REASONABLE ALLOCATION AND MANAGEMENT OF MULTI-WATER RESOURCES IN DALIAN CITY

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According to the statistic data, there are 300 cities short of water in China, more than 100 cities of which are serious water scarcity, such as Dalian. The quantity of water shortage was $4\times10^{11}m^3$ in Chinese city in 2000 (Ruan Guoling, 2004). The city short of water mainly locates the north and the littoral in China. The per capita water resource in Dalian is about 640 m^3. The per capita water resource is only 164 m^3 in downtown (the southern of Jinzhou) (Xu Baocheng, 1998). The fresh water is innate scarce, and the distribution of water resources is asymmetric. In order to alleviate the water shortage, the "Diverting water from Biliu River Reservoir to Dalian city" and "Diverting water from Yingna River Reservior to Dalian city" had been completed. However, with the enlargement of city range, the expediting of industrialization and the increasing of population in Dailan, the demand of water resources is increasing gradually; On the other hand, with the distance of diverting water from external region farther and farther, the cost will become more and more. Urban multi-water resources reasonable allocation is the available approach to alleviate urban water crisis and achieve the sustainable development of urban water resources

In this paper, the characteristics of multi-water resources in Dalian are analyzed in detail. From the point of view of systems analysis, the theory of water resources reasonable allocation has been discussed and researched, and a Multi-water resources system allocation model has been built. The fig 1 shows the frame of multi-water resources reasonable allocation system structure in Dalian city. The Multi-water resources (ground water, surface water, rain water, diverting water from external region, reuse water, seawater and so on) are reasonably allocated among multi-user (living, industry, agriculture, ecology environment and so on). The urban Multi-water resources reasonable allocation changes the traditional water supply pattern and enriches the water resources. The unconventional water resources, such as rainwater, reuse water and seawater, are taken as water resources. The principle of multi-water resources for multi-user is: the inferior water can not be supplied to the higher users, while the superior water can be supplied to the lower users. The order is superior water for the higher users. The superior water should be firstly given to higher users. If there is remnant, the superior water can be given to the lower users. Thus, through the reasonable allocation of multi-water resources, the integrated benefit of water resources has been exerted, and the conflict of water supply and demand has been effective settled. The urban Multi-water resources reasonable allocation is very important for alleviating the urban water scarcity, achieving the sustainable development of urban water resources, and improving the water environment in Dalian city.

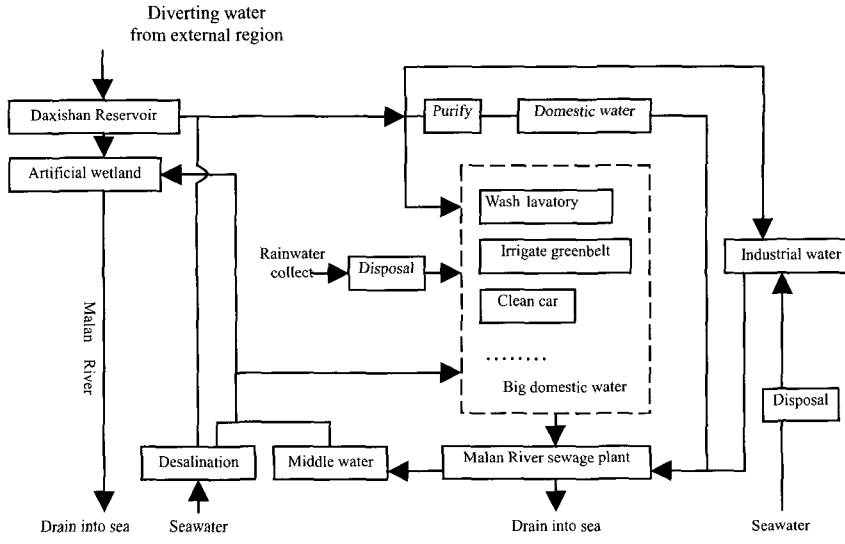

Fig. 1 Frame of multi-water resources reasonable allocation system structure in Dalian city

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