



# Eco-environmental Assessment in the Haihe Basin



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Haihe Basin is located between 35 ° ~43 ° N and 112 ° ~120 ° E. It neighbors the Inner Mongolia Plateau in the north, and Yellow River is the borderline in the south. It faces the Bohai Sea to the east and borders Shanxi Plateau in the west. Its area is 240,000 square kilometers and belongs to the warm temperate zone with a semi-humid and semi-arid climate. The whole river basin covers 8 provinces and municipalities including Beijing and Tianjin City, and divided into 35 water resources subregions (Fig.1). Haihe Basin is the region with high shortage of water resources. The demand of water resources is more and more great and it exceeds the carrying capacity of the water resources and eco-environment enormously. So the matter of restoring the eco-environment and keeping sound circles in Haihe Basin is crucial in order to achieve the sustainable development of basin's society and economy.



Fig.1 SUBREGION DISTRIBUTION IN HAIHE BASIN OF CHINA

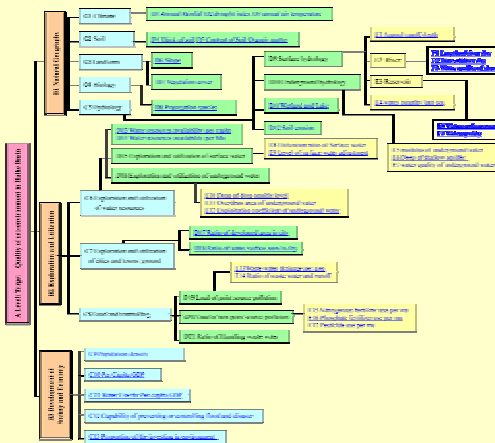


Fig.2 INDEXES SYSTEM OF ECO-ENVIRONMENT ASSESSMENT IN HAIHE BASIN

In order to achieve the target of restoring the eco-environment and keeping sound circles of Haihe Basin, it is necessary to make analysis and assessment of present and history eco-environment quality and its development trend in Haihe Basin. So based on the sufficient investigation and data analysis, the indexes system of eco-environment quality assessment are build up. The indexes system consists of 40 index factors which include three aspects: Natural Geography, Exploration and Utilization of Water Resources, Development of Society and Economy(Fig.2). The corresponding function and weight of each index is confirmed respectively according to their character and the graded value of basin's eco-environment quality is determined when the value of index is confirmed. The weight of index can be fixed on by method of Analytic Hierarchy Process combined with the method of scoring by specialist. The evaluation of the quality of basin's eco-environment is made by the comprehensive index method.

The ways of obtaining basic data and building function of each index factor are different. Fig.3-fig.4 are examples for the indexes of Groundwater Resources Model and Annual Runoff Depth. When their data are obtained form measurement or investigation, the data can be distributed to each subregion by GIS technique. Then the evaluation value of each index can be determined by each function. Assessment function of Groundwater Resources Model is shown as follows (GW – groundwater resources model , 10<sup>4</sup>m<sup>3</sup>/km<sup>2</sup>·a):

$$F(GW) = 25 + 75 \times \frac{GW}{30}, \quad 5 \leq GW \leq 30$$
$$F(GW) = 100, \quad GW > 30$$
$$F(GW) = 25, \quad GW < 5$$

Annual Runoff (mm)	Threshold value	Notation
≥ 1000	100	Very Wet
300	90	Wet
100	70	Semi-humidity
50	50	Normal
20	25	Drought

The evaluation value of Annual Runoff Depth are determined by the threshold value in above table.

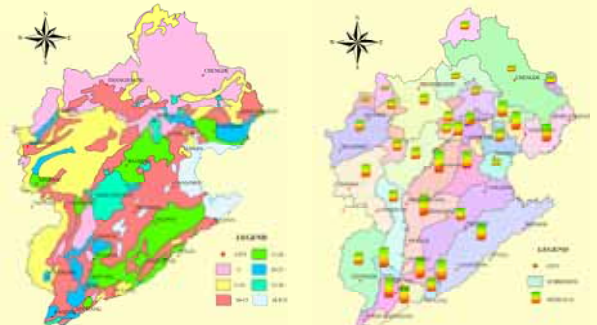


Fig.3 INDEX OF GROUNDWATER RESOURCE MODEL

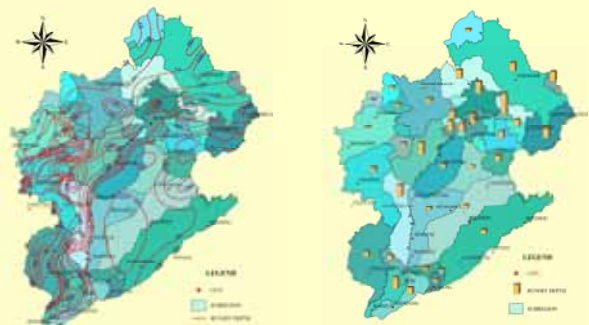


Fig.4 INDEX OF ANNUAL RUNOFF DEPTH (UNIT:MM)



Fig.5 ASSESSMENT RESULTS OF HAIHE BASIN IN DIFFERENT TIME

When the evaluation value and weight of each index is fixed, The evaluation of the eco-environment quality in each subregion as well as in whole Haihe Basin can be made by the comprehensive index method.

In order to find out the time - space variability of eco-environment quality in Haihe Basin, review assessment (1970), present assessment (2000) and forecast assessment (2030) are made respectively(Fig.5). So the status of the eco-environment quality of basin during different time as well as in different region can be mastered, and the development trend of eco-environment quality of basin can be learned by making comparison among assessment results in different time. All of these can provide support for the protection plan of the Haihe Basin's eco-environment.