

HUE CITY – VIETNAM

**WATER SUPPLY AND DRAINAGE
SITUATION AND SOLUTIONS TO PROTECT
AND USE WATER SOURCES IN HUE CITY**

Hue City, 2006

I. OVERVIEW

Thua Thien Hue Province

- ✓ Located at the North of the Central Vietnam.
- ✓ With an area of 5,009km², with Tam Giang Lagoon of 22,000ha wide and 70km long, being the largest lagoon in the Southeast Asia.
- ✓ In the monsoon area, severe weather conditions, short and sloppy rivers, strong water currency in the winter causing flash flood, draught in the summer and the water often salted by the brine.
- ✓ Population: 1,066,162 inhabitants



Hue City

✓ Being the first – rank city of Vietnam; the center of politics, economy, culture and tourism of Thua Thien Hue Province and the Central Vietnam.

✓ With the complex of heritage of ancient capital and Hue folk song recognized by the UNESCO as the world tangible and intangible heritage components.



THUA THIEN HUE MAP

Hue City

- ✓ Area: 76km².
- ✓ Population: 350,000 inhabitants.
- ✓ Topography: partitioned by rivers and canals. Basins of the main rivers are low and frequently flooded.
- ✓ Weather: two separate seasons, rainy and dry seasons.
- ✓ Rainfall: being one of the locations with largest rainfall in Vietnam, average annual rainfall of 3,000mm. .

II. SITUATION OF WATER SOURCES AND WASTE WATER

1. Situation of Water Source

* Surface water:

The Huong River is the biggest river and is the main water source of the city of Hue and surrounding provincial districts. The upstream consists of 02 branches of Huu Trach and Ta Trach.

- ✓ Current: $Q_{max} = 1,600 \text{ m}^3/\text{s}$, $Q_{min} = 5-6 \text{ m}^3/\text{s}$.
- ✓ Water level: affected by semi-daily tide, amplitude ranging from 0.4 -0.6m.
- ✓ In addition, there are several canals connected the Huong River to other places to regulate the current and supply the such rivers as Dong Ba, Ke Van, An Cuu, Bach Yen rivers, ...

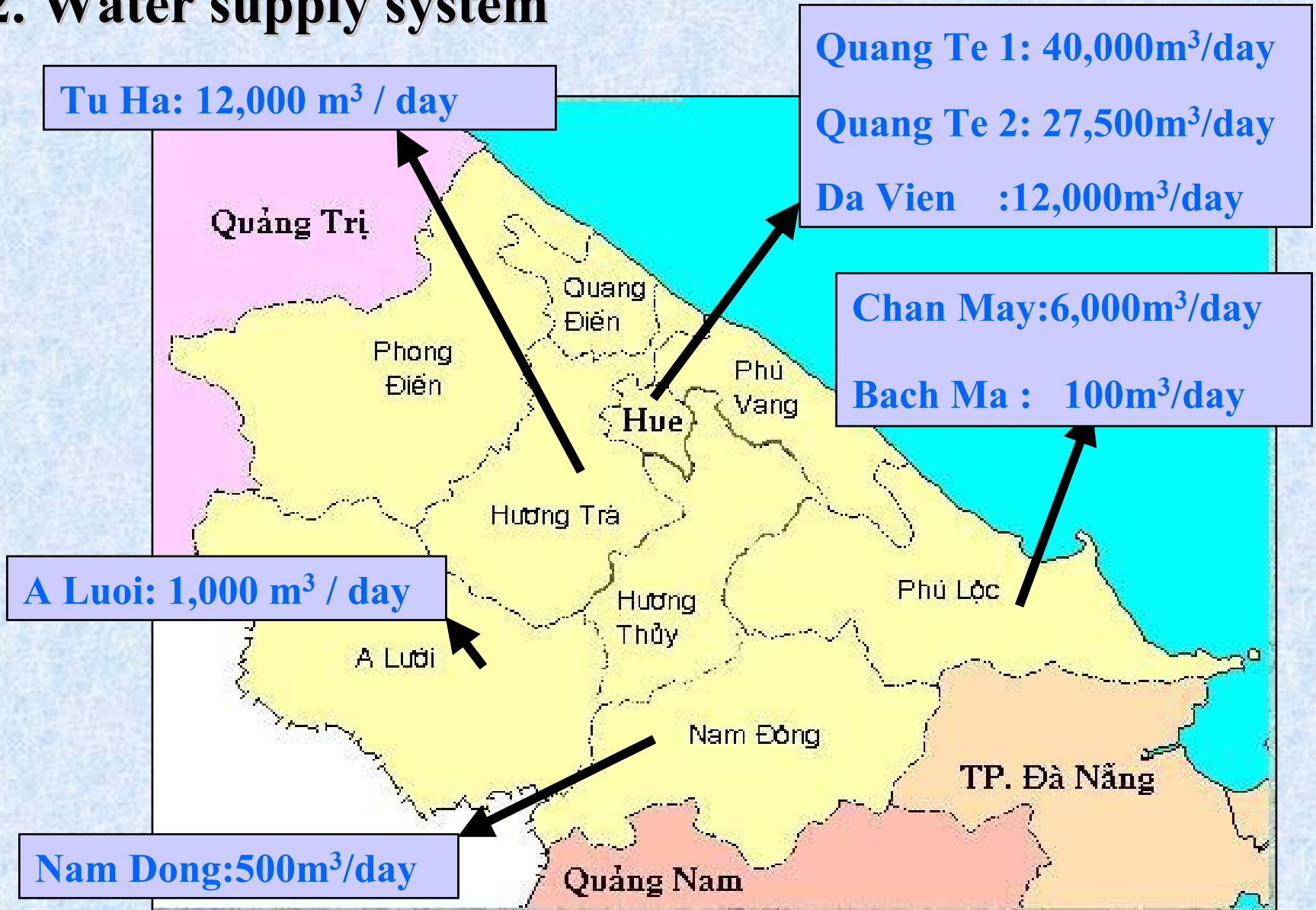
✓ Due to the overload of waste water, most of the rivers in the city have such pollutants as BOD, COD, N, P, Ecoli, Total Coliforms over the acceptable limits.

