

## The valuation of service of recreation function of Dalinor National Natural Reserve

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**Introduction** Dalinor National Natural Reserve is located in the west of Keshketeng Banner of Chifeng City, Inner Mongolia Autonomous Region (IMAR). It covers a total area of 119,413.35 ha, and is in drought or semi-drought continental climatic zone. DNNR is a comprehensive natural reserve made up of different ecosystems including lakes, prairies, wetlands, and forests. Dalinor Lake in DNNR is regarded as the paradise of birds, covering an area of 238 km<sup>2</sup> between sandy lands and grasslands. DNNR was established in 1987 as a provincial natural reserve and was upgraded to a National Natural Reserve by the State Council of China in 1997. DNNR not only serves as an ideal resort for eco-tourism but also serves as an important scientific research base. The value of service of recreation function of DNNR depends heavily on the environmental quality that offers tourists various ecosystem amenities and opportunities for viewing wild plants and animals. So it is meaningful to value the recreation function of DNNR.

**Method and model** This paper values the service of recreation function of the DNNR using travel cost valuation method (TCM) approach which is widely applied to the valuation of all kinds of public goods and recreation activities (Xuedayuan, 1998). This method is specially appropriated for the evaluation of recreation function of ecosystems with low entrance fee or fee free and limited demand for the recreation activities. Based on the principles of TCM (Xuedayuan, 1998), the value of service of recreation function is the sum of total travel cost, consumer surplus, travel time value and other expenses. A regression model is used to determine the correlation between the visiting rate and the variables such as the population, annual wages, and travel cost and travel duration (Chenfu, Zhangjie, 2001). In light of correlation analysis, travel duration and travel cost are the most remarkable factors that affect visiting rate. However, travel duration can be transformed into time cost, i.e. opportunity cost of time, therefore the visiting rate is directly correlated with the travel cost. A questionnaire is developed and random sampling approach was used. More than 450 questionnaires were answered, of which 376 were reasonable. It is supposed that total population; annual average wage and travel duration keep stable, and travel cost 101 yuan, which is the expenses from the nearest place Keshketeng banner of Chifeng City to DNNR, is taken as basic expenses. With the increasing of travel cost, the amount of tourists decreases to zero. At this time, the highest cost is 2447 yuan (1 euro=10.7 yuan) according to our investigation, With the help of SAS software, a regression model of person-time and travel cost was established and tested based on the data collected.

$Y=16998-17.165996+0.004271 x^2$  Y: travel person-time in DNNR; X: increment of expenses According to Clawson-Knetsh curve

**Results** Total travel cost =  $\sum$ travel cost/person-time  $\times$  travel person-time in DNNR from every region = 58,883,580 yuan ;

$$CS = \int_p^{p_m} Y(X) dx = \int_{101}^{2447} (16998 - 17.165996x + 0.004271x^2) dx = 9,429,800 \text{ yuan}$$

CS: consumer surplus; x: total travel cost; Y(x): Clawson-knetch curve P<sub>m</sub>: travel cost at which there is no tourist in departing places; p: travel cost to and fro between the nearest departing region and DNNR.

The sum of total travel cost, consumer surplus, and travel time value and other expenses is 100,228,140 yuan. Not all of the travel cost of tourists should be included in the value of recreation function of DNNR; because 75% of 376 visitors visited DNNR for viewing and admiring prairies and Dalinor Lake. So the total value of service of recreation function of DNNR is 100,228,140  $\times$  75% = 75,171,100 yuan.

**Conclusions and discussion** It is estimated that the total value of the service of recreation function of DNNR is RMB 75,170,100, namely 629.5yuan/ha. Comparing with the value of recreation of Zhangjiajie National Forest Park 6051.07 yuan/ha and the value of recreation of Changbaishan Mountain Biosphere Reserve 2134 yuan/ha, the value of recreation of DNNR is on the low side. The main reason for this is possibly the difference among the actual value of them or the different methods adopted, which needs to be identified further. The result can be of some interest to both policy-making and compensating of natural resources of DNNR.

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