

**MINISTRY OF NATURAL RESOURCES AND ENVIRONMENT  
DEPARTMENT OF WATER RESOURCES MANAGEMENT**

# **SOLUTIONS FOR SUSTAINABLE WATER USE AND MANAGEMENT IN DA NANG CITY**



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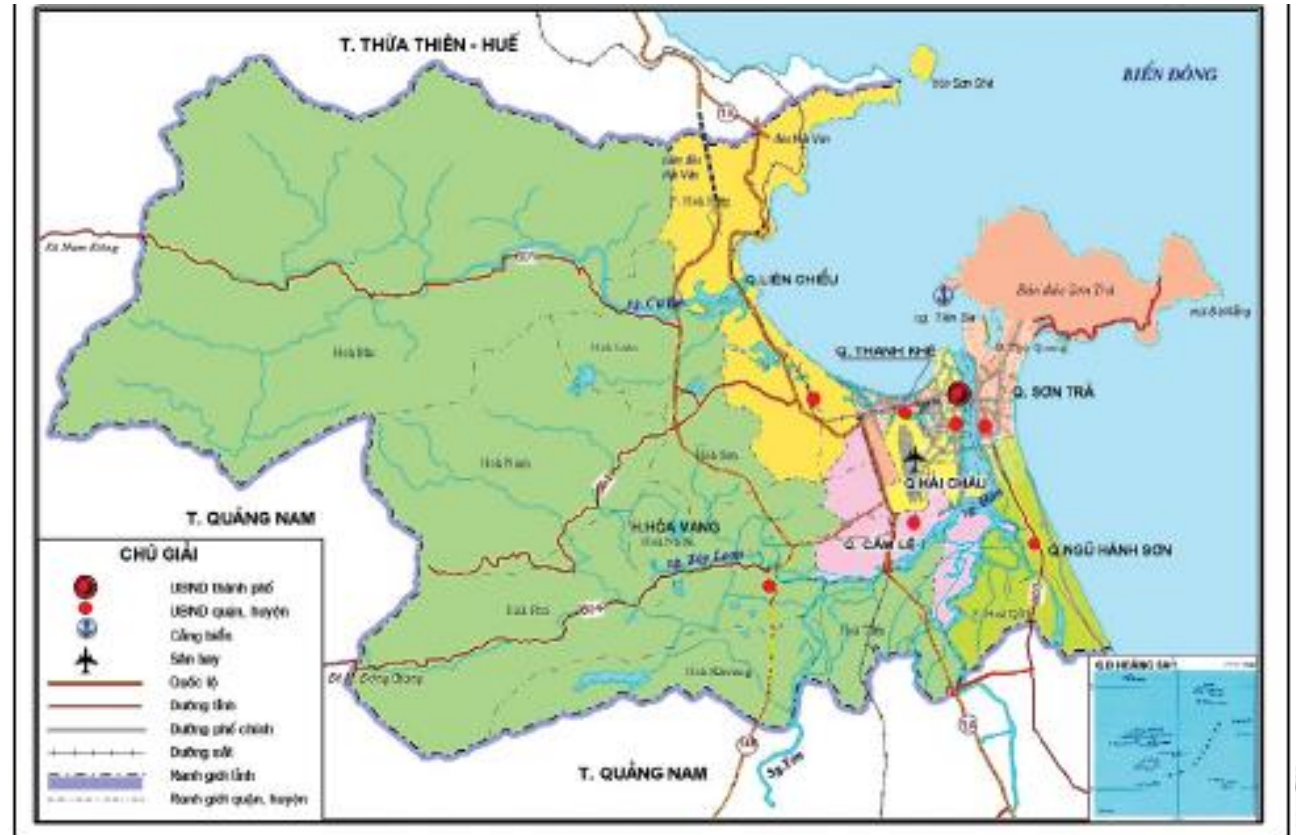
- **I. WATER RESOURCES STATUS**
- **II. WATER CHALLENGES**
- **III. SOLUTIONS FOR SUSTAINABLE WATER USE AND MANAGEMENT IN DA NANG CITY**



# I. WATER RESOURCES STATUS

## 1. GEOGRAPHIC LOCATION AND NATURAL CONDITIONS

- Located in the central of Vietnam, with the area is 1.256,54 km<sup>2</sup>;
- Terrain: over 70% areas are hills, the remaining part is plain.
- Population: 1,06 mil.,
- Number of district-level administrative units: 7 units
- The annual rainfall: 2000 - 2500 mm/year, the rainy season: Sep - Dec



