk, ADB said "where there were environmental and social impacts, these have been adequately remedied," and the project was considered by the ADB as "successful." ADB's statement is contrary to what Phetsavanh Saybouala van, a Lao researcher, and the International River Network (IRN), a California-based NGO, has discovered in the process of his research.

3. Impacts

In May 2003, Phetsavanh Saybouala van, a Lao researcher, visited seven villages in the project site and discovered that the Nam Leuk dam has caused serious problems for local communities. The documented report[79] of Phetsavanh Saybouala van describes the increased health problems, food shortages, flooding, destroyed fisheries, dead livestock, illegal logging and corruption associated with the project. These similar impacts were also discovered by the International River Network (IRN) in an earlier field visit in 2000 and once more in 2003. More than 9,500 people estimated to be affected by the project.

In 2004, ADB released its *Project Performance Audit Report on the Nam Leuk Hydropower Project in the Lao PDR* (ADB, Operations Evaluation Department [2004]) admitting that the Nam Leuk Hydropower Project has affected the livelihoods of thousands of villagers through declines in fisheries and water quality and quantity.[80] Villagers living along the Nam Leuk (upstream) suffered from declines in water flow due to the diversion, while villagers along the Nam Xan (downstream) suffered due to the increased flow.

[78] During his meeting with the IRN people.
[79] The Forgotten Victims of the Nam Leuk Dam in Laos: Summary of Fact-Finding Trip to Affected Villages (2004).
[80] The *Nam Leuk Social Action Plan* (Sogreah Ingenierie, revised January 1998) predicted that 3,120 people living in six villages in the reservoir area and along the Nam Xan and 6,200 people living in seven villages downstream of the dam on the Nam Leuk would be impacted.

Below are enumerations of its impacts, as observed by Phetsavanh Saybouala van and the International River Network.

3.1 Excessive logging. Soon after the Bholisat Phattana Khed Phoudoi[81] (BPKP also known as the Mountain Region Development Company) won the contract to log the reservoir area (inside the Conservation Park), cutting of trees became excessive and uncontrolled, and went beyond the reservoir area. BPKP logged trees with good quality, but reported the timber as being of low quality, allowing BPKP and government officials to make illegal profits. BPKP is a company run by the Lao military. ADB estimates the value of the timber that BPKP logged between US$2 million and US$3 million. Of this, according to ADB, 3% was cut illegally from outside the reservoir area. ADB, in its completion report, made no mention of what happened to the money from the illegally logged trees, or whether BPKP was penalized in any way for violating the law.

3.2 Diversion of water resulted in decline in water quality and quantity. When the water from the Nam Leuk reservoir was diverted into the Nam Xan River, villagers, both in the upstream and downstream, were affected. Villagers living along the Nam Leuk reservoir (upstream) suffered from declines in water flow, while villagers along the Nam Xan (downstream) suffered due to increased flow.

Before the dam was built, the villagers relied on the river for potable water and other domestic uses. The damming of the river resulted in poor quality of water, resulted in increased water-related illness (such as stomach aches, throat infections and other ailments) and skin irritation problems. Many cows and water buffaloes died after drinking the polluted and foul-smelling water released from the reservoir. New water supply was promised, but the absence of electric connection electric pumps could not be used. The villagers could not operate the pumps because they were not connected to the electricity grid. Few houses have been connected to the grid because of the exorbitant 1.4 million kip connection fee (roughly half of annual per capita income).

3.3 Diversion of water destroyed vegetable gardens and decline in fisheries. The diversion of water resulted in flooding and destroying vegetable gardens of the villagers, the source of their income.

The flooding also resulted in decline of fisheries (along the Nam Leuk and Nam Xan rivers), making fishing, as source of livelihood, no longer viable. Fish catch drops (by weight) by 50-95%. Some villagers could catch enough only for personal consumption and have lost an important source of income.

[81] BPKP is the same company that clearcut the reservoir area of the proposed Nam Theun 2 dam (see WRM Bulletins 44 and 50). On the Nam Theun 2 contract, in addition to the reservoir area, BPKP also logged several areas of forest above the reservoir.

3.4 Inadequate compensation and mitigation. Villagers have not been adequately compensated for the losses caused by the construction of the Nam Leuk dam. Some of the indigenous Hmong people now live in Thang Deng village. Villagers affected by the dam claimed that they are poorer since Nam Leuk was built. Villagers have become cynical, and do not believe that the government and ADB are serious about addressing the problems.

4. Failure to mitigate impacts to the Conservation Area due to funds mismanagement

In February 2002, ADB reported problems with the disbursement of funds from the Nam Leuk dam to Phou Khao Khouay. "Much remains to be done for the development of the Phou Khao Khouay National Park to make it into a real national park," states the ADB's project completion report.

More than two years later, in June 2004, ADB's Country Director in Laos, James Nugent, told Aviva Imhof of International Rivers Network that there is still no management plan for the PKK Park.

Below, based from the letter of Suzzane Wong to the ADB, are excerpts from the *Project Performance Audit Report on the Nam Leuk Hydropower Project in the Lao PDR* (ADB, Operations Evaluation Department [2004]. These are examples demonstrating how problems identified in the Nam Leuk Project Completion Report (PCR) of 2002 remain unresolved.

