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*Planning Process in Vietnam: Responding to Competing Needs*

## **I. Background**

Vietnam with total natural area of 330,000 km<sup>2</sup>, has the population of 76 million in which nearly 80% are working on agricultural sector. Located in South East Asia, Vietnam usually suffers from affects of the South-east and North-East monsoon climate and divided topography. The average rainfall is 1750 mm but very unevenly distributed according to time and space. The average annual rainfall in some regions such as Tay Con Linh in the North reaches to 3,000-4,000 mm/year but in others such as Ninh Thuan province in the Central Region is very low, only about 600-700 mm/year.

Three-quarter area of Vietnam are hills, mountains and highlands resulting in most of rivers and stream with high slope, especially rivers in the Central Region. The forest covering rate is low, only 28% in average, in many regions only 9-10%. The difference of discharges of rivers in the flood and dry season is high so that it causes flood in the wet season and drought in dry season.

Vietnam is endowed with a long coast of 3,000 km and 112 river estuaries which are the ways for salt water intruded into the cultivated land, especially in Red River and Mekong River Deltas. So that production of agricultural in particular and socio-economic development in general of Vietnam always faces with water related disasters, mainly flood draught and salinity intrusion. In order to achieve the goal of self sufficient food for such a populous nation with small cultivated land which are frequently threatened by flood, draught and salinity intrusion, since 1955, as the war ended, Vietnam has paid much attention to develop water resources for agriculture, electric generation and to reduce damages by water related disasters. The construction of reservoirs and dams has been proceeded since 1965.

In the North mountainous region, in the Central region, Central highland region and the south-east region of Vietnam where there are suitable conditions for creation of reservoirs, the measure of construction reservoirs and dam for directly regulating water to server irrigation, hydro power generation has been considered as no alternatives for irrigation, flood control, electrical generation and domestic and industrial water supply .

## **II. Situation of dam development in Vietnam**

During the period of 40 years (1959-1999) Vietnam has constructed:

- 500 reservoirs, weirs, dams, sluices for irrigation, hydro power generation, flood control, domestic and industrial water supply and salinity intrusion protection as well. The height of all these dams are over 10 m including 50 dams with height of 25-40m, 8 dams with the height of over 40 m. The highest dam is Hoa Binh with the height of 128m
- Nearly 8.000 km river and sea dikes of which 400 km of Red river dike have the height over 10 m high.

The main functions and tasks of these dams and reservoirs are mainly:

**Irrigation:** most of the medium-scale reservoirs and dams are mainly serving for irrigation and domestic water supply for local people.

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**Flood Control:** The total flood control storage of large and medium scale reservoirs are 9 billion m<sup>3</sup> in which only Hoa Binh reservoir reserves 5 billions m<sup>3</sup> for flood purpose.

**Electricity Generation:** At present, the following large dams have been completely constructed and serving for electricity generation namely:

Name of Dam	Designed power capacity
Hoa Binh	1,920 MW (Ha Tay province in the North)
Thac Ba	108 MW (Yen Bai province in the North)
Vinh Son	66 MW (Binh Dinh province in the Central region)
Tri An	400 MW (Dong Nai province in the South)
Da Nhim	60 MW (Ninh Thuan province in the South)
Thac Mo	00 MW (Binh Phuoc province in the South)
<i>Total</i>	2,754 MW

Some large dams are being constructed: It is expected that these works will be completely constructed in the year 2005 including:

Name of Dam	Design capacity
Yali	720 MW, Pleiku province, Central Highland
Hinh river	70 MW, Khanh Hoa province, Central region
Ham Thuan	300 MW, Ninh Thuan Central region
Da Mi	172 MW, Ninh Thuan Central region
Dai Ninh (possible)	300 MW, Ninh Thuan Central region

It is expected that up to the year 2005, the hydraulic install capacity can be reached to 4,196 MW including 3,850 MW of thermal power (1,500 MW of the North and 2,350 MW of the South). As the estimation, hydraulic power will account for 52% of the total electrical capacity of the whole country.

**Water salinity control:** Some large dams have taken important role in this area such as: Dau Tieng reservoir: in dry season, besides the direct irrigated areas, the double released discharge amount in comparison with the natural flow also facilitates the crop increasing for 40,000 ha in downstream of Sai Gon River; Tri An reservoir: In dry season , it releases an amount of water of four-five times larger than the natural flow to create no way for salinity intrusion into inland. Thac Ba reservoir: to raise the flow rate in dry season at the estuaries of Lo River in Vu Quang to 40-60% from 18-20%. Hoa Binh reservoir: with 8 electricity generation units are in process, it has raised the discharge of flow of Da and Red rivers in dry season up 8 x250 m<sup>3</sup>/s. The flows regulation also facilitates for navigation transport in dry season.

**Water supply for industrial and domestic use:** Reservoirs of all scale contribute positively in supplying water for local people in getting water from reservoirs, channels and canals and digging well in downstream of the works. Tri An reservoir supplies for Ho Chi Minh City an amount of 96% domestic water use with the capacity of 700,000 m<sup>3</sup>/day. Need of water for industrial sector is increasing rapidly, many dams and reservoirs play an important role in supplying water for domestic and industrial uses. For example: Da Den reservoir supplies water for Vung Tau; Na Tay reservoir supplies water for Na Duong industrial zone; Tasa dam creates a water source serving for tin exploitation in Tinh Tuc, Cao Bang.

