

Interregional Water Footprint Analysis between Japan and China

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1. Introduction

The 10th meeting of the Conference of the Parties (COP10) to the Convention on Biological Diversity (CBD) ended in Nagoya, Aichi Prefecture, on Oct. 30.2010. Previously, The Millennium Ecosystem Assessment (MA) concluded concludes that human activity is having a significant and escalating impact on the biodiversity of world ecosystems, reducing both their resilience and biocapacity. Additionally, MA included the sub-global assessment (SGA) that is the assessment of regional, watershed, state as well as the global scale. In Japan SATOYAMA SATOMI SGA is put into practice by using SGA framework. We chose the Hokkaido Tohoku Kanto-Chubu Hokuriku Nishi-nihon cluster as the area of SATOYAMA SATOMI SGA. Above all, Kanto-Chubu cluster has four sites that is Kanagawa Tochigi Chiba Tokyo and the scope of target is Tokyo Bay, Naka River, Ise Bay, Mikawa Bay. The author collaborates with the researcher of Kanagawa site and studies the impact of ecological system through the change of socio-economy of Kanagawa, Ishiro and Hasebe(2010).

Secondly the author expand this research framework into interregional relation about Kanto area, Ishiro(2011)

The Objective of this paper is to clarify the relation between economic activity and structure of water inducement among East Asian countries taking author's research one step further. Especially, having regard to the fact that trade with other country's region is essential to regional activity in recent years , the main purpose is to see how trading of each transnational region between Japan and China region affects the water inducement of each region.

There are previous study, Okadera, Fujita, Watanabe and Suzuki (2005), Shimoda Watanabe Yue , and Fujikawa(2009)that has common awareness of the issues. The former analyze water inducement by the Kanto interregional input output table they made. The latter analyze environmental load including water inducement by Asian international input output table. On the other hand, our study analyzes transnational interregional water inducement by the Transnational Interregional Input-Output Table between China and Japan dividing Kanto region into 11 regions¹.

¹ In this study we compile the transnational interregional Input-Output table based on The 2000 Transnational Interregional Input-Output Table between China and Japan

2. Previous study

There are many studies that analyze the CO₂ emission Land and Waste by using interregional input output tables. As for water, the studies of Niizawa(1988), Okadera, Fujita, Watanabe and Suzuki (2005), Shimoda Watanabe Yue , and Fujikawa(2009) are representative research in Japan. Or there is earlier research of input output study, Carter and Ireli(1970). Niizawa(1988) reveals the balance of water inducement between Chiba and Ibaraki by using regional input output tables. Judging from the result of this analysis he speculates the high water dependency of Tokyo to other region.

In Okadera, Fujita, Watanabe and Suzuki (2005) they target six regions including Tokyo as Tokyo Bay Basin and estimate the structure of water demand of this area by compiling the interregional input output table of six regions. They conclude water demand of Chiba Kanagawa Ibaraki is high compared to the one of Tokyo however water inducement from consumption of Tokyo derives from other region over 50 percent. In Ishiro(2011) we expand the geographical area from seven regions in Okadera, Fujita, Watanabe and Suzuki (2005) to eleven regions and expand the estimation of sectoral water use from Kanagawa in Ishiro and Hasebe(2010) to other regions. We said that Tokyo water inducement in its region by demand of other region is small however water inducement in other region such as Ibaraki and Chiba by demand of Tokyo is large. In Shimoda Watanabe Yue, and Fujikawa(2009), they analyze the embedded water trade with CO₂ energy land by using Asian international input output table made by IDE-JETRO. They concluded the maximum user of water is China, and the maximum transfer of embed water is transfer from China to Japan. Additionally Japan support oneself through domestic water about only 66%, they import largest amount of water from China. In Carter and Ireli(1970) , they calculate water transfer between Arizona and California by using two interregional input-output table between Arizona and California in 1958. They conclude in the actual trade of goods between Arizona and California export from California to Arizona is four times larger than import from Arizona to California, on the other hand in water transfer import from Arizona to California is three times larger than export from California to Arizona.

In this study, we expand the geographical area from Kanto region in Ishiro(2011) to other regions of Japan and China and expand the estimation of sectoral water use from Kanto region in Ishiro (2011) to other regions. In method of analysis we refer to the method of Shimoda Watanabe Yue, and Fujikawa(2009). Additionally we have same problem consciousness that in water transfer considering inter regional economic activity the region have large scale of economic activity depends on other region have water resource in earlier work of Carter and Ireli(1970).

made by IDE and Kanto interregional Input-Output table from Ishiro(2011).