NAM LEUK PROJECT COMPLETION REPORT (FEBRUARY 2002)	NAM LEUK PROJECT PERFORMANCE AUDIT REPORT (JUNE 2004)
Phou Khao Khouay	*Phou Khao Khouay*
"The disbursement of funds for the PKK NP has not yet been adequately institutionalized, and ADB must ensure that this matter is resolved and that the funds reserved for the stipulated purpose are safeguarded until they are used in accordance with an environmental management plan for the PKK NP." *(pg. 20)* Phou Khao Khouay "will not become a real national park unless its management is improved drastically." *(pg. 20)*	The PKK Park "is not sustainable as a national park unless efforts are made immediately to channel the funds allocated under the Project in a more productive manner." (*pg. viii)* "Unless the management of the PKK Park is strengthened, its long-term sustainability is not assured." *(pg. 29)*
ADB follow-up monitoring	*ADB follow-up monitoring*
"[I]t would be prudent for the ADB to monitor the Project's performance through regular visits, keep the necessary records, and provide assistance as appropriate. It would be contentious to hand over a large and essentially dynamic infrastructure project to an agency, with limited funds and little operational experience or skills in environmental and social mitigation measures, and not expect problems." (*pg. 20)*	"…supervision and monitoring waned substantially once the power plant was built and the loan was closed." (pg. 41) "ADB also could have provided better post-completion follow-up monitoring of environment and social mitigation measures, particularly because the PCR specifically recommended it as a follow-up action." *(pg. 18)*

5. Strengthening EdL as one of four objectives was a failure

"The [Operations Evaluation Mission] considers that there was no serious effort put into the design of the objectives for strengthening the EdL and providing assistance to the PKK Park…" (pg. 7) "Little was achieved on the capacity building objective due to the lack of preparation at the design stage and lack of monitoring during implementation. There was no assessment of EdL's needs, no specific task, no specific budget, and no monitoring provisions." (pg. vi) "Although the 1% funds are being disbursed by EdL to the PKK Park authorities, the OEM believes that the intended goal, which was to support ecotourism and village-based integrated conservation and development programs is not being achieved." (pg. 38)[82] The project was reported suffering from US$20M cost over-run.

6. Possible Policy Violations

It is stipulated in the ADB Policy (Involuntary Resettlement) that affected people should be no worse off as a result of the ADB-funded projects. The affected communities are poorer now since Nam Leuk dam was built, and that they have not received full compensation for impacts they have suffered.

C. THE CASE OF KALI GANDAKI "A" HYDROELECTRIC PROJECT IN NEPAL

Kali Gandaki 'A' Hydroelectric Project is another example of how the government, the contractor and financiers concealing the information related to project by not revealing them publicaly. Nepal is one among the countries in the world with a very high potential for hydroelectricity generation and other multipurpose project. In the recent years Nepal had resorted to build large number of hydroelectric and irrigation dam projects.

[82] Excerpts from *Project Performance Audit Report on the Nam Leuk Hydropower Project in the Lao PDR,* ADB, Operations Evaluation Department (2004).

1. Project Background and Description

Kali Gandaki 'A' (KGA) is a US$452.8 million, 144-megawatt (MW) hydroelectric project built in the western region of Nepal, 180 kilometers from Kathmandu, the Capital. The run-off-river project (utilizing the fall) generates 842 megawatt-hours (MWh) of renewable energy annually using the flow of the Kali Gandaki River.[83] It is the biggest hydropower project in Nepal built as of today.

KGA is located between Mirmi and Beltari, which are just 6 kilometers apart on land, the Kali Gandaki River flows in a U-loop over a length of about 50 km. The drop in elevation in this section of the river is about 124 meters (m). A dam was constructed at Mirmi just after the confluence of the Andhi Khola and Kali Gandaki River to divert part of the river flows into a tunnel. The tunnel conveyed water to Beltari, where a 144-MW power station was located. The Project had some storage behind the diversion dam sufficient to operate at full capacity for six hours a day even during the dry season.[84]

The main objective of the Project was to help meet the demand for electric power in Nepal at the least cost in an environmentally sustainable and socially acceptable manner. Other aims of providing the loan in support of the Project were (i) institutional and financial strengthening of Nepal Electricity Authority (NEA), and (ii) improved cost recovery to promote efficiency in power consumption.[85]

According to the Asian Development Bank (ADB), "the Project has the following components: (i) civil works comprising (a) a 44-meter high concrete gravity diversion dam and gated spillway, and an adjacent intake and desanding basin; (b) a 5.9 km long concrete-lined headrace tunnel with a diameter of 7.4 m; and (c) a surge shaft, pressure shaft, tunnel leading to the power station; (ii) mechanical and electrical plant and auxiliaries for the three 48 MW turbo-generating units, transformers, and switchgear to be installed at the power station; (iii) hydraulic steelwork including the supply of gates for the spillway, desander, headrace tunnel, power station, and steel liners for the pressure tunnel; and (iv) two 132-kilovolt transmission lines, one to Pokhara (61.4 km) and the other to Butwal (44.3 km). An access road of 28.5 km length from the Pokhara- Butwal highway to the dam and power station sites had already been constructed by NEA out of its own funds. The Project also provided for construction engineering services; Project management services; a system loss reduction component; a panel of experts for safety and technical aspects; a panel of experts for environmental and social advisory aspects; and a Kali Gandaki Environmental Monitoring Unit."

[83] The Kali Gandaki River originates from Tibetan Plateau, north of Nepal. The river runs between elevations 5,500 m and 1,250 m forming deep gorges. Four tributary streams join it as the river loses elevation and enters the Kali Gandaki "A" project area. Above the dam it is joined by the Andhikhola; between the dam and powerhouse Badigarh and Ridikhola join it. Below the powerhouse, it joins with the Trisuli and forms the Narayani River before it flows into the Gangetic plains of India and finally into the Bay of Bengal.

[84] Report and Recommendation of the President to the Board of Directors on a Proposed Loan and Two Technical Assistance Grants to the Kingdom of Nepal for the Kali Gandaki "A" Hydroelectric Project, RRP: NEP 26362 (June 1996). ADB.

[85] Report and Recommendation of the President to the Board.