*Administrative map of Da Nang city*



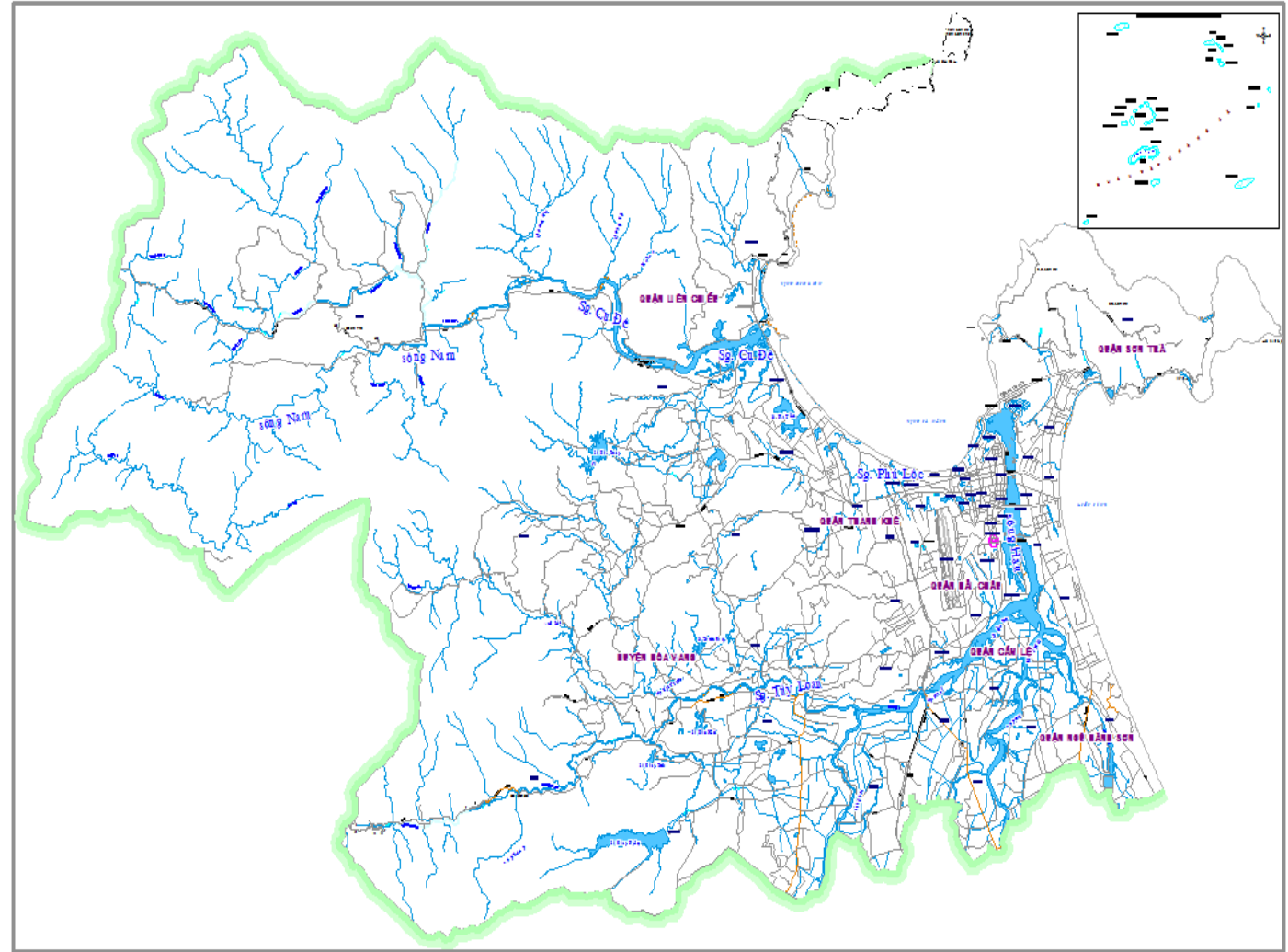
# I. WATER RESOURCES STATUS



## 2. Surface water

Da Nang is *located downstream of the Vu Gia - Thu Bon river basin*, with 03 inter-provincial rivers flowing in, including: Cau Do, Cam Le and Vinh Dien rivers.

- Annual flow  $W_0 = 17,46$  billion  $m^3$ /year.
- Low flow  $W_k = 6,16$  billion  $m^3$ /year.
- 21 reservoirs, total capacity: 38 million  $m^3$ , irrigating for about 2500 ha.