3. Compilation of data

3-1 interregional input-output table

We compile our transnational interregional input-output table between Japan and China based on the transnational interregional input-output table between Japan and China (TIIOT) made by IDE and Kanto interregional input-output table made by Ishiro(2011). Specifically we divide Kanto area of TIIOT into 11 regions by information of Kanto interregional input-output table. The procedure of division is as follows. 1) In intermediate transaction within Kanto area we divide Kanto area by information of Kanto interregional input-output table. 2) In transaction between Kanto and other region of Japan we divide Kanto area from agricultural sector to manufacturing sector by information of census of logistics in Japan. We divide from electricity to services sector by assumption that trading from one region to another region depends on the volume of demand. 3) In transaction between Kanto and foreign country including the Chinese region we divide Kanto area by assumption that trading from one region to another region depends on the volume of demand.

3-2 water use

Firstly we estimate the sectoral water use data in Japanese region by the same method as Ishiro(2011) that it estimate the data from cultivated acreage, water use of manufacturing and unit water use data from Tsurumaki and Noike(1997). Secondly we estimate water use data in Chinese region from the data of gazette of Chinese water resources. We drive the water use data of other country from Statistical Yearbook for Asia and the Pacific 2007 by United Nations ESCAP and The World's Water 2008-2009 Data by Pacific institute².

² In this paper we are not able to collect the water use data of Taiwan. Therefore we use the unit water use of Korea for Korea and Taiwan sector.

Figure1 Table type of Interregional Input-Output Table (intermediate Part)

		Intermediate sector																											
		ASEANS		China					Korea and Taiwa		Japan												U.S.A						
		Dongbei	Huabei	Huadong	Huanan	Huazhong	Xibei	Xinan	Hokkaido	Tohoku	Tokyo	Kanagawa	Chiba	Saitama	Ibaraki	Tochigi	Gunma	Niigata	Nagano	Ferriari	Shizuoka	Chubu	Kinki	Chugoku	Shikoku	Kyushu	U.S.A		
Intermediate sector	ASEANS																												
	China	Dongbei																											
		Huabei																											
		Huadong																											
		Huanan																											
		Huazhong																											
	Xibei																												
	Xinan																												
	Korea and Taiwan	Hokkaido																											
		Tohoku																											
	Japan	Kanto	Tokyo																										
			Kanagawa																										
			Chiba																										
			Saitama																										
Ibaraki																													
Tochigi																													
Gunma																													
Niigata																													
Nagano																													
Ferriari																													
Shizuoka																													
Chubu																													
Kinki																													
Chugoku																													
Shikoku																													
Kyushu																													
U.S.A																													
International Freight and Insurance																													
Import From ROW																													
Duties and Import Tax																													
Value Added																													
Total Input																													

Figure1 Table type of Interregional Input-Output Table(Final demand Part)

		Final Demand																											Export to ROW	Imports	Total Output
		ASEANS		China					Korea and Taiwa		Japan												U.S.A								
		Dongbei	Huabei	Huadong	Huanan	Huazhong	Xibei	Xinan	Hokkaido	Tohoku	Tokyo	Kanagawa	Chiba	Saitama	Ibaraki	Tochigi	Gunma	Niigata	Nagano	Ferriari	Shizuoka	Chubu	Kinki	Chugoku	Shikoku	Kyushu	U.S.A				
Intermediate sector	ASEANS																														
	China	Dongbei																													
		Huabei																													
		Huadong																													
		Huanan																													
		Huazhong																													
	Xibei																														
	Xinan																														
	Korea and Taiwan	Hokkaido																													
		Tohoku																													
	Japan	Kanto	Tokyo																												
			Kanagawa																												
			Chiba																												
			Saitama																												
Ibaraki																															
Tochigi																															
Gunma																															
Niigata																															
Nagano																															
Ferriari																															
Shizuoka																															
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Kinki																															
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Kyushu																															
U.S.A																															
International Freight and Insurance																															
Import From ROW																															
Duties and Import Tax																															