The KGA was funded by the Asian Development Bank (ADB), a loan amounting to US$160 million; another US$160 million loan from the Japanese Overseas Economic Cooperation Fund (OECF) (now Japan Bank for International Cooperation or JBIC), and a counterpart from the Nepal Electric Authority (NEA) amounting to US132.8 million **(Table 13).** The loan provided by the ADB will have a repayment period of 40 years, including a grace period of 10 years, and a service charge of 1% per annum.

The borrower had to relent the proceeds of the Bank loan to NEA, denominated in Nepalese rupees, at an interest rate of 10.25% per annum and with a repayment period of 25 years, including a grace period of five years. The foreign exchange risk will be borne by the Government.

Table 13: Sources of Funding, Kali Gandaki A

Source	Foreign Exchange (US$)	Local Counterpart (US$)	Total Cost (US$)	Percentage Share
ADB	160.0	---	160	35.3
OECF	160.0	---	160	35.3
NEA ***[1]***	---	132.8	132.8	29.4
TOTAL	320.0	132.8	452.8	100.0

ADB - Asian Development Bank; OECF – Overseas Economic Development Fund; NEA – Nepal Electric Authority
[1] *Includes Government Funding*

The construction of the KGA was a result of the cancellation of the Arun III Hydroelectric Project by the World Bank in August 1995. The activists and experts had presented the KGA as a better and cheaper alternative option to Arun III. The main contractor in KGA was an Italian Impregilo SPA company, the same as in Arun III. The construction of KGA began in 1997 and completed in 2003.[86]The commercial production of KGA began earlier in August 2002.[87]

2. Issues and Concerns at that time

2.1. Limited and selective manner of consultation.

Though the project proponents were holding public meetings both in the project site and Five Star Hotel in Kathmandu, these are selective type consultations. Participants were all pre-selected at the instigation of project officials. Critical people, such as activists, were prevented from attending in these so-called consultations.[88]

[86] On January 22, 2003, the King Gyanendra Bir Bikram Shah Dev inaugurated the Kali Gandaki "A" Hydroelectric Project.
[87] See also, Gopal Siwakoti 'Chintan', "How donors reject governance and human rights", The Reality of Aid 2004, An Independent Review of Poverty Reduction and Development Assistance, IBON Books, Manila and Zed Books, London (2004). The author discussed Kali Gandaki 'A' and the Melamchi Water Supply Project as two case studies in his contribution.
[88] There are people who tried to distribute printed information encountered by both verbal and physical abuse and harassment. The project officials were reported of recruiting some local politicians and leaders to systematically attack the critics.

2.2. Concealed information.

Local people, the NGOs and other affected people were denied of access to critical project documents and information. Documents are released only after the completion of the project or after decision have been made. Still few important documents are kept as confidential. Not to mention the documents are written in English language that cannot be understood by the people. No sincere attempts were made to translate these documents into Nepali language and inform the local peoples about all the positive and negative aspects of the project. Even the requests for information by the local elected bodies were repeatedly dismissed. Any attempts by NGOs of obtaining the basic project documents and information did not succeed according to Gopal Siwakoti 'Chintan', a human rights lawyer and activist based in Kathmandu. Basic project and contract documents are denied from access even after the completion of the project.

2.3. Affected families have to produce legal land titles to be mitigated.

All families whose lands were appropriated had to produce legal land ownership certificate to claim for compensation. Not all people, specially the indigenous peoples, have land certificates and not all lands are properly registered in Land Revenue Office. This has created serious problem of formed displacement with no compensation when their traditional livelihoods have clearly been denied with no remedies. The buring issue of social justice has not been addressed in the KGA as in many other similar projects in the country.

2.4. Kali Gandaki was a costly project.

When the Arun III was cancelled on the basis that there are many other better alternatives, and it included the KGA. However, the irregularities and corruption practices, including delays, seen throughout the construction period made the KGA equally worse as in the case of the Arun III and costly compared to the original forecast," according to 'Chintan'. As a result, the cost escalated from US$250 to US$360 millions by the time of its completion. The civil construction cost was increased by 67% in civil construction work alone. The KGA stands now as a failed project in terms of producing cheap electricity with full social and environmental compliance as originally committed.

2.5. Kali Gandaki 'A' as a white elephant

As mentioned above, the corruption and cost overrun due to delays not only made the KGA cost-ineffective but it also led to series of legal battles between the NEA and the construction company, the Impregilo SPA. There have already been some cases before the Milan Court in Italy and in Paris about payment disputes. For example, the Impregilo has claimed additional Rs. 1.67 billions from the NEA whereas the. NEA has already paid NRs.11.07 billions to the Impreligo as against the originally agreed tender/contract amoun ot Rs. 7.35 billions. WAFED with local groups has also filed a case against the NEA and the local Impregilo agent in Nepal on grounds of corruption and canecellation of illegal payments made by the NEA. A similar complaint filed by the groups before the Commission on Investigation of Abuse of Authority (CIAA) as systematically been ignored due to the vested interest of the CIAA Chief who was the Water Ministry Secretary during the Arun III scandal and has joined the King during the inauguration of the KGA.[89]

2.6. Unequal benefit-sharing

Some people in Kali Gandaki have lost their lands and livelihoods. There still affected persons and families struggling for just compensation of their land. The local youth who were employed as drivers are also sacked recently and replaced by others – mostly outsiders. They are also denied of direct access to reliable electricity and are continuously suffering from regular load-shedding. The 50% of the royalty amount which is supposed to reach to local affected areas is also missing in the absence of clear guidelines for beneft-sharing, and the money is controlled and (mis)used by various District Development Committes. A law suit filed by the Kali Gandaki A Affected Concerned Group is now pending in the Supreme Court of Nepal. They have claimed for direct sharing of such benefits in affected areas and communities for development.[90]

3. Impacts

3.1. The blocking of the Kali Gandaki River prevented migration of fish

The construction of KGA has prevented the movement and migration of fish in the river. Migration patterns of fishes include long distance (to and from Terai and/ or Bay of Bengal); medium distance, and residents (moving from the mainstream to immediate tributaries). Upstream migration starts at the beginning of monsoon which triggers spawning behaviour, and downstream migration starts when water levels in the tributaries subside.