*River system in Da Nang city*

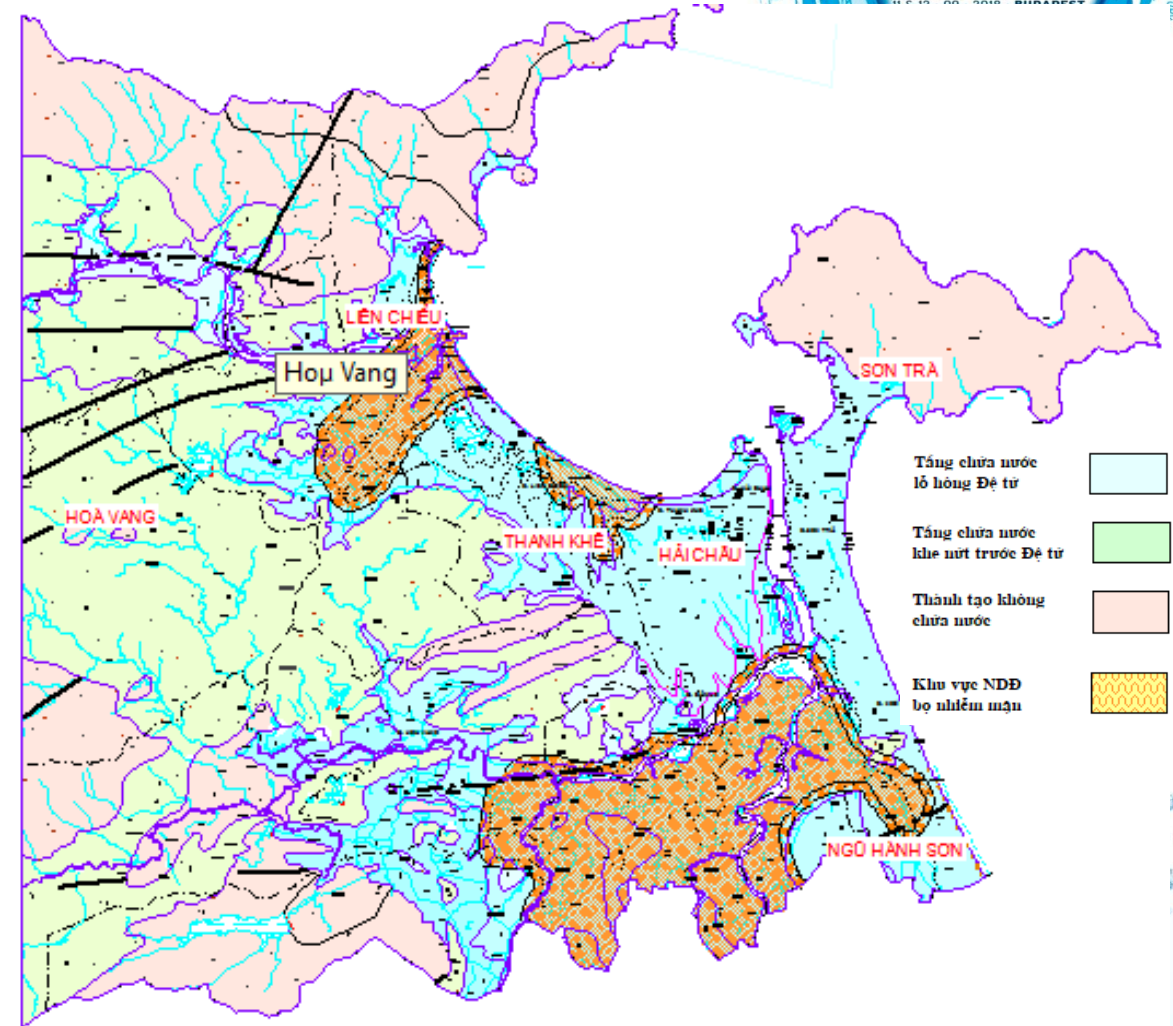


# I. WATER RESOURCES STATUS



## 3. Underground water

- Water in the Quaternary aquifer (including qh, qp) is distributed in the area of about 140 km<sup>2</sup> with the Water table ranges from 40-45m.
- Groundwater is distributed mainly in Hoa Vang and in the porous aquifers.
- Potential groundwater storage: about 354 thousand m<sup>3</sup>/day.
- Exploitable groundwater Reserves: 91.100 m<sup>3</sup>/day.
- 1300 drilled wells with the total water extraction is about 26,000 m<sup>3</sup>/day.



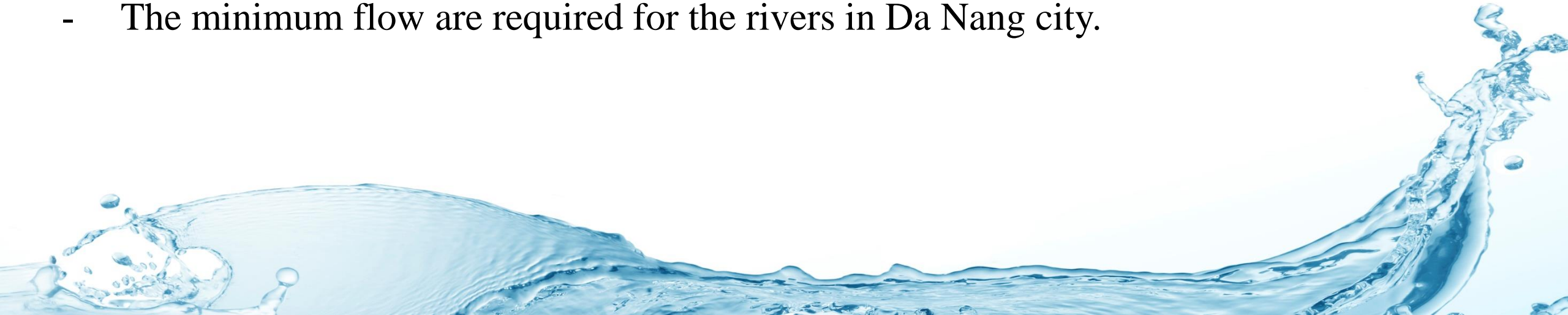
*Distribution of aquifers in Da Nang city*