Figure 2 Classification of regions in China

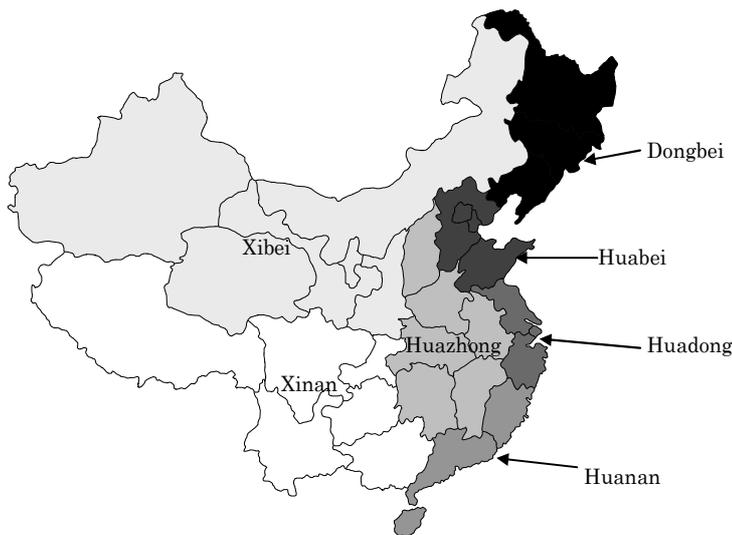


Figure 3 Classification of regions in Japan

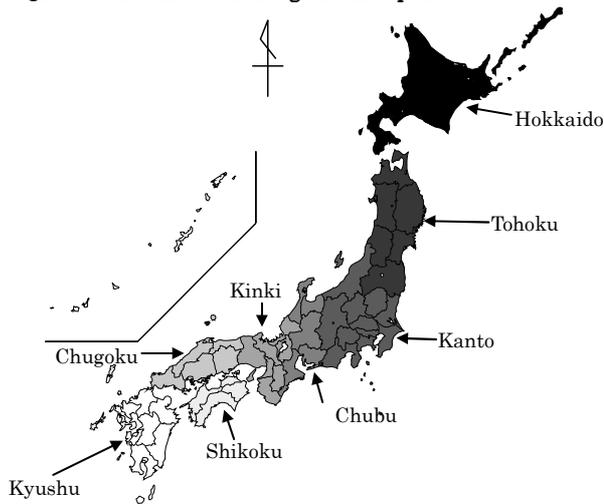


Figure 4 Classification of regions in Kanto



Figure 5 Regional classification

Asean5		Indonesia	Malaysia	the Philippines	Singapore	Thailand			
China	Dongbei	Liaoning	Jilin	Heilongjiang					
	Huabei	Beijing	Tianjin	Hebei	Shandong				
	Huadong	Shanghai	Jiangsu	Zhejiang					
	Huanan	Fujian	Guangdong	Hainan					
	Huazhong	Shanxi	Anhui	Jiangxi	Henan	Hubei	Hunan		
	Xibei	Inner Mongolia	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang		
	Xinan	Guangxi	Chongqing	Sichuan	Guizhou	Yunnan	Tibet		
East Asia		Korea	Taiwan						
Japan	Hokkaido	Hokkaido							
	Tohoku	Aomori	Iwate	Miyagi	Akita	Yamagata	Fukushima		
	Kanto	Tokyo	Kanagawa	Chiba	Saitama	Ibaraki	Tochigi	Gunma	Niigata
	Chubu	Nagano	Yamanashi	Shizuoka					
	Chubu	Toyama	Ishikawa	Gifu	Aichi	Mie			
	Kinki	Fukui	Shiga	Kyoto	Osaka	Hyogo	Nara	Wakayama	
	Chugoku	Tottori	Shimane	Okayama	Hiroshima	Yamaguchi			
	Shikoku	Kagawa	Ehime	Kochi	Tokushima				
Kyushu	Fukuoka	Saga	Nagasaki	Kumamoto	Oita	Miyazaki	Kagoshima	Okinawa	
U.S.A	the United States								

Figure 6 Sector classification

1	Agriculture, livestock, forestry and fishery
2	Mining and quarrying
3	Household consumption products(Life-related manufacturing products)
4	Basic industrial materials(Primary makers' manufacturing products)
5	Processing and assembling(Secondary makers' manufacturing products)
6	Electricity, gas and water supply
7	Construction
8	Trade
9	Transportation
10	Services

4. The models

We use basically the same model of the one of Ishiro (2011) refer to the model of Shimoda Watanabe Yue, and Fujikawa(2009).

We indicate the model of simplified version about two endogenous regions and one exogenous region. The equation (1) denote as follows.

$$\begin{bmatrix} \mathbf{x}_1 \\ \mathbf{x}_2 \end{bmatrix} = \begin{bmatrix} \mathbf{A}_{11} & \mathbf{A}_{12} \\ \mathbf{A}_{21} & \mathbf{A}_{22} \end{bmatrix} \begin{bmatrix} \mathbf{x}_1 \\ \mathbf{x}_2 \end{bmatrix} + \begin{bmatrix} \mathbf{f}_{11} & \mathbf{f}_{12} & \mathbf{f}_{13} \\ \mathbf{f}_{21} & \mathbf{f}_{22} & \mathbf{f}_{23} \end{bmatrix} \quad (1)$$

\mathbf{x}_i denotes domestic products of i regions, \mathbf{A}_{ij} denotes input coefficient if $i=j$ it represents intermediate goods within this region, if $i \neq j$ input coefficient of import intermediate goods from i region to j region. \mathbf{f}_{ij} denotes final demand of j region about the goods of i region. \mathbf{f}_{i3} denotes the export to exogenous region. \mathbf{I} denotes unit matrix.