[89] According to Gopal Siwakoti 'Chintan', a human rights lawyer and activist based in Kathmandu.
[90] According to Gopal Siwakoti 'Chintan', a human rights lawyer and activist based in Kathmandu.

There are 57 recorded fish species within the project area. These fishes have adapted to the extreme flow and turbidity of the river. The river's fish supports subsistence, commercial and sports fisheries. The annual catch from the river is estimated at between 80-150 tons. The principal species are snow trouts, mahseer, carp, catfish, eel, murrel, loach and barbs. Mahseer (sahar), snowtrout (asla), catfish and eel are sport fish. The catadromous eel is abundant in the river.

3.2. Low fish catch resulting to economic and physical displacement.

The Botes, one of Nepal's indigenous groups, are dependent on the river for their survival. The livelihood of the Bote fisherfolks has been affected due to the construction of the KGA. As the dam had restricted the movement of fishes in the river, the fisherfolks have experienced low fish catch resulting in the loss of sustainable livelihoods. Some have even left the areas seeking alternatives for survival living their dependent children and elderly members of the families behind with no physical care and economic security.

3.3. Displacement without resettlement and compensation.

The NEA acquired about 53.7 hectares (1054 ropani[91]) of land and 57 houses for the access road. A further 148.62 hectares land was acquired (of which 94.2 hectares was private and *guthi*[92]land) for the main facilities that included dam, powerhouse, and office sites.

The indigenous Bote were provided with neither proper resettlement nor guaranteed jobs. Instead, they had to lose their traditional livelihoods permanently. Of the 18 Botes households displaced by the construction activities and dam inundation[93] only 8 houses were built after the claim made by WAFED to the ADB in 1993 and as per the recommendation of its fact-finding team. But the problem is that the houses made are found of very low quality and could collapse in time of heavy monsoons. Income generation programmes as stated in the EIA reports were not adequately implemented. Other displaced peoples, however, had no choice but to accept whatever money was made available for compensation. The reality is that the indigenous peoples like Bote and others in Nepal are now becoming the double victims – both by the high class and caste dominated ruling elites as well as the development agencies.

[91] 1 hectare land equals 19.6 *ropanis.*
[92] Committee managing religious institution; land ceded by individuals or the King for financing such religious or social institutions.
[93] Originally, NEA claimed only 12 Bote households affected by the dam construction.

4. The institutional gaps aggravated the conditions

The institutional conditions such as (1) categorization of affected people; (2) outdated rules relating to compensation; (3) the non-inclusion of indirectly affected people in compensatory procedures; and (4) the lack of strong consultation processes created additional gaps that determine outcomes differently amongst those affected.

By category, those who lost 50% or more of legally registered land and/or their living quarters and experienced the loss of income greater than 60% were declared as Seriously Project Affected Families (SPAFs) and those individuals losing less than 50% of land were categorized as Project Affected Families (PAFs). There were 263 SPAFs and 1205 PAFs. These included families that lost land and assets in the main facilities area (dam site and power house site), road access, Pokhara substation and the corridors of transmission lines. Partly responsible of the unjust compensation are the requirements. All families whose lands were appropriated had to produce legal land ownership certificates to receive the compensation. Many affected people, including the Botes, do not have titles.

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PART FIVE

BEYOND DAMS AND ALTERNATIVES

A. THE HUMAN INTERVENTION ON HYDROLOGICAL CYCLE

The **hydrosphere** consists of all bodies of water and ice, plus water vapor in the atmosphere on the Earth. The Earth's bodies of water are bigger than its lands. More than 97% of the hydrosphere's volume is salt water (ocean and seas); about 2% consists of ice stored in the polar icecaps; and **less than 1% is fresh water found in lakes, rivers** and **other forms of ground water** (caves, geysers, springs and wells). Water vapor in the atmosphere makes up only one-thousandth of 1% of the hydrosphere.

The role of river water in the global hydrological cycle is very important. **Hydrological cycle** (or water cycle) means the **movement of water** between land, ocean and air; the **change of water states** between liquid, solid and gas; and the **continuous exchange of water** within the hydrosphere (between the atmosphere, land, surface water, groundwater and plants). The hydrological cycle— the water's movement, changes and its continuous exchanges—may be divided into four main phases: (1) *evaporation* — the moving up of water from any bodies of water (land and sea) into the air; (2) *precipitation* — the falling of water (from condensed clouds) through rainfall or snow; (3) *infiltration* — the penetration of water from surface into the ground; and (4) *run-off* — the travel or flow of water from its source into the river or lakes and ending to the sea.

The different forms of water in the hydrosphere (ocean, lakes, rivers, and others) are fully replenished during the hydrological cycle **but at very different rates**. For instance, the period for complete recharge of oceanic waters takes about 2,500 years, for permafrost and ice some 10,000 years and for deep groundwater and mountainous glaciers some 1,500 years. Water storage in lakes is fully replenished over about 17 years and in **rivers about 16 days**.