# I. WATER RESOURCES STATUS



## 4. Current status of water use and exploitation and water demand

- ***Urban water supply:*** 04 plants exploiting surface water with the total capacity of ***242,000 m<sup>3</sup>/day supply about 98% of the city's needs***
- ***Rural water supply:*** 02 water supply systems with the total ***capacity of 4.400 m<sup>3</sup>/day, serving for 3.800 households,*** 13 rural water schemes. People also extract groundwater for daily life with the total extraction of about 1.200 m<sup>3</sup>/day
- ***Total water demand*** by 2030 is about ***283 million m<sup>3</sup>/year.***
- The minimum flow are required for the rivers in Da Nang city.



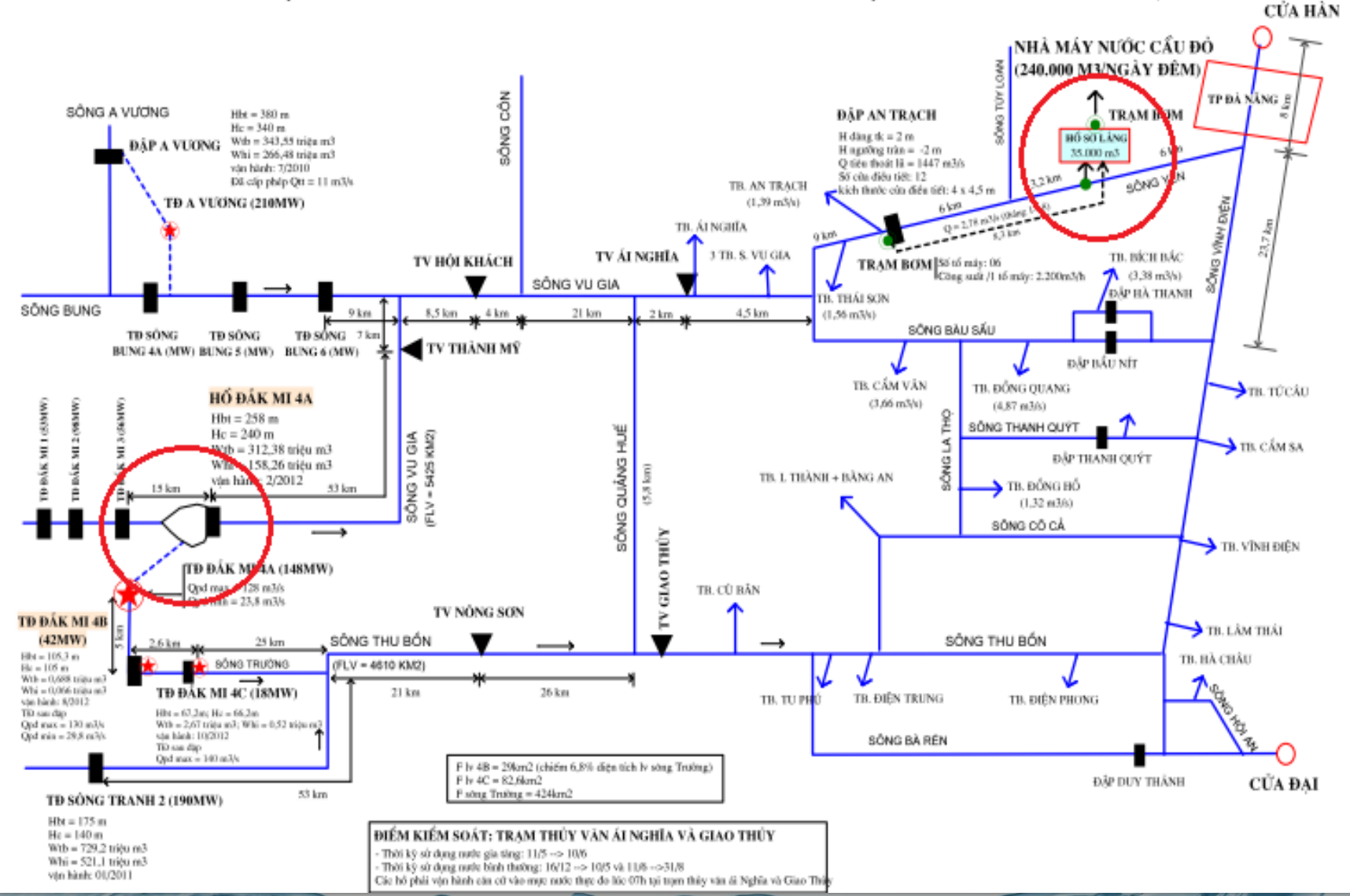


# II. CHALLENGES

## 1. The impact of vegetation cover change and of the upper flow of the Vu Gia River

- rapid increases in the flood flow and decreases in the low flow
- Water diversion from the Vu Gia River to Thu Bon River decreased the flow.
- Flood release of hydro power reservoirs changed the hydrological regime.