If we development equation (1), we get equation (2) as follows.

$$\begin{bmatrix} \mathbf{x}_1 \\ \mathbf{x}_2 \end{bmatrix} = \left[\mathbf{I} - \begin{bmatrix} \mathbf{A}_{11} & \mathbf{A}_{12} \\ \mathbf{A}_{21} & \mathbf{A}_{22} \end{bmatrix} \right]^{-1} \begin{bmatrix} \mathbf{f}_{11} & \mathbf{f}_{12} & \mathbf{f}_{13} \\ \mathbf{f}_{21} & \mathbf{f}_{22} & \mathbf{f}_{23} \end{bmatrix} = \begin{bmatrix} \mathbf{B}_{11} & \mathbf{B}_{12} \\ \mathbf{B}_{21} & \mathbf{B}_{22} \end{bmatrix} \begin{bmatrix} \mathbf{f}_{11} & \mathbf{f}_{12} & \mathbf{f}_{13} \\ \mathbf{f}_{21} & \mathbf{f}_{22} & \mathbf{f}_{23} \end{bmatrix} \quad (2)$$

If \mathbf{w}_i denotes unit of water use of i region, \mathbf{h}_i represents water intensity equation (3) as follows.

$$\begin{bmatrix} \mathbf{h}_1 & \mathbf{h}_2 \end{bmatrix} = \begin{bmatrix} \mathbf{w}_1 & \mathbf{w}_2 \end{bmatrix} \begin{bmatrix} \mathbf{B}_{11} & \mathbf{B}_{12} \\ \mathbf{B}_{21} & \mathbf{B}_{22} \end{bmatrix} \quad (3)$$

About water inducement in each region, we divide the final demand of equation (2) into region 1 region 2 and region3 and if \mathbf{W}_i denotes diagonal matrix of \mathbf{w}_i , we get equation (4) as follows.

$$\mathbf{L} = \begin{bmatrix} \mathbf{W}_1 & 0 \\ 0 & \mathbf{W}_2 \end{bmatrix} \begin{bmatrix} \mathbf{B}_{11} & \mathbf{B}_{12} \\ \mathbf{B}_{21} & \mathbf{B}_{22} \end{bmatrix} \begin{bmatrix} \mathbf{f}_{11} + \mathbf{f}_{12} + \mathbf{f}_{13} \\ \mathbf{f}_{21} + \mathbf{f}_{22} + \mathbf{f}_{23} \end{bmatrix} \quad (4)$$

\mathbf{L} denotes two by three matrixes. The column side of the matrix means the region that generates final demand. The Row side of the matrix means the region that is done by water inducement. In the analysis of this thesis there are 28 endogenous regions and 1 exogenous regions including rest of the world therefore \mathbf{L} denotes 28 by 29 matrixes.

5. The results

In this chapter we summarize the analysis of water footprint of between Japan and China. **Figure 7** shows the result of calculation based on equation (4). Grey cells shows the diagonal factor that represents water inducement of its own demand in its own region. Furthermore in the row direction **Figure 7** shows the water inducement that occurs in the other regions based on demand in its region in the column direction water

inducement that occurs in its region based on demand in other regions. For convenience of reference we aggregate the Kanto 11 region in **Figure 7**. Additionally we shows **Figure 7** that is the disaggregated version of figure

First of all we focus on Chinese part. In Huazhong there are 12 billion cubic meter of water inducement in its region out of water demand in its region. Additionally in Xinan there are also large amount of water inducement in its region out of water demand in its region. However the water inducement in other region of China and Japan by water demand of Huazhong or Xinan is comparatively small. On the other hand in Huadong and Huanan water demand of these regions cause comparatively large water inducement in other region like Huazhong and moreover certain amount of water inducement in Japanese region like Kanto and Kinki. For that reason Huadong and Huanan have large dependency on water resources of other region such as Huazhong and have a few dependencies on water resources of other country compared to other Chinese region.

Secondly we focus on Japanese part. The water demand of Kanto caused large water inducement in other region like Tohoku Hokkaido Chubu and even Huadong. Additionally the water inducement in the U.S.A by the demand of Kanto is largest amount compared to other region. Though it is not as large as Kanto, Kinki denotes the same tendency of Kanto. As a whole Kanto and Kinki have large dependency on water resources of rest of Japan and other countries. On the other hand Tohoku assume the water demand of Kanto and Kinki. However water inducement in Kanto by demand of Kinki and Chubu have some level. For that reason it is not the case that Kanto unilaterally depend on water resources of other region. As for the relation of water inducement between Japan and China each region of Japan unilaterally depends on water resources of each region of China.