"Since the demand for water is rising exponentially, **human intervention in the hydrological cycle is occurring at a rate, many times faster than the natural rate of replenishment** in various units of hydrosphere. This is the root cause of water crisis being faced globally," explained by Arun Kumar Singh in his book "Privatization of Rivers in India." The demand for dams[94] for energy, irrigation and water supply will step up *hydrological alteration.*[95] This will further intensify the withdrawal of fresh water from the rivers, lakes and groundwater. The magnitude and extent of dam construction and associated water diversion, exploitation of groundwater aquifers, stream channelization, and inter-basin water transfer in the world today are so large that these hydrological alterations are having global–scale environmental effects.[96]

[94] According to ICOLD, "one of the most efficient ways to manage water resources for human needs is by the construction of dams that create reservoirs for the storage and future distribution. This is in response to uneven distribution of water resources and its scarcity globally.

[95] *Hydrological alteration* is referring to any anthropogenic disruption in the magnitude or timing of natural river flows.

[96] David M. Rosenberg, Patrick McCully, and Catherine M. Pringle.

B. ALTERNATIVES AND OPTIONS

There are viable alternatives to dams. These are more sustainable and cheaper. Decentralized, high-efficiency generating technologies are replacing hydropower dams, along with nuclear power and big coal-fired plants. What is needed is an environment where competition replaces monopolies, and private and decentralized power production exists.

What is challenging and pressing is how to improve the efficiency of existing water supply and energy systems, and at the same time managing the utilization of water resources (from lakes, rivers and others) in such a way not altering the hydrological cycle faster than replenishment. These different options are the: (1) demand-side management; (2) supply-side efficiency measures; and (3) new supply options in the four areas of agriculture, energy, water supply and flood management.

These different options can enhance, improve or expand water and energy services to all types of users. However, the application or treatment of these options should be viewed in an integral fashion and not for an individual sector. The following are the general findings and lessons:

1. Demand-side management (DSM). Demand-side management usually implies actions (it can be a program, laws or policies) that influence the quantity of power or water consumed by users. The objective is to reduce demand for power or water. There are many options under DSM and that include reduced consumption, recycling, shifting to less water-intensive crops and encouraging the use of more efficient electrical appliances and technological and policy options that promote efficiency of water and power for end-users side. The WCD states that the demand-side management (DSM) has "significant untapped and universal potential and provides a major opportunity to reduce water stress."

2. Supply-side efficiency (system management improvement). Aside from influencing the consumption of end-users the delivery systems or the supply-side has to be efficient also. This is all about **improvement of system management**. Unnecessary loss of water and power can be avoided through reductions in water leakages from the system, keeping up with system maintenance and upgrading of control, transmission and distribution technology in the power sector. This may involve reducing leaks in water pipes, retrofitting power plants and irrigation systems with modern equipment or reducing losses in power transmission lines. DSM provides opportunity to reduce water stress and power requirements as well as reduction of greenhouse gas emissions.

WCD states that improving system efficiency at the supply side can "defer the need for new sources of supply by enhancing supply and conveyance efficiency.

3. New supply options (the renewables). When efforts to conserve resources and improve the efficiency of existing dams are not enough to meet growing demand, renewable energy supply options should be considered. Renewable options include efficient and sustainable biomass, wind, solar, geothermal, and eventually, ocean energy sources and fuel cells. These new supply options can diminish the need for new or existing sources of supply.

A key part of WCD's mandate was to assess the different options available for meeting the services provided by large dams. WCD assessed possibilities for demand-side management, supply-side efficiency measures and new supply options.

The photographs show examples of solar and wind power.

The following are short summary of the findings of the World Commission on Dams (WCD) on options for water and energy resources development:

C. FINDINGS OF WCD ON OPTIONS FOR WATER AND ENERGY RESOURCES DEVELOPMENT

1. Agriculture and irrigation

In the irrigation and agriculture sector, preference is for improving the performance and productivity of existing irrigation systems; and alternative supply-side measures that involve rain-fed, as well as local, small-scale, and traditional water management and harvesting systems, including groundwater recharge methods.

To improve the performance and productivity of existing systems, the WCD identifies the following options:	Improved basin and system level management, including sediment flushing and catchment management that can increase the efficiency and life of irrigation systems.
	Controlling salinity and reclaiming saline land is an urgent priority in order to increase productivity of existing land. New drainage and maintenance of existing drainage is one method, but is insufficient in itself. WCD recommends an integrated approach combining management of surface water, groundwater and agricultural practices. Salt-tolerant crops and vegetation can remove excess surface water and lower water tables.
	Controlling the loss of seepage in canals could save up to 14.8 billion m3/yr of water. Canal lining is one way to control losses, as well as maintenance of irrigation systems.
	Technologies exist for improving the efficiency of surface irrigation, through cultivation of less water intensive crops in dry regions, and micro-irrigation methods such as sprinkler and drip systems.
	Pricing structures for irrigation water which reflect the cost of supplying water and associated externalities can encourage efficient use of water and should be designed with stepped rates to provide security for basic livelihood needs.

Some alternative supply-side measures include:	Enhancing rain-fed agriculture and supporting local irrigation technologies. “Some 80% of agricultural lands world-wide are under rain-fed cultivation, contributing to 60% of food production. Given the number of low-income households that rely on rain-fed agriculture throughout the developing world, the enhancement of opportunities in this sector can have a major effect on productivity and livelihoods.
	Some examples of appropriate technologies include treadle pumps and low-cost drip systems, small motorized ground pumps, rainwater tanks, and rainwater harvesting using small dams and embankments to trap run-off.
	Reuse of irrigation drainage water and urban wastewater.

2. Power

The priority for a sustainable and equitable global energy sector is for all societies to increase the efficiency of energy use and the use of renewable sources. High-consumption societies must also reduce their use of fossil fuels. Decentralized, small-scale options based on local renewable sources offer the greatest near-term and possibly long-term potential in rural areas.

