

# Chronological quantitative analysis of water use and wastewater discharge of industrial and domestic sectors in Japan and their estimation in Asian countries

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## 1.Objectives

The objectives of the study is to analyze the chronological quantitative characteristic of direct and indirect industrial water use and wastewater discharge in Japan, and to analyze the chronological quantitative characteristic of domestic water use and waste water discharge. The objectives also include the estimation of water use and wastewater discharge of Bangladesh, Cambodia, China, India, Indonesia, Laos, Malaysia, Nepal, Philippines, Thailand and Vietnam by analyzing and decomposing the influencing factors in Japan.

## 2.Method and Results

### (1) Chronological analysis of water use and wastewater discharge in Japan

The water use in the manufacturing sector in Japan increased in the rate of 300 m<sup>3</sup>/year from 1970 to 2010. The water intensity calculated based on value added (Purchasing Power Parity) decreased from 1975. By decomposing the influencing factors to intensity factor and structural factor, the intensity factor had a more significant negative effect towards the total water use intensity. Also, the pollution load intensity in Chemical products and Pulp and paper and wood products are the biggest among all sectors.

### (2) Chronological analysis of indirect water use and wastewater discharge in Japan using Input–Output table

The indirect water use rate (compares to the total water use which is the sum of direct and indirect water use) was higher in Processing and Assembly Industry than in Material Industry. Also, the indirect pollution load rate was 10% bigger than indirect water use rate in Chemistry and Electrical machinery sectors, which indicates that the pollution load in other sectors which provide the raw material to these sectors were more significant than in the concerned sectors.

### (3) Chronological analysis of domestic water use and wastewater discharge

The domestic water use in Japan peaked in 2007, which increased 100 (L/day/cap.) compare to 1975. In addition, wastewater treatment rate in 2012 increased 19.2% compared to 1999, which decreased 250 thousand tons of chemical oxygen demand (COD) pollution load.

### (4) Current Status and estimation of industrial and domestic water use and wastewater discharge in Asian countries

The result of relevance analysis indicated the high relevance of GDP/cap. with water use intensity in Japan. By applying the relevance to estimate the industrial water use and water withdrawal in Bangladesh, Thailand and India, it is found that the both industrial and manufacturing industrial water use will double increase in 2030 compare to 2010.