

# **Research on the Relationship between Economic Growth and the Awareness on Water Protection——A Case Study of China and Japan**

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China

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## 1. Abstract

After searching data for the economy growth and governments' awareness of public education on water protection, we managed to yield a pattern of the relationship between the 2 factors. The awareness of public education on water protection is likely related to the outbreak of public events and GDP per cap, and it is implied that citizens play important roles in governments' awareness of public education on water protection of water protection

## 2. Keywords

water protection, public education, pattern, economic growth, gross domestic product per capital

## 3. The purpose of the research

The governments' awareness of public education on water protections can vary over time. For example, it is the lack of awareness that leads to the outbreak of the minamata disease event in 1950s, and it is the event that signifies the Japanese government's increasing awareness on environment protection and, specifically, water protection. Similar stories take place in China. In 1980s and early 1990s, water protection was not taken seriously due to the governments pursue of economic growth, until several water contamination events causes severe consequences. It is an interesting topic that how the government makes choices between economic growth and environment protection, thus we decide to do some research on the pattern of the relationship between the economic growth and the public awareness of water protection, in both countries.

Public's awareness is closely related to the topic of education. Education can be sorted into 2 categories, which are the professional education from school and the public education from the society. The education that we discuss here is specifically the public education from society. The public education may come from public service advertisement, public propaganda, and the advertisement from enterprises, which are the aspect of our research.

As for the economic growth, in our research it is measured by the gross domestic product and the GDP per capital here. These are the sort of data most directly reflecting the growth of a country.

## 4. Method of the research

The process of research is mainly about searching and analyzing information. To be specific, we first collect data from the internet about the water protection and the economic growth, and then we would try to find out the pattern that matches both aspects.

## 5. Results of the research

### 5.1 Economic growth

The data from 1960 to 2016 of both countries are collected (from the world-bank database), and are then made the into graphs. It can be seen that the economy of Japan started significant expansion around 1978, while the expansion of the economy of China started expansion around 1985 and eventually exceeds that of Japan in 2010. However, the GDP per capital of Japan has always been times higher than China since recorded, and the former showed growth in 1965 while the latter showed growth around 2000.

Notably, it can be seen that the Japan has experience several economy recessions, while the economy of China has not experience severe decreasing over time.

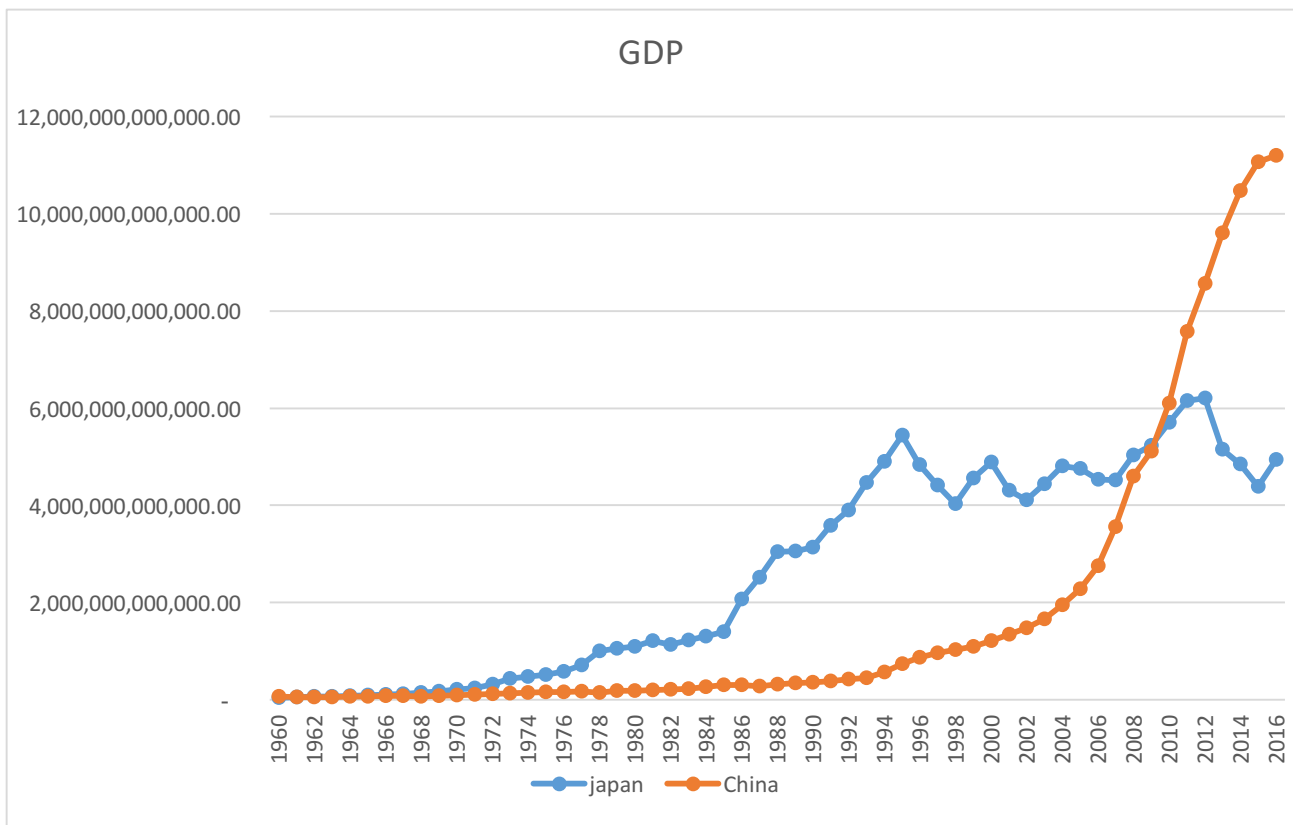
### 5.2 Awareness of public education and other policies on water protection