Thirdly we focus on Kanto part in **Figure 8**. In water inducement within Kanto region the result is the same as Ishiro(2011) that analyze water footprint within Kanto region by using Kanto interregional input-output table. In the next place we focus attention on the relation between Kanto and other region. It is found that the water inducement of Tohoku by demand of Kanto is attributed to the demand of Tokyo Kanagawa Saitama Chiba. Furthermore the water inducement of Huadong in China by demand of Kanto is similarly attributed to the demand of Tokyo Kanagawa Saitama Chiba. Additionally the water inducement of the U.S.A by demand of Kanto is mainly attributed to the demand of Tokyo and Kanagawa. The water inducement of Kanto by demand of other Japanese region such as Kinki and Chubu is attributed to the water inducement of Niigata.

We plot the information of **Figure 7 and Figure 8** on geographical information for the sake of understandable way. **Figure 9** shows the water inducement by demand of Tokyo

in each region of Japan and China. **Figure 10** shows the water inducement by demand of Kinki in each region of Japan and China. **Figure 11** shows the water inducement by demand of Huadong in each region of Japan and China. We can see the water inducement in each region by the demand of the region that is noted on the map including its own region.

Figure 9 Water Inducement by demand of Tokyo in Japan and China

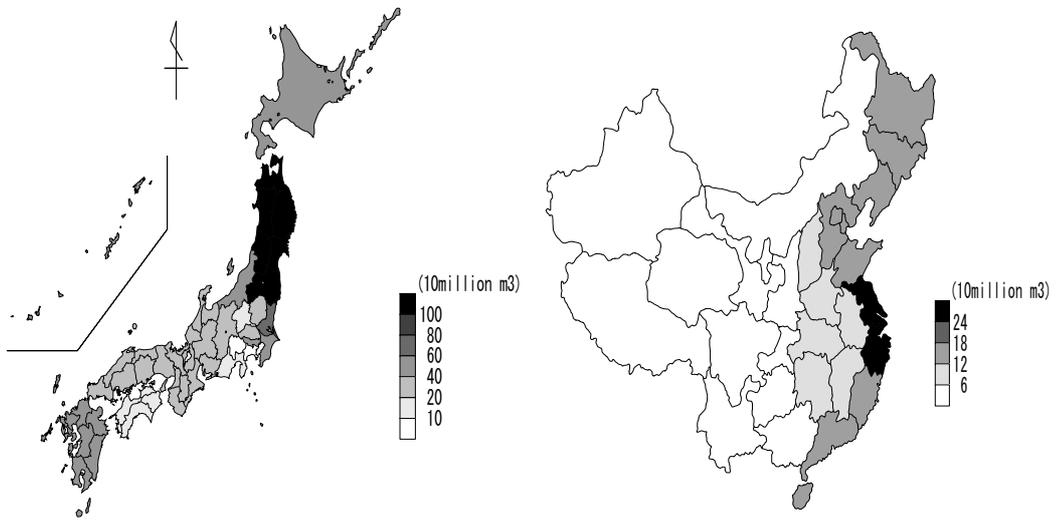


Figure 10 Water Inducement by demand of Kinki in Japan and China

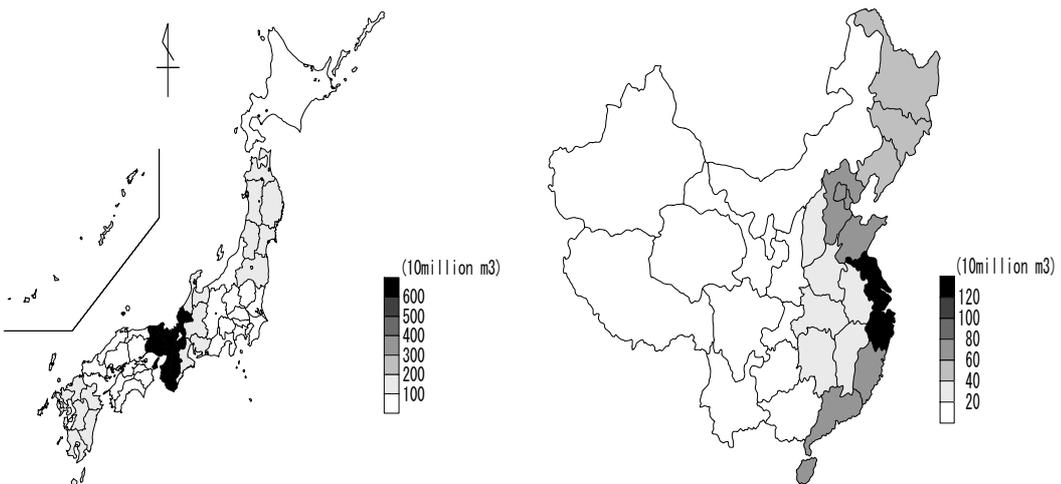
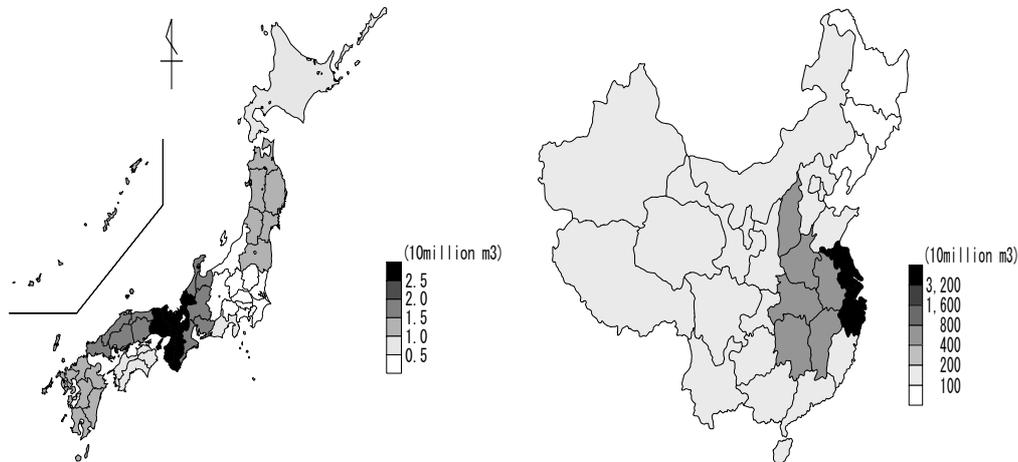


Figure 11 Water Inducement by demand of Huadong in Japan and China



6. Conclusion