SƠ ĐỒ VỊ TRÍ CÔNG TRÌNH THỦY ĐIỆN ĐẮK MI 4A, 4B

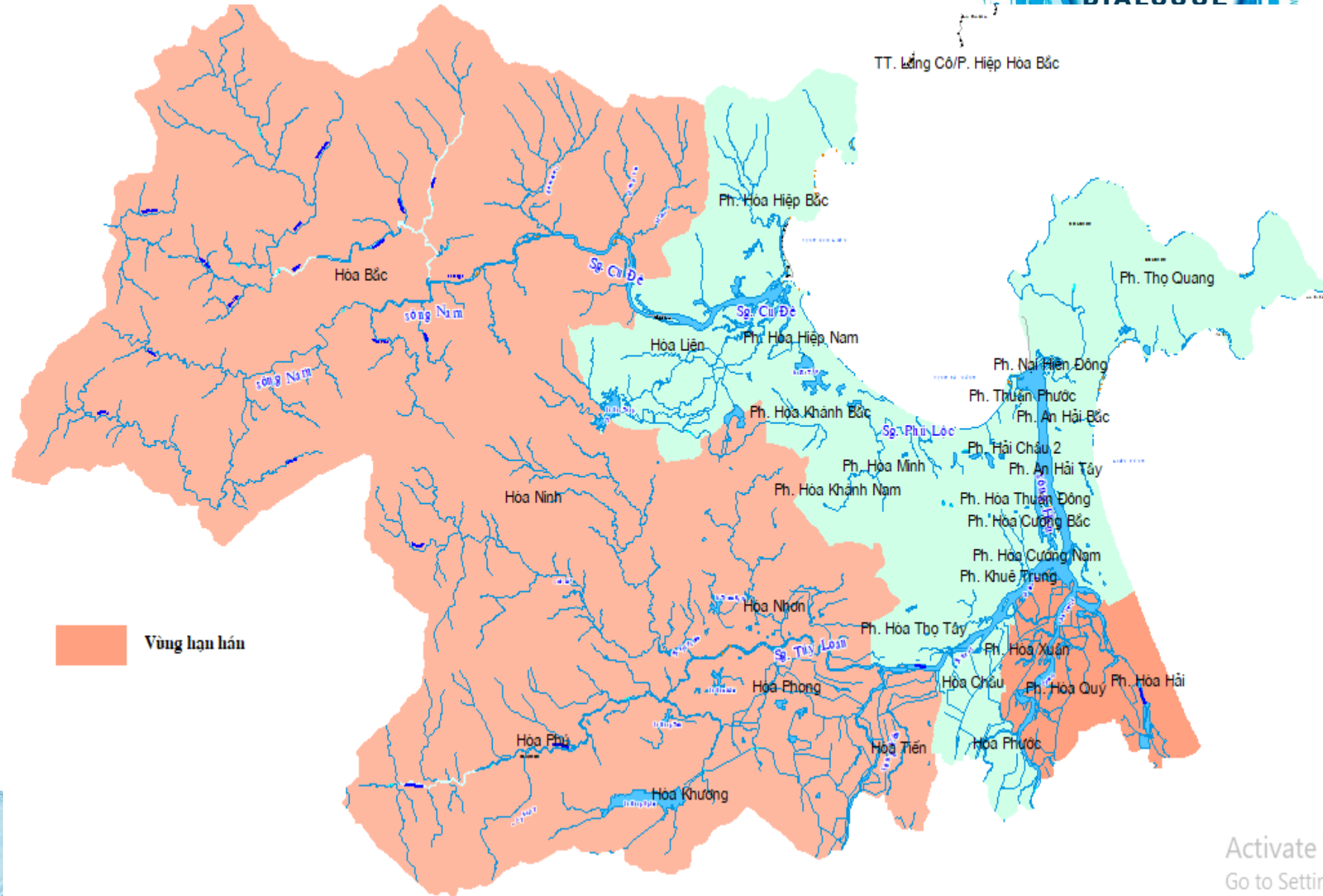


# II. CHALLENGES



## 2. Drought and water shortage

- The amount of **water in dry season**: about 2.4 billion m<sup>3</sup>/year. The **water demand accounts for 7.9% of the low flow and accounts for 12.5% of the driest month flow (April)**.
- **Groundwater sources are limited.**
- 95% of water supplied to Da Nang is exploited from the Vu Gia River.
- **lack of hydraulic works**