*** Underground water:**

✓ At the hilly areas, underground water is available from 5 to 10m.

✓ Other areas, underground water is available from 1.5 to 2m.

2. Water supply system



WATER PURIFICATION PLANTS

* **Water production process:**

- ✓ Gathering.
- ✓ Accumulation (Sand tank, active coal).
- ✓ Sterilizing (ultraviolet rays, javelin water).



*** Water supply system:**

✓ The whole province has 10 water supply plants with a total capacity of 100,000m³/day.

✓ Total pipeline length: 1,050km.

Of which:

+ D300-1000: 91.3km

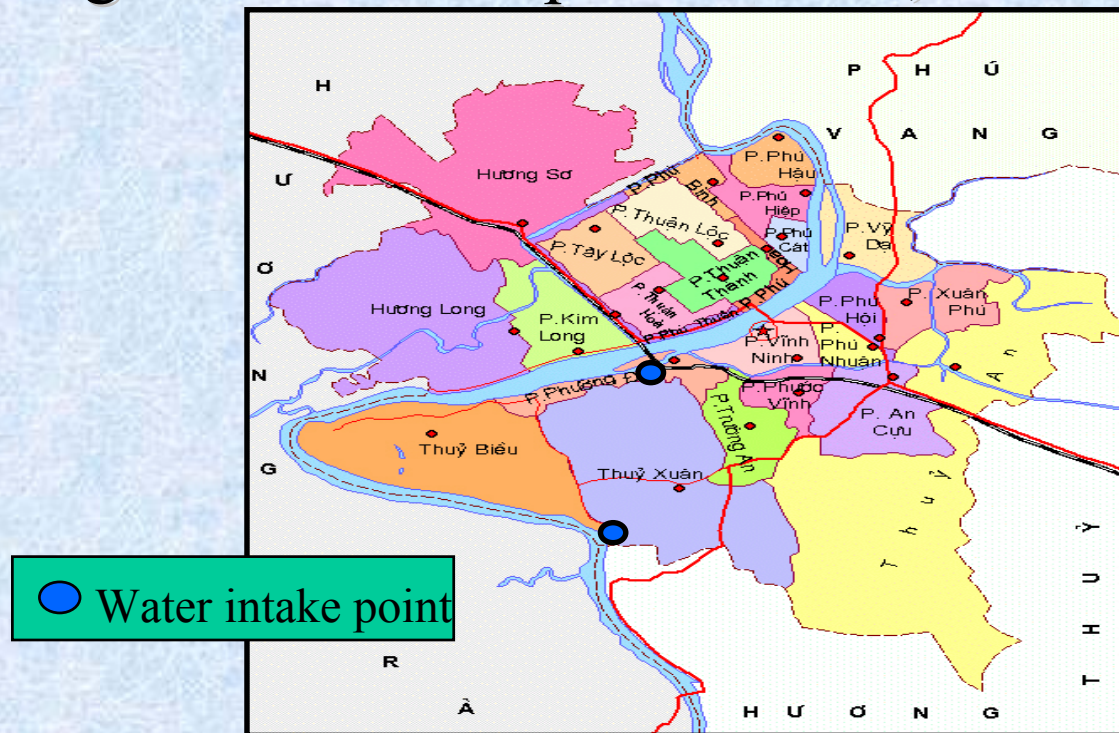
+ D100-300: 313km

+ D<100: 645.7km

✓ Most of the pipes has been restored or renewed, others are used for many years, usually causing the leak of water and affect the water quality.