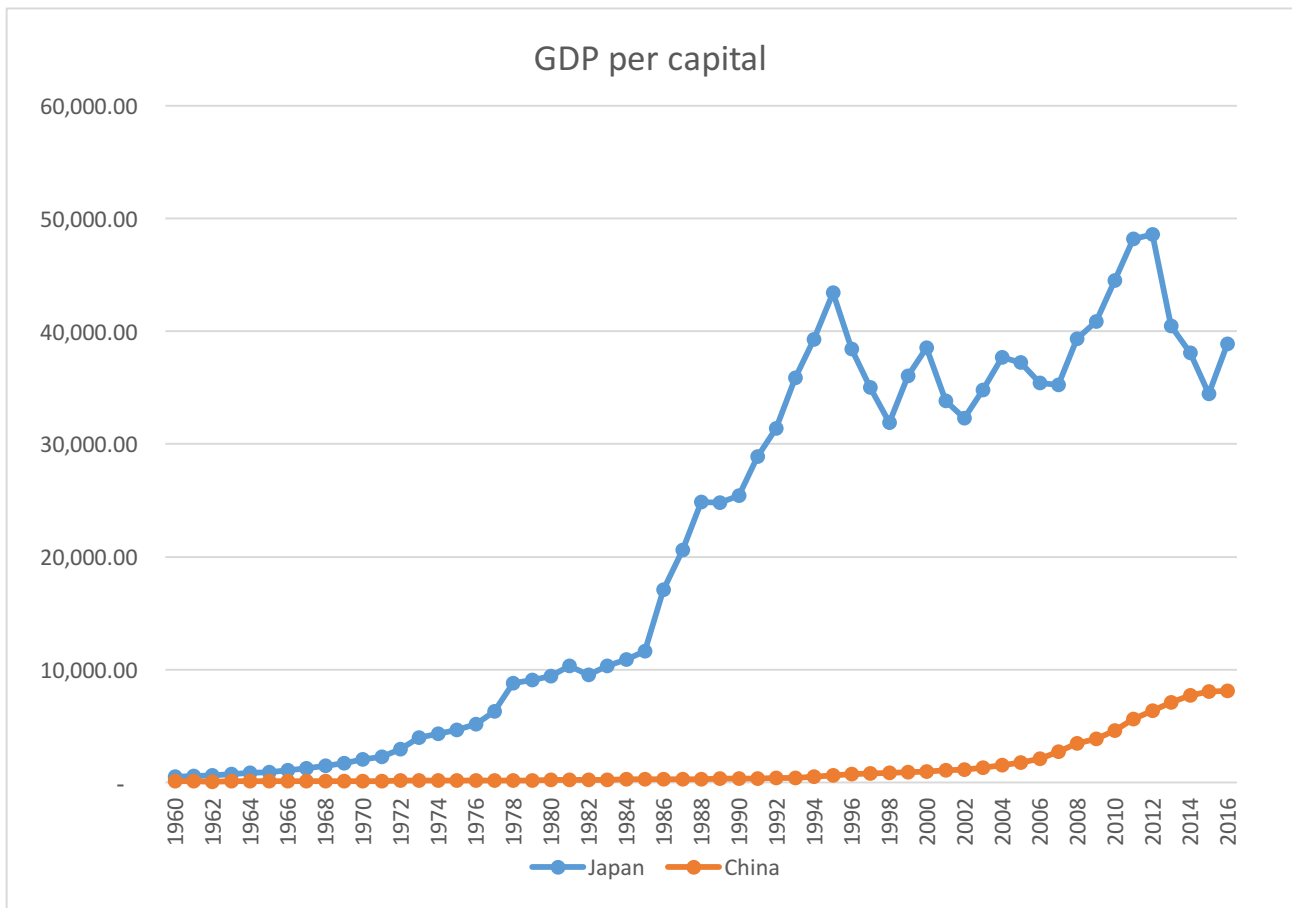
The propaganda about water in China is relatively weak. Although the government had started to consider environmental problems decades ago, it did not immediately advocate these problems to its people. Instead, it keeps the problems to itself.