In this study after we made Transnational Interregional input-output table that Kanto region is divided into 11 regions and made the sectoral water usage data in accordance with such input output table we analyze the transnational interregional water inducement between Japan and China. The result of this study is as follows.

In China Huazhong have large water inducement mainly by demand of Huadong and Huanan. For that reason Huazhong assume the water demand of Huadong and Huanan. Additionally water demand of these regions causes comparatively large water inducement in other region like Huazhong and moreover certain amount of water inducement in Japanese region like Kanto and Kinki.

In Japan the water demand of Kanto caused large water inducement in other region like Tohoku Hokkaido Chubu and even Huadong. Additionally the water inducement in the U.S.A by the demand of Kanto is largest amount compared to other region. Secondly Tohoku assume the water demand of other Japanese region. As for the relation of water inducement between Japan and China each region of Japan unilaterally depends on water resources of each region of China.

In Kanto region the water inducement of Tohoku by demand of Kanto is attributed to the demand of Tokyo Kanagawa Saitama Chiba. Furthermore the water inducement of Huadong in China by demand of Kanto is similarly attributed to the demand of Tokyo Kanagawa Saitama Chiba.

This study shows the transnational interregional water footprint relation between Japan and China. These results request that considering the whole water resources between Japan and China, the region that gives other regions the burden of water use should work on conservation and maintenance of water environment in the region that receives the burden of water use by more transnational interregional aspects.

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Figure 7 Water Inducement of each regions and countries (Kanto aggregated)