Supplied Water usage:

- ✓ 95% of the population use the supplied water.
- ✓ 87/150 quarters and communes have the water supply network.
- ✓ 25/25 quarters and communes of the city have access to water supply system.
- ✓ Average usage: 120 – 150 liters per person per day in the city and 30 – 50 liters in the rural areas.
- ✓ Total usage in the whole province: 52,000m³/day.



3. Water drainage system of Hue City

Consisting of 03 parts:

- ✓ Rivers.
- ✓ Lakes and canals.
- ✓ Ditches and sewers.

**** Rivers system:***

- ✓ Rivers system consists of the Huong River, Bach Dang River, Ke Van River, An Cuu River and Nhu Y River.
- ✓ Functions: draining, irrigation, traffic, tourism, landscape.

RIVERS AND LAKES SYSTEM OF HUE CITY



** Lakes and canals*

- ✓ 41 lakes mainly located at the North of Huong River; total area: 60ha.
- ✓ Ngu Ha Canal: 3,017m long, Hao Thanh Canal: 10,571m.
- ✓ Functions: lakes and canals are connected amongst others to regulate the storm water and flood water in the citadel area. This system is also historically significant and was formerly functioned as traffic, tourism and military components.
- ✓ Most of lakes are encroached, shortened and its original functions are lost. They are used now for planting and connected to household waste water.