In Chinese school civic educations, the main content is always about collectivism education and obedience to the court party. Environmental education is less or none. Almost all of the elementary school environmental studies textbooks are made spontaneously by school teachers, indicating a blank in official textbooks. Nevertheless, in these spontaneously-made textbooks, over 80% of the contents are about animal distinction, and water protection only occupies a small proportion of the rest. Even though most people have

<b>COUNTRY</b>	<b>JAPAN</b>	<b>CHINA</b>	<b>JAPAN</b>	<b>CHINA</b>
<b>INDICATOR NAME</b>	GDP, current dollar	GDP, current dollar	GDP per capital	GDP per capital
<b>INDICATOR CODE</b>	NY.GDP.MKTP.CD	NY.GDP.MKTP.CD	NY.GDP.PCAP.CD	NY.GDP.PCAP.CD
<b>1960</b>	44,307,342,950.40	59,716,467,625.31	479.00	89.52
<b>1961</b>	53,508,617,739.38	50,056,868,957.67	563.59	75.81
<b>1962</b>	60,723,018,683.73	47,209,359,005.61	633.64	70.91
<b>1963</b>	69,498,131,797.33	50,706,799,902.51	717.87	74.31
<b>1964</b>	81,749,006,381.51	59,708,343,488.50	835.66	85.50
<b>1965</b>	90,950,278,257.78	70,436,266,146.72	919.78	98.49
<b>1966</b>	105,628,070,343.11	76,720,285,969.62	1,058.50	104.32
<b>1967</b>	123,781,880,217.60	72,881,631,326.67	1,228.91	96.59
<b>1968</b>	146,601,072,685.51	70,846,535,055.65	1,450.62	91.47
<b>1969</b>	172,204,199,480.89	79,705,906,247.46	1,669.10	100.13
<b>1970</b>	211,514,189,326.39	92,602,973,434.07	2,027.07	113.16
<b>1971</b>	238,914,956,436.92	99,800,958,648.14	2,260.38	118.65
<b>1972</b>	316,393,344,649.99	113,687,586,299.05	2,951.76	131.88
<b>1973</b>	429,857,320,166.57	138,544,284,708.96	3,977.25	157.09
<b>1974</b>	477,155,786,487.72	144,182,133,387.72	4,331.40	160.14
<b>1975</b>	518,855,814,542.73	163,431,551,779.76	4,635.12	178.34
<b>1976</b>	583,142,956,487.97	153,940,455,341.51	5,171.04	165.41
<b>1977</b>	717,696,307,916.65	174,938,098,826.57	6,303.16	185.42
<b>1978</b>	1,008,391,778,690.25	149,540,752,829.27	8,776.41	156.40
<b>1979</b>	1,049,578,503,045.09	178,280,594,413.04	9,058.24	183.98
<b>1980</b>	1,099,692,917,412.75	191,149,211,575.00	9,416.63	194.80
<b>1981</b>	1,215,508,719,880.85	195,866,382,432.54	10,331.74	197.07
<b>1982</b>	1,129,894,523,635.09	205,089,699,858.78	9,539.08	203.33
<b>1983</b>	1,232,343,804,284.17	230,686,747,153.26	10,333.34	225.43
<b>1984</b>	1,309,740,021,609.74	259,946,510,957.14	10,912.86	250.71