unit:100million m³

	ASEAN	Dongbei	Huabei	Huadong	Huanan	Huazhong	Xibei	Xinan	Korea and Taiwan	Hokkaido	Tohoku	Kanto	Chubu	Kinki	Chugoku	Shikoku	Kyushu	U.S.A	ROW	Total
ASEAN	2163.8	1.9	6.3	9.1	12.1	1.7	0.9	1.3	47.6	3.9	5.3	70.8	17.8	32.0	6.1	4.0	15.0	236.5	570.8	3207.2
Dongbei	2.2	389.5	10.3	6.4	3.2	7.0	4.4	3.0	5.0	0.3	0.4	8.3	2.4	5.8	0.8	0.3	1.9	8.7	26.4	486.5
Huabei	5.1	16.3	286.6	18.7	11.4	25.4	9.1	8.0	7.5	0.4	0.4	9.9	3.0	7.1	1.0	0.3	2.3	19.8	48.4	480.7
Huadong	5.0	11.1	16.4	384.4	19.7	29.5	7.5	10.1	7.1	0.6	0.6	17.4	5.3	12.2	1.6	0.5	3.3	40.8	99.4	672.6
Huanan	7.0	6.8	6.9	15.5	399.5	16.4	5.2	12.9	4.5	0.3	0.4	9.0	2.6	6.1	0.8	0.3	1.9	62.3	137.2	695.6
Huazhong	2.2	32.3	49.6	75.7	66.0	1280.1	35.4	47.9	2.6	0.2	0.2	5.4	1.6	3.6	0.5	0.2	1.0	20.2	52.1	1676.8
Xibei	0.9	12.5	17.6	11.6	11.1	26.7	550.8	18.1	1.1	0.1	0.1	2.1	0.6	1.4	0.2	0.1	0.4	4.8	18.5	678.5
Xinan	0.9	4.7	5.7	10.1	18.8	17.8	8.8	716.1	0.7	0.0	0.1	1.2	0.3	0.8	0.1	0.0	0.2	5.6	17.8	809.8
Korea and Taiwan	2.0	0.3	0.7	0.9	1.3	0.2	0.1	0.1	136.0	0.1	0.1	2.5	0.6	1.1	0.7	0.1	0.7	9.7	29.2	186.5
Hokkaido	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2	38.2	3.3	19.9	3.8	6.1	1.5	0.7	3.1	0.5	1.1	78.8
Tohoku	0.4	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.5	6.5	61.0	57.8	8.3	14.7	3.4	2.1	5.7	1.5	4.5	166.9
Kanto	1.0	0.1	0.1	0.3	0.2	0.0	0.0	0.0	1.1	4.8	10.5	126.5	11.0	14.3	3.5	2.0	7.5	3.5	5.3	192.0
Chubu	0.5	0.1	0.1	0.2	0.1	0.0	0.0	0.0	0.5	1.8	2.5	19.2	37.1	10.3	2.2	1.5	3.8	2.4	4.9	87.3
Kinki	0.7	0.1	0.1	0.3	0.1	0.0	0.0	0.0	0.8	1.5	2.5	13.0	6.2	63.4	3.3	2.1	3.9	2.2	4.0	104.2
Chugoku	0.4	0.1	0.1	0.2	0.1	0.0	0.0	0.0	0.8	1.1	1.9	12.1	3.1	8.3	26.6	2.7	6.7	1.1	3.7	69.2
Shikoku	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.5	1.1	5.7	2.6	5.6	2.9	10.6	1.9	0.4	1.9	33.6
Kyushu	0.4	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.6	1.3	2.3	17.2	3.7	11.9	6.0	1.5	54.8	1.4	4.0	105.4
U.S.A	22.1	2.0	5.3	5.6	4.1	1.1	0.5	0.8	41.4	4.4	5.0	52.3	9.7	19.8	4.7	1.8	9.4	3961.7	624.8	4776.5
Total	2214.9	477.9	406.0	539.3	548.1	1406.2	622.8	818.5	258.2	66.2	97.8	450.3	119.5	224.7	65.8	31.0	123.5	4383.4		

Figure 8 Water Inducement of each regions and countries (Kanto disaggregated)