Drainage around Imperial



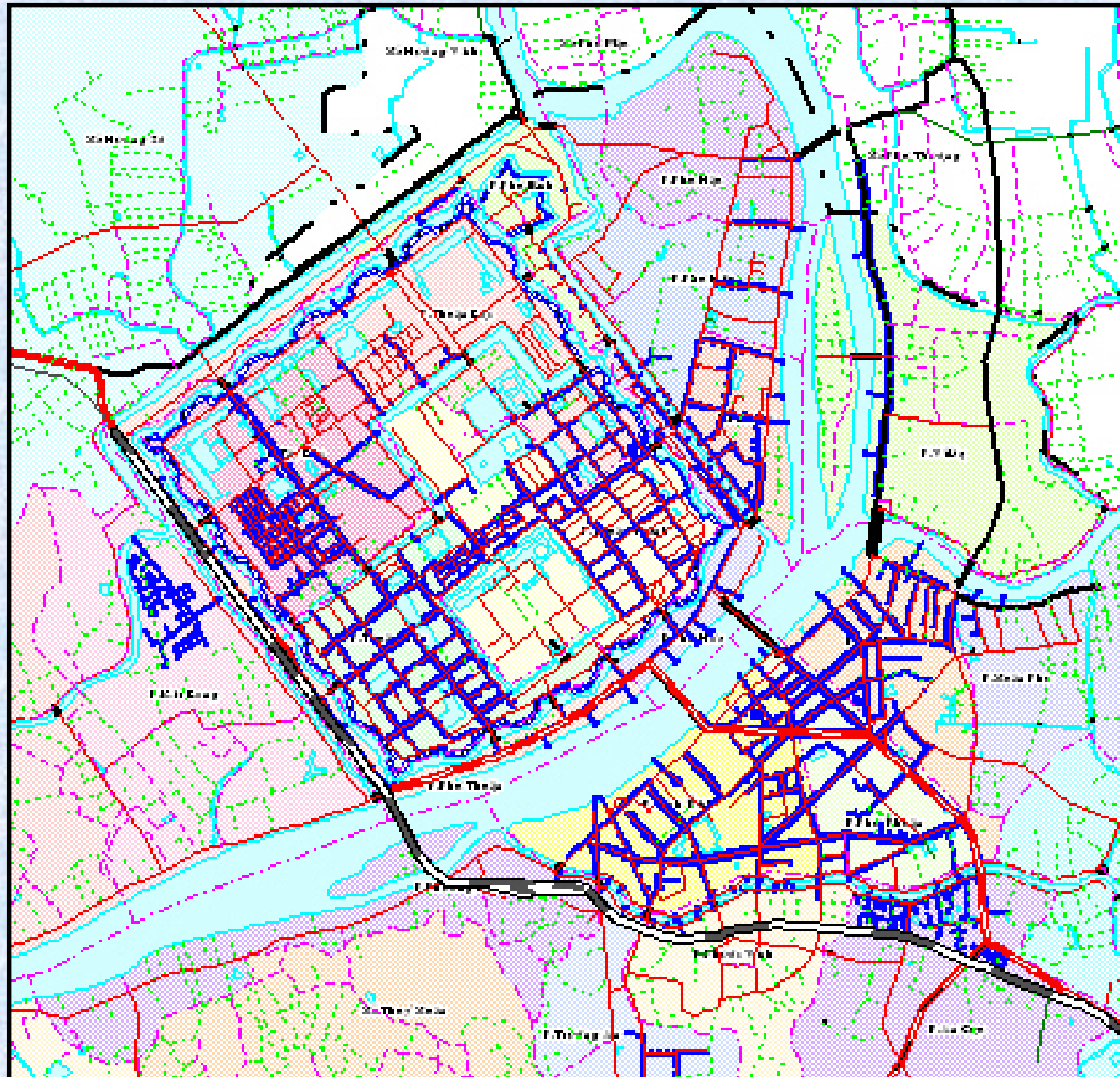
Vo Sanh lake



*** *Ditches and sewers:***

- ✓ 45km of concreted ditches with B300-600.
- ✓ 64km of sewers with D400- 1200.
- ✓ 4,400 bio-tanks of different types; typical size: 1.0x1.0m.
- ✓ Functions: draining storm water and waste water.
- ✓ Being the common drainage system, currently meeting 40% of the demands.

WATER DRAINAGE SYSTEM OF HUE CITY



*** *Operation of the city's drainage system:***

✓ Normally: waste water and surface water automatically flows through the ditches and sewers system and directly comes into the rivers or stagnated in lakes.

✓ In rainy season: water from rivers comes into the system and flood the whole system and fills in to canals, causing the block of drainage system and waste water cannot be drained and causes pollution to the environment.

4. Reasons and risks of pollution to the water source

* Surface water:

✓ All the rivers have high risks of pollution due to the big load of household waste water, production activities, services and agriculture. All types of waste water are mostly not or little treated (not accepted) and thrown the surface water environment.



✓ Especially, there are lots of inhabitants residing on the boats who dispose all the wastes directly to the rivers, causing pollution to the water sources.



✓ In rainy season (from September to November), the current of the Huong River is very strong and of high silt. In dry season (from June to September) the water is salty due to the serious invasion of ocean water to the river.



HUONG RIVER IN RAINY SEASON

CITY IN RAINY SEASON



*** Underground water:**

- ✓ Only 40% of the household waste water is connected to the drainage pipes and sewers, the remaining is absorbed into the ground. This is a source of high risk for underground water pollution.
- ✓ Areas surrounding the Huong River are affected by salty water in the dry season.

*** In addition, there are other reasons that cause pollution to the water sources:**

- ✓ Awareness of the inhabitants on environment and water sources protection is still weak.
- ✓ Technical infrastructure in the field of environment and water supply and drainage is insufficient.
- ✓ Protecting forests at the upstream and botanical buffer areas were destroyed in the war and are being exploited illegally , especially at the upstream of the Huong River.
- ✓ Efficiency of state governance on clean water and environmental sanitation is not adequate.

III. SOLUTIONS AND PLANS ON WATER SOURCE AND SEWAGE TREATMENT

1. Activities implemented

- ✓ Promulgating regulations on production, distributing and using the source of water. Implementing protection measures and water source economization.
- ✓ Publicizing the information on the mass media.
- ✓ Improving and renew many water supply and drainage facilities of the city (rate of inhabitants' water usage: 95%, drainage: 40%).
- ✓ Protecting and planting preventive forests at the upstream of Huong River.
- ✓ Continuing to construct the Ta Trach Lake and Thao Long Dam to keep the drinking water and prevent the salty water for Huong River.

2. Upcoming solutions and plans

- ✓ Strengthening propaganda and education to enhance the inhabitants' awareness with an aim to improving actively their participation in the activities of the water source protection and economization.
- ✓ Putting the program “Protecting water source means protecting our living environment” into the school curriculum.
- ✓ Training the managerial staff specializing in environment and urban management.
- ✓ Enhancing the inspection and penalizing the agencies, organizations and individuals that violate regulations and contaminate the source of water.

- ✓ Strengthening the forestation at the upstream of the rivers.
- ✓ Speeding up the construction process of reservoirs and hydro power plants at the upstream of the Huong River: Ta Trach Lake, Binh Dien and Huong Dien Hydro Power Plant, Thao Long Dam to regulate the water, prevent flooding and salty water.
- ✓ Continuing to complete the waste water drainage and treatment.
- ✓ Dredging and enlarging canal and lake system in the citadel area.
- ✓ Investing in environmental sanitation and waste water treatment.
- ✓ Calling for investment and cooperation from other cities and international organizations in the field of water supply and drainage and environment.