<b>1985</b>	1,400,714,806,812.65	309,488,028,132.65	11,599.74	294.46
<b>1986</b>	2,075,034,242,192.31	300,758,100,107.25	17,079.60	281.93
<b>1987</b>	2,514,283,894,261.86	272,972,974,764.57	20,593.52	251.81
<b>1988</b>	3,050,637,784,817.52	312,353,631,207.82	24,880.21	283.54
<b>1989</b>	3,052,315,661,954.82	347,768,051,311.74	24,792.19	310.88
<b>1990</b>	3,139,974,443,543.00	360,857,912,565.97	25,417.28	317.88
<b>1991</b>	3,578,139,437,172.02	383,373,318,083.62	28,874.36	333.14
<b>1992</b>	3,897,826,229,662.86	426,915,712,711.15	31,376.14	366.46
<b>1993</b>	4,466,565,327,401.26	444,731,282,436.76	35,865.66	377.39
<b>1994</b>	4,907,039,384,469.68	564,324,670,005.92	39,268.57	473.49
<b>1995</b>	5,449,116,304,981.10	734,547,898,220.51	43,440.37	609.66
<b>1996</b>	4,833,712,542,207.10	863,746,717,503.79	38,436.93	709.41
<b>1997</b>	4,414,732,843,544.43	961,603,952,951.82	35,021.72	781.74
<b>1998</b>	4,032,509,760,872.94	1,029,043,097,554.08	31,902.77	828.58
<b>1999</b>	4,562,078,822,335.45	1,093,997,267,271.06	36,026.56	873.29
<b>2000</b>	4,887,519,660,744.86	1,211,346,869,605.24	38,532.04	959.37
<b>2001</b>	4,303,544,259,842.72	1,339,395,718,865.30	33,846.47	1,053.11

<b>2002</b>	4,115,116,279,069.77	1,470,550,015,081.55	32,289.35	1,148.51
<b>2003</b>	4,445,658,071,221.86	1,660,287,965,662.68	34,808.39	1,288.64
<b>2004</b>	4,815,148,854,362.11	1,955,347,004,963.27	37,688.72	1,508.67
<b>2005</b>	4,755,410,630,912.14	2,285,965,892,360.54	37,217.65	1,753.42
<b>2006</b>	4,530,377,224,970.40	2,752,131,773,355.16	35,433.99	2,099.23
<b>2007</b>	4,515,264,514,430.57	3,552,182,311,652.97	35,275.23	2,695.37
<b>2008</b>	5,037,908,465,114.48	4,598,206,091,384.00	39,339.30	3,471.25
<b>2009</b>	5,231,382,674,593.70	5,109,953,609,257.25	40,855.18	3,838.43
<b>2010</b>	5,700,098,114,744.41	6,100,620,488,867.55	44,507.68	4,560.51
<b>2011</b>	6,157,459,594,823.72	7,572,553,836,875.34	48,168.00	5,633.80
<b>2012</b>	6,203,213,121,334.12	8,560,547,314,679.28	48,603.48	6,337.88
<b>2013</b>	5,155,717,056,270.83	9,607,224,481,532.65	40,454.45	7,077.77
<b>2014</b>	4,848,733,415,523.53	10,482,372,109,961.90	38,096.21	7,683.50
<b>2015</b>	4,383,076,298,081.86	11,064,666,282,625.50	34,474.14	8,069.21
<b>2016</b>	4,940,158,776,617.16	11,199,145,157,649.20	38,900.57	8,123.18





learned to save water in their childhood, they didn't adopt the habit to do it in their daily life.