unit:100million m³

		Kanto																		ROW	Total
		Hokkaido	Tohoku	Tokyo	Kanagwa	Chiba	Saitama	Ibaraki	Tochigi	Gunma	Niigata	Nagano	Yamanashi	Shizuoka	Chubu	Kinki	Chugoku	Shikoku	Kyushu	ROW	Total
ASEAN		3.9	5.3	15.4	12.5	8.6	10.3	5.0	4.1	3.6	3.3	2.9	1.1	4.0	17.8	32.0	6.1	4.0	15.0	570.8	725.8
Dongbei		0.3	0.4	1.5	1.6	1.1	1.2	0.6	0.6	0.5	0.4	0.3	0.1	0.4	2.4	5.8	0.8	0.3	1.9	26.4	46.8
Huabei		0.4	0.4	1.8	1.9	1.3	1.5	0.7	0.7	0.6	0.5	0.4	0.2	0.5	3.0	7.1	1.0	0.3	2.3	48.4	72.8
Huadong		0.6	0.6	2.9	3.4	2.2	2.5	1.2	1.3	1.1	0.9	0.8	0.3	0.8	5.3	12.2	1.6	0.5	3.3	99.4	140.9
Huanan		0.3	0.4	1.6	1.7	1.1	1.2	0.6	0.8	0.6	0.4	0.4	0.1	0.4	2.6	6.1	0.8	0.3	1.9	137.2	158.6
Huazhong		0.2	0.2	0.9	1.1	0.7	0.8	0.4	0.4	0.4	0.3	0.2	0.1	0.2	1.6	3.6	0.5	0.2	1.0	52.1	64.6
Xibei		0.1	0.1	0.3	0.4	0.3	0.3	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.6	1.4	0.2	0.1	0.4	18.5	23.4
Xinan		0.0	0.1	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.3	0.8	0.1	0.0	0.2	17.8	20.6
Korea and Taiwan		0.1	0.1	0.5	0.5	0.3	0.3	0.2	0.2	0.1	0.1	0.1	0.0	0.1	0.6	1.1	0.7	0.1	0.7	29.2	35.1
Hokkaido		38.2	3.3	5.5	2.6	2.6	3.1	1.5	0.7	1.3	0.7	0.5	0.5	1.0	3.8	6.1	1.5	0.7	3.1	1.1	77.8
Tohoku		6.5	61.0	11.9	8.6	6.2	9.7	5.1	3.4	3.0	4.2	1.8	0.6	3.1	8.3	14.7	3.4	2.1	5.7	4.5	164.0
Kanto	Tokyo	0.2	0.4	5.5	0.5	0.3	0.7	0.2	0.1	0.1	0.1	0.1	0.0	0.1	0.5	0.6	0.2	0.1	0.4	0.5	10.9
	Kanagwa	0.3	0.4	0.2	3.2	0.5	0.3	0.1	0.1	0.1	0.1	0.1	0.0	0.2	0.4	0.5	0.2	0.1	0.3	0.4	7.5
	Chiba	0.6	1.3	4.3	1.4	6.7	1.2	1.4	0.3	0.4	0.3	0.2	0.1	0.3	1.1	1.5	0.4	0.2	0.8	0.7	23.1
	Saitama	0.3	0.5	3.0	0.8	0.9	5.2	0.5	0.2	0.5	0.1	0.1	0.0	0.1	0.6	0.8	0.2	0.2	0.4	0.3	14.7
	Ibaraki	0.6	1.8	6.9	1.5	2.2	1.5	4.6	0.8	0.8	0.2	0.2	0.1	0.4	1.3	1.8	0.5	0.2	1.4	0.6	27.1
	Tochigi	0.6	1.2	3.3	1.5	1.0	3.0	0.8	4.8	1.8	0.6	0.3	0.1	0.3	1.2	1.7	0.4	0.2	1.0	0.4	24.1
	Gunma	0.2	0.4	1.1	0.5	0.4	0.7	0.5	0.3	2.2	0.1	0.1	0.0	0.1	0.6	1.4	0.2	0.1	0.3	0.3	9.5
	Niigata	1.1	3.1	4.4	1.4	0.9	2.2	0.6	0.8	0.7	11.1	1.5	0.1	0.3	2.4	3.0	0.6	0.4	1.2	0.8	36.5
	Nagano	0.3	0.5	3.6	0.6	0.5	0.8	0.2	0.1	0.3	0.4	2.3	0.2	0.2	1.2	1.2	0.2	0.1	0.5	0.3	13.3
	Yamanashi	0.1	0.1	0.7	0.1	0.1	0.3	0.0	0.0	0.0	0.0	0.1	0.5	0.1	0.1	0.2	0.0	0.0	0.1	0.1	2.8
Shizuoka	0.6	0.8	1.1	1.6	0.8	1.0	0.4	0.2	0.2	0.2	0.3	0.2	2.7	1.6	1.6	0.5	0.3	1.0	1.0	16.0	
Chubu	1.8	2.5	3.8	2.8	1.9	2.5	1.0	0.6	0.7	1.0	1.6	0.6	2.7	37.1	10.3	2.2	1.5	3.8	4.9	83.4	
Kinki	1.5	2.5	2.7	2.2	1.7	2.1	1.0	0.5	0.5	0.5	0.5	0.2	1.0	6.2	63.4	3.3	2.1	3.9	4.0	99.9	
Chugoku	1.1	1.9	2.3	2.2	1.5	1.8	0.8	0.4	0.4	0.4	0.6	0.1	1.5	3.1	8.3	26.6	2.7	6.7	3.7	66.3	
Shikoku	0.5	1.1	1.4	0.8	0.7	0.8	0.3	0.2	0.2	0.3	0.3	0.1	0.7	2.6	5.6	2.9	10.6	1.9	1.9	32.7	
Kyushu	1.3	2.3	4.3	3.5	2.1	3.0	0.8	0.5	0.7	0.7	0.6	0.2	0.9	3.7	11.9	6.0	1.5	54.8	4.0	102.6	
U.S.A	4.4	5.0	11.9	9.2	6.0	7.5	3.6	3.4	2.7	2.4	2.1	0.8	2.7	9.7	19.8	4.7	1.8	9.4	624.8	731.9	
Total		66.2	97.8	103.0	68.3	52.7	65.5	32.3	25.8	23.6	29.6	18.3	6.2	25.0	119.5	224.7	65.8	31.0	123.5		