WCD estimates that the technical potential of demand-side management (DSM) in countries with a high per capita consumption, such as the United States, may be up to 50%. DSM is about consumers using less electricity and using it more efficiently in the residential, industrial, commercial and government sectors. One major DSM measure is replacement of energy inefficient appliances. Generally, investments in promoting consumers' use of efficient appliances are much cheaper than new supply options.
Alternative renewable supply options include biomass, wind, solar, geothermal, ocean energy sources and cogeneration.

	Wind power is the fastest growing of the renewable energy options and is competitive with other conventional options when a back-up generation source is available and when government support is provided as an incentive.
	The cost of **solar photovoltaics** (PV) has dropped 80% in the past two decades and will need to fall by a further 50-75% in order to be fully competitive with coal-fired electricity." While this technology will not significantly contribute to grid power in the short-term, the long-term potential is considerable.
	Solar thermal systems can almost compete with conventional thermal power in settings with high solar insolation levels.
	Biomass options are commercial where biomass fuel is readily available. The greatest potential is in decentralised local systems.
	Fuel cells show great promise, and are expected to be commercially available for use in vehicles and in grid and off-grid electricity supply by 2005.

In rural areas, decentralized options provide an opportunity to reach some of the 2 billion people who currently have no access to electricity. Some options include simple household lighting systems and minigrids powered by diesel generating sets, small gas turbines, micro-hydro units, windmills, and photovoltaic systems. These are simple and flexible ways to expand energy services to remote areas, have a short construction time and have low environmental impacts.

3. Water supply

In the water supply sector, meeting the needs of those currently not served in both urban and rural areas through a range of efficient supply options is the priority. Further efforts to revitalize existing sources, introduce appropriate pricing strategies, encourage fair and sustainable water marketing and transfers, recycling and reuse, and local strategies such as rainwater harvesting also have great potential.

Demand-side management measures to reduce consumption include:	Regulatory standards for appliance and equipment manufacturers and subsidies to consumers to install water-saving devices such as low-flow toilets, showers and washing machines;
	Tariff structures that start low and progressively rise for high levels of consumption;
	A significant proportion of high-quality domestic water is used in sewerage systems to transport waste. A number of low-cost and alternative sanitation systems that have low water requirements are available, such as pit latrines and septic tanks.

Supply-side alternatives include:	Stabilizing and reducing losses from piped systems through leakage and other problems can save a substantial amount of water.
	Rainwater harvesting through rooftops, tanks and other methods are an alternative source of domestic water supply.
	Recycling of wastewater for agriculture, groundwater recharge, landscape irrigation and industry.

4. Integrated flood management

In the case of floods, as absolute flood control may be neither achievable nor desirable, it is necessary to manage floods so as to minimize flood damages and maximize their ecological benefits.

Reducing the scale of floods implies managing the quantity and quality of surface water runoff. Catchment management measures include:	Groundwater recharge measures, such as infiltration trenches, detention basins, infiltration ponds, retention ponds and wetland areas to reduce runoff;
	Forest protection, lower impact logging practices, avoidance of clear-felling and less intensive agriculture to reduce soil erosion and landslides that lead to channel siltation;
	Small-scale storage of runoff and improvements in drainage can mitigate floods.

Isolating the threat of floods can be done through:	Flood embankments that do not cut off natural drainage patterns;
	Flood proofing of houses and other structures through waterproofing walls, fitting openings with permanent or temporary doors or gates; raising houses; or building boundary walls around the house;
	Limiting floodplain development.

Increasing people's coping capacities can be done through:	Integrated catchment and coastal zone management, and wise planning and use of floodplains and coastal zones;
	Emergency planning such as forecastings, warnings, evacuation plans and post-flood recovery. Compensation and insurance should be considered as part of this.

5. Decommissioning of dams

WCD recommends the incorporation in the dam designs the provision for decommissioning. This is necessary or may be necessary due to safety concerns, dam owners' concerns about lower profits, or concerns about social and environmental impacts. In some countries, like France and the United States, decommissioning is associated with the restoration of key environmental values, often related to migratory fish, and as a condition of project re-licensing. While the dam is generating revenue, funds must be set aside be for decommissioning.

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PART SIX

ADB's INVOLVEMENT IN DAM-BUILDING: PAST, PRESENT AND BEYOND

A. FROM IRRIGATION TO POWER GENERATION SAME DESTRUCTION

The sharp upsurge of dams in the 1950s and onward is associated with the world's growing population (food production, water supply) and industrial expansion (energy generation) **(Figure 5)**. The peak of dam-building in the 1970s was a response from capitalist establishment rocked by the 1973 oil shock[97]. This oil crisis situation influences ADB's First Energy Policy until the early eighties.[98] Though there was a slow down in dam-building in the 1980s-1990s periods, the number is not comparable to 1900-1940s very low dam-building activities. Dam-building will continue. "As the world population continues to grow at the rate of over 100 million people each year, so does the demand for water," according to the International Commission on Large Dams (ICOLD). For the ICOLD, "one of the most efficient ways to manage water resources for human needs is by the construction of dams that create reservoirs for the storage and future distribution."

While some rivers are dammed enough, dam-builder and its financiers are eyeing other rivers. The rivers of Mekong[99] and South Asian regions are candidates for further damming.

Part Four and **Part Four-02** of this guidebook clearly enumerate and discuss negative impacts of large dams to people and environment. Large dams are not competitive, according to Grainne Ryder (Probe International) and uneconomic, as what Patrick McCully (International River Network) said. Costs and risks in constructing dams are very high and cost over-runs are also high. The scientific community, the dam and hydro industry and the WCD acknowledge these.