Moreover, news websites hardly ever represent news about water. In the classification bars of the five most influential news websites in China, none of them have "water" or "environment" on their list. Also, as the result of skimming through the top 10 hottest news in February, only two in the entire month was about water. This demonstrates that water propaganda does not have a significant impact on Chinese citizens. According to data analysis, citizens care more about politic situation, wars between other countries, entertainment... in a word, appalling news that enable them to laugh, tease, and judge, instead of reading them seriously.

Every time when we open up the newspaper, turn on the TV, or logging into the internet, and see advertisements informing us to turn off the tap while putting shampoos and to reuse water to flush the toilet, and other ways to save water. In fact, when we do such things, we do not save water. We reduce the cost to purify water, because water cannot disappear from planet Earth by itself. Hence, even if we are doing things that water-saving advertisements tell us to do, we still cannot save water.

From 1949 to 1986, according to from the first to the sixth Five-year Plans of China, there was no sign at all that water resource had been considered as an essential problem. Chinese government didn't give specific regulations towards water resource. However, the plan did mention that the flood control of main river was yet to be improved. Furthermore, the water consumption conflict between agriculture and industry needed to be mitigated.

In the seventh five-year plan of China, we didn't find any effective information about treating water resource.

After these five blank years, in 1991, the eighth five-year plan of China was published. It contains one specific chapter of water resource regulations but surprisingly, only little problems were mentioned. Treatment of main river, rural water conservancy and flood control were main contents in that specific chapter.

Comparing to the eighth five-year plan, the ninth one paid obviously more attention to this whole thing about water resource even it didn't give any specific chapter towards the problem. It emphasized the importance of not only the main river, but also the tributary and marine conservation. Main

conflicts in agricultural water consumption such as water and soil loss were being attached importance to. In addition, government started to notice the problems in other area such as water pollution and irrigation consumption.

Things changed a lot when it came to another century. In the tenth five-year plan, one specific chapter and more effective contents appeared. Both city and rural water consumption were restricted. Technology of water saving was in development. The importance of marine and underground water conservation had been noticed. The pollution control part had been paying increasing attention to which contains factors like recycle e of sewage, river pollution and the silting-up. Publicity and education of water saving were also in progress while flood control was still a serious problem to deal with.

In 2006 when the eleventh five-year plan was published, environmental content had a dramatic increase. Information can be divided into three parts. First is the city water consumption. The government aimed to improve the protection of urban water resource and supply, control the scale of water deficient cities and control the usage of underground water. Water saving devices are forced to be utilized in urban area, especially in public buildings and residential area. Second part was agricultural water consumption. Irrigation consumption was expected to have zero increase in following years. West parts of China needed to improve the control of water pollution. Third part is all other things concerned. Sewage recycling devices must start to be built and the fee of disposal was set. Industries were not supposed to discharge excessive amount of sewage into lake or river. The east line of "South Water to North" was yet to be accomplished. The protection and development of marine resource were expected to be done at the same time.

With the upcoming of the 21th century, the Chinese government paid more and more attention to all sorts of environmental problems, including water problems. Starting from the twelfth five-year plan, comparing to the precedent five years plans, the government has put substantial time and energy on not only the exploit of agricultural and industrial water, but also the protection of them.

According to the twelfth five-year plan, the effective rate agricultural water should be increased to 53%. For using agricultural water more wisely and effectively, the government is going to construct a series of water conservation facilities, for examples, pipes, pumps, and drought-preventing equipment. To prevent overuse by

individuals, the government made stricter water fee charging policies in rural areas. Additionally, the government is going to enforce the purify of water in rural areas. Furthermore, the government claimed that the efficiency of industrial water should be maximized. The use of industrial water should be reduced by 30%.