### III. Decision making and planning process

Under the pressures of population growth; food security on national wide scale; the demand for increasing irrigation ratio serving for intensive cultivation for exploitation of 3 million ha of potential cultivated land; the water requirement for industrial activities and domestic use of 600 urban areas and for sanitation, environment and rural areas. In addition, in recent years, serious natural disasters draught, flood have increased in term of magnitude, frequency and damages. For example: Severe draught in 1998 and 1999 which resulted in decreased rainfall by 20-40% compared

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to the average in the past years in almost regions of the country. In November and December 1999, heavy rain occurred in 9 provinces in the Central Region. The first 5 days of November precipitation was recorded nearly 1,500 mm, and 2,000 mm in some places such as in Hue city, causing inundation with depth over 3,000m m for large areas of 9 provinces of the Central Region. Under these pressures, Vietnam has to find the way to effectively develop and manage water resources. In the coming years, some large dams will be constructed. The preparation for construction of these dams is being made at stage of pre-feasibility or feasibility such as: Cua Dat; Nuoc Trong, Dinh Binh, Tapao in the Central Region, Son La and a series of others dams aiming at flood control, electricity generation in the North Region.

The contents of water resources development planning in Vietnam have continuously been renewed and supplemented to adapt to socio-economic development process of the country and to scientific and technological advancements in the world. The social and environmental impact assessments of the alternatives of dams and reservoirs have been considered carefully.

At present large dams have been being constructed in Vietnam such as Hoa Binh, Dau Tieng, Thac Mo, Yali, Son La, Cuu Dat, etc. which are implemented in accordance with national plan and have been being contributed importantly to the water resources development of Vietnam and to enrich and diversify the theoretical and practical treasure on large dams in Vietnam and in the world.

#### **IV. Policy and strategy for dam development in Vietnam**

Planning and construction of dams in Vietnam are concerned by all water related sectors in the country. Water resources are very important for development not only agriculture but also socio-economic of the country as well.

At present, Vietnam has exploited 66 billion m<sup>3</sup> of water, ranking at 12 in the world, including 59 billion m<sup>3</sup> for agriculture; 5 billion m<sup>3</sup> for industry; 2 billion m<sup>3</sup> for domestic uses.

In the next 10 years, the water demand for industrial activities is expected to substantially increase. It is estimated that the total of water using up to the year 2010 will be 73 billion m<sup>3</sup> and be distributed as follows: 62 billion m<sup>3</sup> for agriculture; 7 billion m<sup>3</sup> for industry; and 4 billion m<sup>3</sup> for domestic uses. Dams and reservoirs are still considered as important measures to meet these requirements.

Strategy for development of dams are:

- Upgrade and rehabilitate the existing dams for improvement of efficient uses of stored water and dam safety;
- Develop large dams for multipurpose uses based on the integrated water resources development.
- Minimize the adverse impacts caused by construction of dams to community and natural ecological systems.

In order to set up the legal framework for implementation of these policy, first time in Vietnam, an Water Resources Law had been passed by National Assembly of Vietnam in 1999 and effective in January 2000. Some major changes in the water resources management in Vietnam have taken placed with the proceedings for establishment by June 2000 the National Water Council and River Basin Organizations for 3 biggest river basins in Vietnam namely, Red Basin in the North, Dong Nai basin the Centre and Mekong basin in the South.

For construction of large dams, the effects on environment, ecological system, especially on the resettlement are thoroughly considered and should be appropriately settled. Government of Vietnam have introduced many legal documents such as decrees, regulations, rules to ensure that negative impacts of the construction of dams and reservoirs will be minimized. A major changes have been taken in the policy of government for resettlement in which people to be resettled will receive

appropriate compensation for their losses. Government also has responsibility in construction of all necessary infrastructure in resettled places. The living standard of people in resettled area should be better than before. In the policy, the Government also identifies resettlement component for each stage of study on dams and reservoirs: In the feasibility study of work, it is necessary to have a separated program for resettlement; Infrastructure should be developed for new resettlement places, a part of benefit getting from electricity generation will be used to support for people who has to be resettled until they can stabilize their own life. The participation of people who will be effected by and organizations who concern the construction of dams and reservoirs is the most important factor for the Government making final decision.

## **V. CONCLUSIONS**

The planning for development of dams and reservoirs to meet increasing competitive demands in water of different sectors in Vietnam is raising the concerns not only of the Government, beneficiaries, but also of the social and environmental and financial organizations within and out of the country. From the experiences and lessons learnt from the success and failure of construction of large dams and reservoirs in the past in Vietnam in particular and the world in general, Vietnam does its best for ensuring the construction of large dams and reservoirs not only to meet the increasing water demands of users, to mitigate the water related disaster, to serve the social-economic development of the nation at present but also to minimize the negative impacts on the environment, ecological systems and resettled communities. It is necessary to make sure that the planning and construction of large dams and reservoirs have to be connected with integrated and sustainable management of water resources.