## II. CHALLENGES

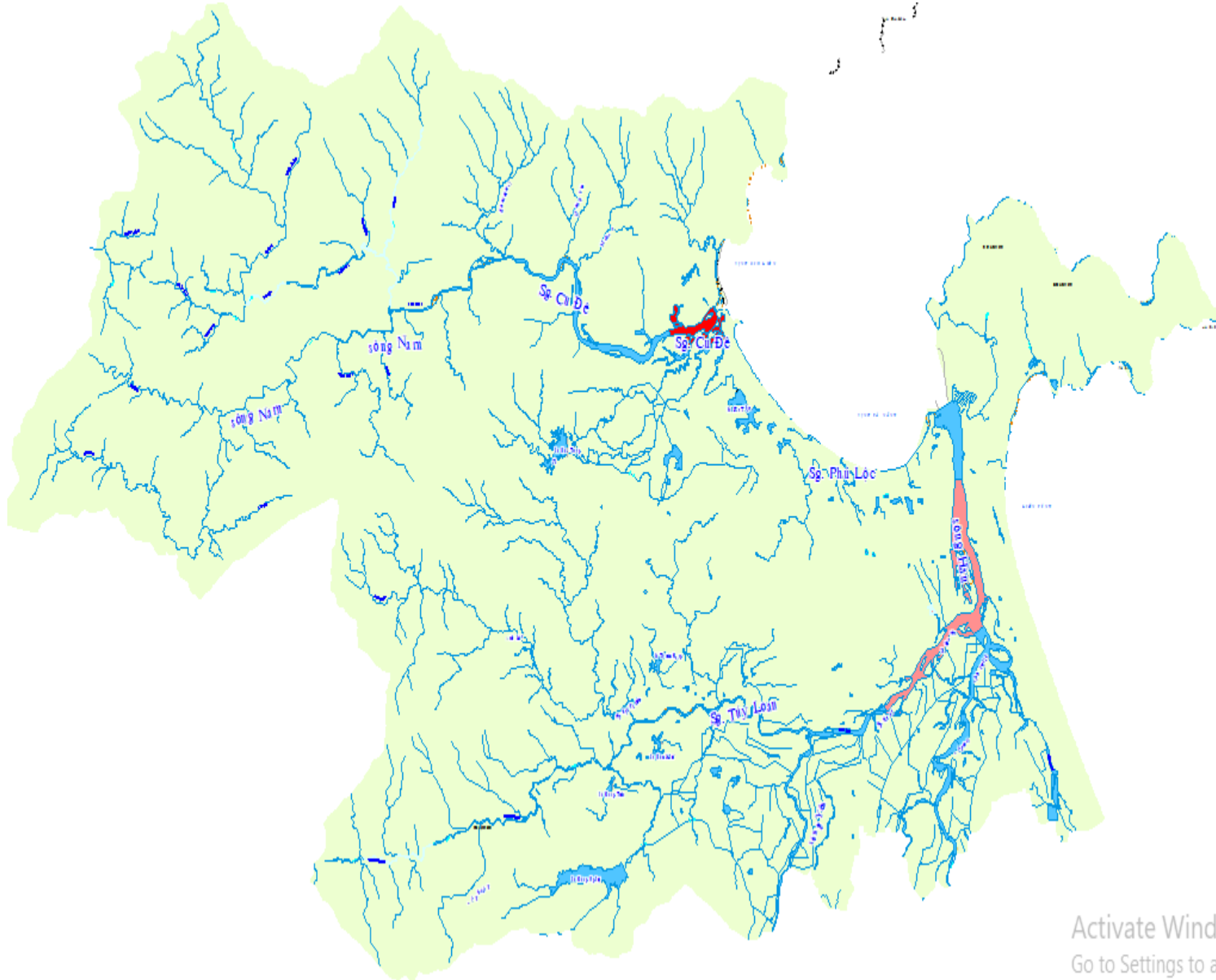


### 3. Pollution and salinity intrusion

- **Organic pollution**, microorganisms, oil and grease in rivers.
- Salinity intrusion reduced the ability to exploit water
- From 2010 to now, **salinity intrusion** in Cau Do river has taken place continuously causing the non-operation time of Cau Do pumping station is 100 days/year, particularly in 2013, the non operation time was 185 days.
- Ground water sources of Da Nang have small reserves. **Aquifers** in the downstream of Cu De river, Vinh Dien, Cam Le and Han rivers **were salinized** so they can not be used



## II. CHALLENGES



### 3. Pollution and salinity intrusion

- **Organic pollution,** microorganisms, oil and grease in rivers.
- Salinity intrusion caused the non-operation time of Cau Do pumping station.
- **Aquifers in the downstream were salinized**