Despite exploiting water resource, the government started to advocate people to economize on water. Underground water mining activities will be diminished, its blank replaced by the result of the advance of purify technology of reclaimed water, pit water, rain water, sea water and brackish water. The "South to North" water project will be complete. Also, dozens of small canals will be constructed.

According to the thirteenth five years plan in 2016, which is the most current one, the government paid more attention to taking care of drought regions in the country. The government advocates people to raise dry crops in drought areas. In south Xinjiang, Gansu, and Jilin, there will be specialized water saving projects. Furthermore, the government realized to construct irrigation projects scientifically, which is a big progress since many years. As a result of precedent water projects, floods are frequently caused. Accordingly, many canals are built in order to prevent floods. This is a way to achieve both. Establishing on the previous plan, the government takes a new step on using water created by weather.

In 2018, the Constitution of China was modified. In the foreword, "environment-friendly" is added after "prosperous", "democratic", "civilized", and "harmonious", which is the core motto of the Chinese government.

By reading the different kinds of water laws of Japan, we can extract the following information.

1. Fluvial law is the main water law in Japan which was published in 1964. It aimed to prevent the disaster caused by river and high tide so that the river could be used more properly. It covers the appropriate maintaining and utilization of river and restriction about them. The constructing of dams and fee of river management were also regulated.

2. In 1961, Japanese government published the water resources development promotion law. It mainly contained some water resources developing plans of the river in Japan. It was aimed to guarantee the water supply and sustainable water resources development in Japan.

3. In the same year as last one, Japanese government published the water resources corporation development law. Which regulated the names, employment and finance of some water resources corporation.

4. By 1957 the tap water's law was published. It was aimed to regulate the maintain and management of tap water pipe, to provide clean and low-cost tap water. The material and structure of the water supply devices were restricted lately. Workers needs to get qualified in order to work as technicians.

5. Also in 1957, the law of industrial water complement was published. This law specifically restricted the use of water in industrial area. It was aimed to save the underground water resources and to prevent ground subsidence. It covered laws of qualification apply process, standard, condition, inspection and related penalty.

6. Early in 1949, Japanese government published the law of land reclamation to improve the situation of agricultural structure. It mentioned the standard and fee of improving drainage facility.

7. Sewerage act was published in 1958. It maintains the sanitation and water quality of the sewage in order to improve the urban development. It restricted the setting of sewage and demanded that a plan should be given if a sewage system was going to be built. The confirmation of drainage facility was also required.

8. In 1968 the law of depollution of water was published. It was a restriction to urban, industrial and agricultural drainage. It was set up towards those corporations with special demands of drainage and areas needed drainage permission. Quantum and concentration were main standard of restricted groups.

## 6. Conclusion

It can be seen that Chinese government's awareness of education on water protection was not significant until the presence of the seventh five-year plan which appears in late 1980s. The following publication of laws concerning water protection were then continuously being proceeded. Noting that the GDP of China expanded quickly since around 1978, it can be seen that Chinese government's growth of the awareness on water protection appears about a decade later than the rapid growth of GDP.

As for Japan, many of its laws had been published just around 1960, before which the GDP data were not well-collected. Noting Japan's GDP started rapid growth after 1965, it is clear that Japan's growth of awareness had started before that of its economy. However, as the minamata disease event took place in early 1950s, this growth of awareness may be the aftermath of the event, and this is also around a decade later than the event, which echoes that the growth comes a decade after the expansion in economy. Thus the causes of governments' growth on awareness of public education may be not only economy growth but severe public events as well.

Besides, late 1980s, when Chinese government's awareness of public education notably grows, the GDP and GDP per cap are respectively about \$ 300 billion and \$ 300. Meanwhile, early 1960s, when that of Japan grows, the GDP and GDP per cap are respectively about \$40 billion and \$380. According to these data, the growth on awareness is more likely related to GDP per cap instead of the GDP. This indicates the environment protection is more related to individuals, not the entire country. Concerning about the public events' influence on the growth of awareness of governments, it is also implied that the citizens plays a more essential role on the topic of environment protection, and governments' awareness may be driven by citizens and are not spontaneous. This encourages us to promote more citizens' awareness on water protection, as individuals' effort are even more dominant than the governments.

## 7. Acknowledgements

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