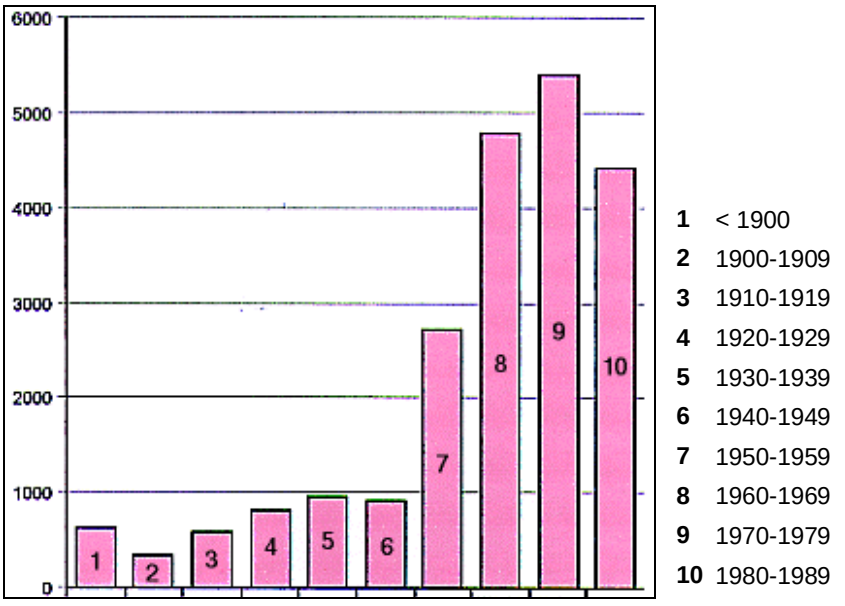
But financiers and dam-builders, using water crisis, scarcity and expanding demand, continue to praise dams because governments are providing special subsidies to commercial investors, monopolies and the socialization of private risk for them to put their money into large hydropower projects. ADB and the World Bank, financiers of hydroprojects, knew all of these.

[97] The **oil shock** (also known as the **1973 oil crisis**) started when Arab members of the Organization of Petroleum Exporting Countries (OPEC), during the Yom Kippur War, stopped shipping petroleum to countries (United States and its allies in Western Europe) supporting Israel. The crisis occurred when they quadruple their petroleum prices. **Yom Kippur War** (known as the **1973 Arab-Israeli War)** was fought from October 6 (the day of Yom Kippur, a Jewish holiday) to October 24, 1973, between Israel and Egypt-Syria coalition.

[98] The Second Energy Policy emphasized the infrastructure-related projects in the energy sector, and the Bank's promotion of private sector participation in the sector. This policy was carried until the Energy 2001, the latest ADB Energy Policy.

[99] ADB-financed studies have identified the potential for over 50 large dams on the Mekong River and its tributaries (IRN).

Figure 5: Trends in Dam-building, 1900 – 1980s



Source: International Commission on Large Dams (ICOLD)

Grainne Ryder concluded that "big hydro dams continue to be built whenever dam proponents have access to the deep pockets of taxpayers. Without taxpayers to subsidize the capital costs of big dams, without taxpayers to internalize private sector risk, without monopolies to keep competitors out, without public oversight, without market discipline, and without the power to expropriate riverine communities' resources with impunity, few, if any, big hydro dams would be under construction today."

WCD found that large dams have been a longtime favorite of politicians, government officials, dam-building companies and development banks. They have provided opportunities for corruption and favoritism and have skewed decision-making away from cheaper and more effective options.

B. ADB's MISCONDUCT AND NEGLIGENCE IN DAM-BUILDING

ADB's involvement in dam-building in Asia and Pacific is tainted with misconduct and negligence. These attitudes were best described by the International River Network's summary of ADB's involvement in dam-building in Mekong Region. In the said article (**ADB's Dam-Building Record "Seriously Deficient"), the following glaring and blatant negligence were noted, "that the Asian Development Bank:**

1. Is **failing to adhere to its own policies** in the Mekong region, particularly those on energy, public participation and consultation;

2. Is **subsidizing private companies vying to build dams** in the region as hydropower projects are uneconomic for the private sector without public assistance;

3. Has **failed to recognize the impacts of dams** on the rivers, fisheries, forests and livelihoods of local communities, and has failed to provide adequate compensation for those affected;

4. Has **used consultants to** conduct feasibility studies, environmental impact assessments and basin studies and the findings of these studies consistently **exaggerate the benefits of dams and downplay their costs**; and

5. Has **failed to respond adequately to criticisms** of its dam projects and continues to downplay their impacts.

(Please refer to Parts Four and Four-Zero Two of this guidebook for an in-depth discussion on the aforementioned.)

C. WHAT ADB PRONOUNCED ON THE AIR IS OPPOSITE ON THE GROUND

ADB is good only in pronouncements and rhetorics. In President Mitsuo Sato[100] inaugural speech he made mention about **stakeholders partnership** in addressing water issues. "In order for the Bank's (ADB) support to be most relevant and effective in our DMC's, the policy review and the strategy-setting have to adopt a **consultative approach**, involving not only the Bank staff but also the DMC's policy makers; not only the technical experts but also NGOs, private sector and **all other stakeholders**."

In September 6, 2005, more than ten years later, in a press briefing in Pakistan, the new ADB President, Haruhiko Kuroda, said that "we (ADB) are hopeful that big dams will be initiated after a **consensus** is developed." What Kuruda meant was that ADB is ready to finance constructions of major dams in Pakistan, provided that, the provinces can reach **agreement** on them and the ADB's policies on environmental protection and displacement of populations are followed. Good public relations projection, but expect the opposite outcome.