*Map of organic pollution, microorganisms, oil and grease*



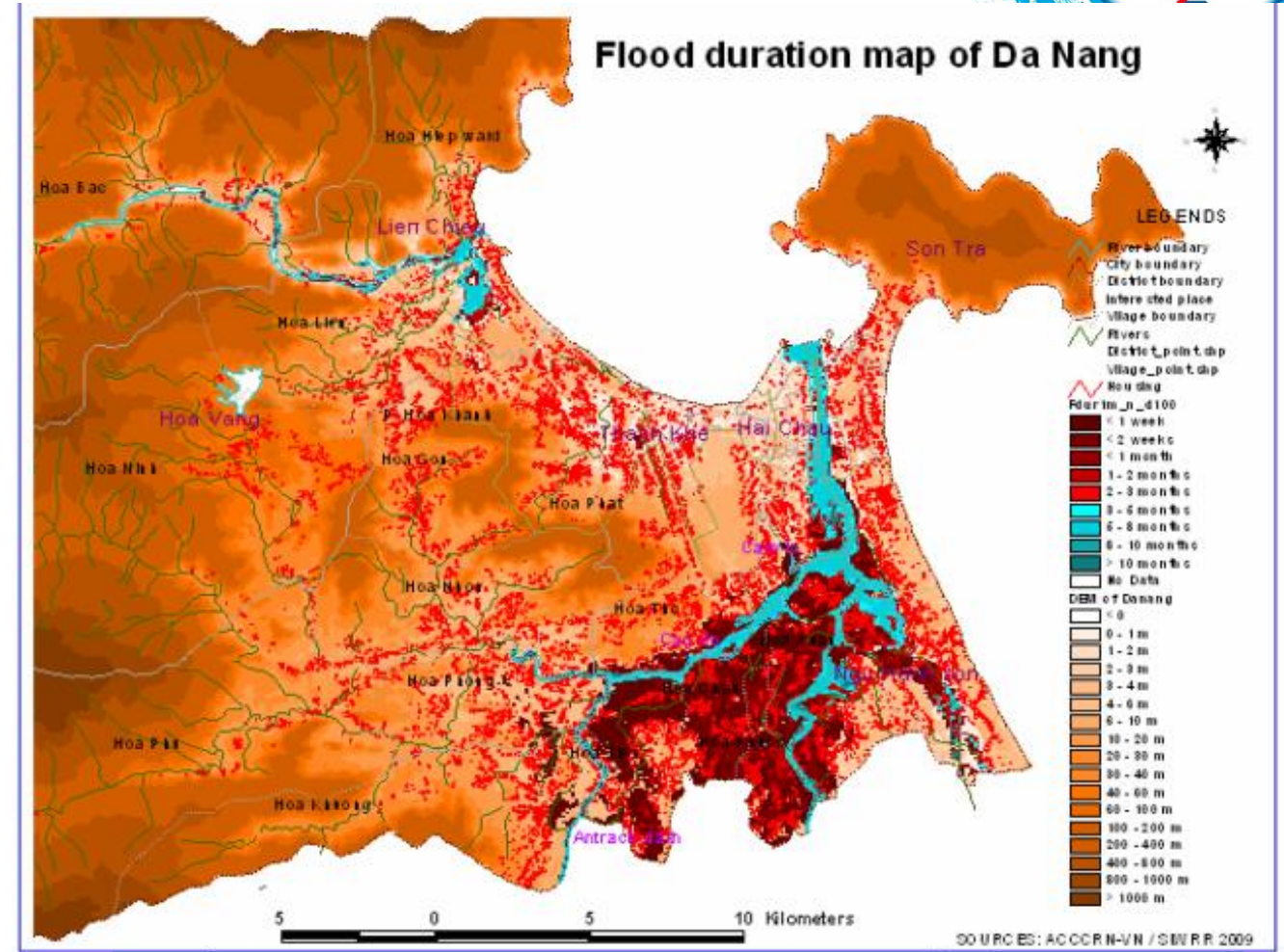
# II. CHALLENGES



## 5. Impacts of climate change

Climate change **increased rainfall and flood flows in the rainy season**, causing significant impacts on production and life of people living in Da Nang city as following:

- **Flash floods and landslides** in the mountains in the west of the city;
- **Increased inundation** depth, prolonged flooding time, damaging infrastructure in areas affected by floods;
- **Inundation in urban areas.**



Hình 21

Map of inundation with the water depth is over 1.0m

Act  
dâng 1.0.m.



