

# Study on Water Resource Accounting in Hainan

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## 1 Introduction

### 1.1 Problem statement

- > The water resource crisis in China is aggravating, and the quality of the environment for water is deteriorating.
- > Many rural areas face the threat of shortage of water resource.
- > To correctly recognize and evaluate the value of water and solve the problems of water resource by economic leverage, it is important to promote optimal allocation and sustainable utilization of water resource.
- > Evaluation of water resource is a main part of integrated environmental and economic accounting.

### 1.2 Main objectives

- > Accounting of Hainan water resources in quantity and value
- > Integration the changing value of water into its GDP component, to weigh Hainan sustainability of social and economic development.

### 1.3 Study area

- > Hainan island, located in the southernmost China, is the second biggest island in China.
- > There is abundant rainfall, average rainfall is 1758mm in several years of the whole island providing the water resources.
- > Hainan has 154 rivers moving independently into the sea, among which are 89 main streams and tributaries with more than 100 km<sup>2</sup> catchment.

## 3 Results

- > In figure 1, they are percentage data, i.e., physical quantity of water in various quality accounts for total quantity.
- > Figure 1 shows that the quality of Hainan surface water has been maintained well overall since 2001. Quality of grade 1 and 4 has basically kept no change; grade 2 has decrease at a small rate, and grade 3 has promoted a small rate. Water with good quality has been 97% of gross water resources since 2001, so there is no degradation trend.

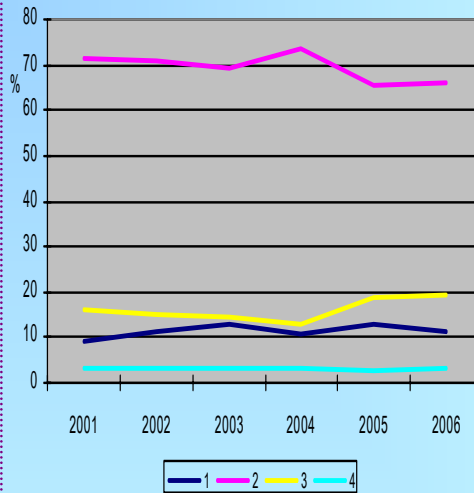


Figure 1 2001-2006 quality change of Hainan surface water  
Source: own calculation

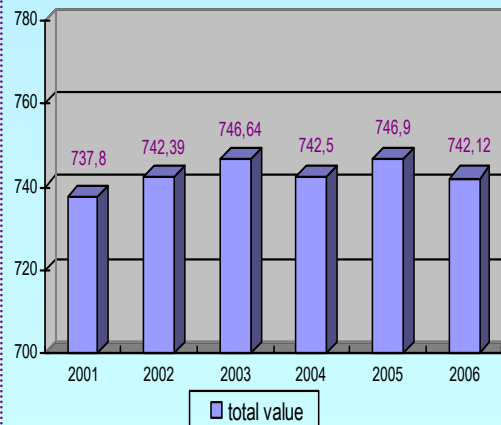


Figure 2 Hainan gross water value  
Source: own calculation

- > As figure 2 shows, Hainan's water value has increased overall since 2001, it augments more in 2003 and 2005 and reached the most in 2005, but reduced a small rate in 2006.

Table 1 adjustment of Hainan GDP by water accounting  
unit:100million yuan

	$V_t$	$\Delta V$	GDP	EDP	$\Delta V/GDP$ (%)
2001	737.80	32.75	566.05	598.80	5.79
2002	742.39	37.34	623.45	660.79	5.99
2003	746.64	41.59	691.69	733.28	6.01
2004	742.50	37.45	790.12	827.57	4.74
2005	746.90	41.85	905.03	946.88	4.62
2006	742.12	37.07	1052.43	1089.50	3.52

Note:  $\Delta V = V_t - V_0$ ,  $V_0$  is basic water value ;  
EDP=GDP+ $\Delta V$ (EDP, GeGDP)

Source: own calculation

- > We use the value of all Hainan water reaching grade 3 as a value of a baseline stock. According to annual reports of Hainan water resources, 50% of water amounts are usually 59,750 million M, so the base water value is 70,505 million yuan.
- > Table 1 shows that the water situation has been good and water value-added has been maintained at high levels; water value-added has been 5.11% of GDP from 2001 to 2006.

## 2 Methods

- > Physical accounting builds on physical units of water resources to study the change of quantity and quality of Hainan water resources.
- > Value accounting
  - ◇ surface water: restoration costs.
    - It serves to evaluate the price of surface water resources with different quality.
    - According to it the different objectives of usage and protection valuation problems are addressed. Surface water is divided into five grades: grade 1, grade 2, and grade 3 are suitable for drinking, grade 4 adapts to industrial sectors, grade 5 is mainly used in agricultural sectors. If the water quality is worse than that of grade 5, it is useless with the worst quality.

$$V = \sum Q * P$$

V means gross value of water resources; Q is the physical amount of water with different quality; P is the price of water with different quality (i.e. the restoration cost).

- ◇ underground water: market price  
market price = price of original water + water fee

- ◇ changing value of water resources:  
 $\Delta V = V_t - V_0$

$V_t$  means gross value of water resources in the t year;  $V_0$  is total value of water resources in base year.

## 4 Conclusion

- > Hainan achieves certain accomplishments on conservation of water resources and water environment, thus no environmental degradation can be detected, yet, such as resource value losses, etc..
- > Hainan does not use the traditional economic development model—economic development at the expense of environment and economy.
- > It pays great attention to protect its environment and natural resources while rapidly developing its society and economy, and practices as an "ecological province", as well as having a suitable development strategy.