But despite ADB's claims (i.e. praises of consensus, consultation, environment protection, and other development jargons, the realities of displacement and environmental degradation are still happening. Without a doubt, these recurring problems are rooted in the nascent stages of any ADB-funded infrastructure projects, particularly in the conceptualization phase.

[100] Mr. Mitsuo Sato served as ADB's President from 1993 to 1999, steering the Bank through one of Asia's most challenging periods, following the onset of the Asian financial crisis in 1997.

In the conceptualizing phase of any projects, the people and institutions involved failed to consider, if not totally and deliberately excluded; potential and directly affected people. In **Part Four-02** of this Guidebook, three sample cases (Theun-Hinboun, Nam Leuk and Kali Gandaki dams) were presented. These three cases ascertain very common issues and controversies relating to consultations:

ADB approves the WCD New Decision-Making Framework, its Seven Strategic Priority, except some of the 26 Guidelines and Criteria for Good Practices. One crucial guideline—the free, prior and informed consent, ADB is neither conforming nor currently conforming). ADB left this to the borrower-government, as project owner, to comply with. What follows are bogus, selective and questionable consultations. The other two important guidelines where ADB does not conform are the following: (1) ensuring operating rules reflect social and environmental concerns, and (2) improving reservoir operation. ADB only considers these after loan completion, unless it is stipulated in the loan agreement.

WCD recommended new guidelines on decision-making before stepping into a dam-project. But the ADB, out of 26 WCD Guidelines and Criteria for Good Practices, conforms with the 17, partially conforms with three (3), and not "currently" conforming with six (6) as they are not incorporated in ADB Guidelines and/or not in accordance with DMC policy and/or practice **(see Part Three of the Guidebook)**.

D. ADB IS PREPARING THE GROUNDWORK FOR ANOTHER DAM-BUILDING

The Asian Development Bank (ADB) will continue to funds dams (large or small) in the future, regardless of WCD guidelines and the Bank's own policies. In one of the Bank's documents, it declared that "in line with its energy sector policy, ADB will continue to extend its support for technically and economically feasible hydropower projects that form part of a country's least-cost energy development plan, provided their environmental (including impact on fisheries) and social effects can be satisfactorily managed in accordance with ADB policies."

In accordance with ADB policies, the move of ADB in amending paragraph 32 of its 2001 Water Policy — by loosening and weakening it, is an indicator that the Bank will step into large dam projects **(see Part Three of the Guidebook)**.

The second move of ADB (following the World Bank's decision) in supporting Nam Theun 2 Hydropower Project in Laos, despite oppositions from environmentalists and NGOs, was a clear indicator and a loud message that ADB will be involved in future dam-building. Nam Theun 2 project failed to comply with the six out of seven Strategic Priorities of WCD, according to Aviva Imhof (International River Network). ADB President's recent visit to Pakistan was an opportune time for him to make an announcement to the public that ADB will fund dam-building in Pakistan as long as there is a consensus.

E. NEW "HIGH-RISK, HIGH-REWARD" STRATEGY FOR DAM-BUILDING?

Will ADB follow the World Bank's new approach? In February 2003, after a decade-long of turning away from risky projects, World Bank re-embarked on what is called a "high-risk, high- reward" strategy or approach to projects in the water sector. And this strategy explicitly called for an increased investment in dams. In March 31, 2005, the World Bank approved and supported the risky US$1.3-billion Nam Theun 2 Hydropower dam project in Laos. On April 4 of the same year, ADB followed suit. Do these approvals signal the application of "High-Risk, High-Reward" strategy of two giant banks?

Critics said that borrower-governments and its taxpayers would be the victims of this strategy. Implementing safeguard policies (environmental protection, resettlement, mitigation, and others) and other standards will push the cost of the project upward. On the other hand, this promises high rewards for investors, but at the expense of borrower-government, its taxpayers and electricity consumers. This makes doing business with ADB costlier..

F. IT'S THE PEOPLE'S MOVEMENT, NOT THE BANK'S AMBIGUOUS SAFEGUARD POLICIES

The emergence of people opposing to dams is not parallel to the history of dam-building. The first recorded anti-dam activity by a person came later, in 17th century, by a Scottish fisherfolk trying to destroy the newly-completed weir (a small dam). In the 1910s, a so-called conservationist, John Muir, unsuccessfully lobbied public opinion and the US Congress against the building of O'Shaugnessy dam in Yosemite National Park in California.

As dam-building accelerated after the 1950s, opposition to dams became more widespread, vocal and organized. Conservationists in northern countries, especially in the United States, led the first notable successes for campaigns against large dams. These conservationists were able to stop the 175 meter-high Echo Park dam on a tributary of the Colorado River in the 1950s and two dams planned for the main stem of the Colorado River in the Grand Canyon in the following decade. In 1973-77, the resistance of indigenous peoples of Cordillera to four dams along the Chico River in Cordillera, Philippines, led the World Bank to withdraw from the project and resulted in the government postponing it indefinitely. This indigenous people's victory costs the life of its own leader, Mac-Liing Dulag.

The influence of the anti-dam movement has been increasing. In India, jailed activists have gone on hunger strike to protest against the displacement of large numbers of villagers by the series of dams along the Narmada Valley. The protests have reached an international audience, credited largely to the eloquence of Arundhati Roy, the Booker Prize-winning author who has campaigned fervently on behalf of the villagers.

The Ilisu dam in Turkey has also elicited international reaction, as well as highlighted the impact on the Kurdish people whose villages and towns imminently, would be flooded. Campaigners argue it could potentially trigger a war with Syria and Iraq by damaging potable

water supplies and the livelihoods of local farmers. Industrialists and financiers cannot ignore this debate.

In the end, it is the strong people's movement that will serve as a deterrent to any socially- and environmentally- destructive dams, and not the Bank's ambiguous safeguard policies.

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