# III. SOLUTIONS FOR SUSTAINABLE WATER USE AND MANAGEMENT



## 1. Short-term solutions

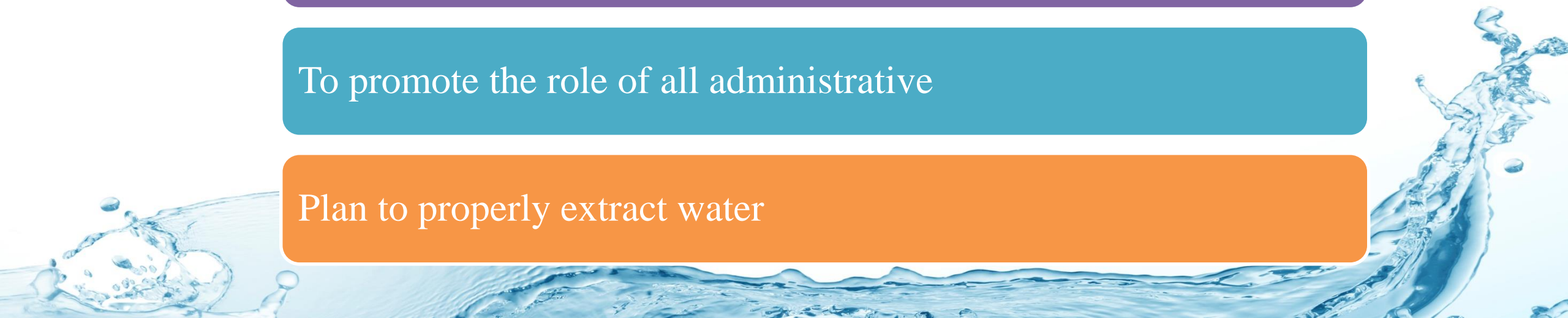
Propagation and education.

Monitoring water sources.

Store water

To promote the role of all administrative

Plan to properly extract water



# III. SOLUTIONS FOR SUSTAINABLE WATER USE AND MANAGEMENT



## 2. Long-term solutions:

### a) Group of solutions on laws and policies

- Review of the policy system
- Standards and technical-economic norms
- Regulations to encourage the collection and treatment of wastewater
- Mechanism to promote the socialization in water sector
- Water resources planning, which take into account the impacts of climate change;

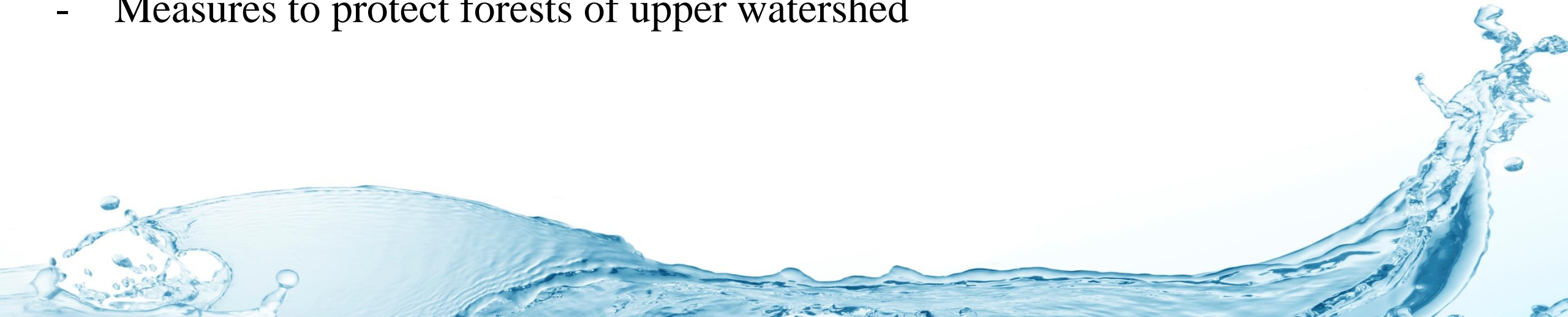


# III. SOLUTIONS FOR SUSTAINABLE WATER USE AND MANAGEMENT



## **b) Group of solutions on technologies and software for the management, protection and restoration and assessment of water resources**

- Technologies for monitoring and evaluating water resources
- Technologies to desalinate seawater.
- Technologies for treatment and restoration of polluted water sources;
- Enhance international cooperation;
- Measures to protect forests of upper watershed





# III. SOLUTIONS FOR SUSTAINABLE WATER USE AND MANAGEMENT



## c) Group of solutions on economy

- Mobilization of financial sources for investment from the state budget, private sectors and supports of international organizations for the management, exploitation and use of water.
- Set up and collect the natural tax, fees for the granting the right of water use, fees for using water resource monitoring data in order to generate income for the State budget and reinvest in the management of water exploitation and protection.



# III. SOLUTIONS FOR SUSTAINABLE WATER USE AND MANAGEMENT



## d) Group of solutions on propaganda and education

- Promote propaganda and education in order to raise awareness;
- Strengthening the inspection, supervision and clarification of responsibilities of sectors and administrative agencies;
- Integrate the information in protection and economic use of water resources in the general education programs
- Set criteria for protection and economic use of water



# III. SOLUTIONS FOR SUSTAINABLE WATER USE AND MANAGEMENT



## e) Group of solutions on benefit sharing

- Identification of objectives, benefits and responsibilities of relevant stakeholders in the protection and use of water resources;
- Mechanism for cooperation, benefit sharing, and responsibilities for localities using the shared water resources;
- Sharing information in water resources, water use allocation





# THANK YOU FOR LISTENING

