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The Impact of Environmental Preferences on Public Supporting for the River Ecosystem Restoration Program in China

Wpływ uwarunkowań środowiskowych na społeczne poparcie dla Programu odnowy środowiska rzecznego w Chinach

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Abstract
Restoration of the urban river system is urgently needed as urban river pollution is becoming an important environmental problem in China. Apart from the technical challenge, explicitly including the local residents' preferences toward ecosystem management and restoration often is critical for municipal planners and policy implementation. This study used a contingent valuation method to estimate the public preferences for supporting urban river restoration in Hangzhou and Nanjing, China. The results show that environmental preferences including perception, beliefs and past behavior were better explanatory variables than socio-demographic characteristics for explaining people's support for ecosystem restoration actions. But the respondents' *demand* and *supply* on environment goods are mismatch. People want better environments goods but they are unwilling to make an effort to build the environments. We also find that the average conjectural payment for the restoration project is only 36 Yuan RMB per capital. Efforts to assess and foster support for urban ecosystem restoration should be pay more attentions to the public's perception, beliefs and past behavior.

Key words: river restoration, public preference, environmental awareness, city planning, water quality, urbanization, China

Streszczenie
Odnowa środowiska rzecznego na terenach zurbanizowanych staje się w Chinach ważnym problemem środowiskowym, z uwagi na wysoki poziom zanieczyszczeń. Oprócz wyzwań technicznych, wyraźne uwzględnienie preferencji lokalnych społeczności odnoszących się do zarządzania środowiskiem i jego restytucji stanowi istotne wyzwanie dla miejskich planistów i wdrażanych programów. W tym artykule zastosowano metodę wyceny warunkowej w celu określenia społecznych preferencji związanych z wdrażanym programem odnowy środowiska rzecznego w Hangzou i Najing w Chinach. Otrzymane wyniki pokazują, że preferencje środowiskowe (uwzględniające percepcję, przekonania i dotychczasowe wzorce zachowania) okazały się być trafniejszymi zmiennymi wyjaśniającymi, niż wskaźniki społeczno-demograficzne, w kontekście wyjaśniania poziomu społecznego wsparcia dla działań podejmowanych na rzecz restytucji środowiska. Zarazem *popyt* i *podaż* respondentów na dobra

środowiskowe rozmijają się. Ludzie oczekują lepszej jakości środowiska, ale nie są zainteresowani podejmowaniem osobistych działań w tym kierunku. Okazało się także, że przeciętny poziom hipotetycznego finansowego wsparcia respondentów dla działań na rzecz środowiska wynosi zaledwie 36 yuanów RMB za kapitał. Wysiłki w celu oceny i kształtowania wsparcia dla odbudowy środowiska powinny w większym stopniu zwracać uwagę na społeczny odbiór podejmowanych działań, ludzkie przekonania i dotychczasowe wzorce zachowania.

Słowa kluczowe: restytucja środowiska wodnego, preferencje społeczne, świadomość ekologiczna, planowanie miast, jakość wody, urbanizacja, Chiny

Introduction

Urban rivers play important roles in providing ecosystem services as well as recreation sites for residents. In the past years, pollution along the urban rivers, including the ugly color, bad smell, and visible oil on the surface resulting from untreated sewage being discharged into the river directly without any treatments, has been more severe with the fast development of economics and urbanization in China. Human modification of rivers is a concern to environmental managers, engineers, and economists in many part of the world (Schmidt, 1998; Cairns, 1991; Kern, 1992). Relative regulations and actions like garbage treatment, controlling wastewater discharge or increasing water price indeed have already been implemented by government or non-governmental organizations aiming to diminish the pollution in urban stream.

Understanding public support for ecosystem restoration is an important part of environmental protection (Endter-Wada et al., 1998). Water quality, riparian landscaping, and similar issues have no market price tag. Explicitly including the local residents' preferences toward ecosystem management and restoration often is critical for municipal planners and policy implementation because the sustainability of sound management is rooted in stakeholder support (Lee, 1995; Haney & Power, 1996; Proctor, 1998). Information is generally obtained by assessing the individual's environmental preference and willingness to pay for ecological projects. Those preferences can inform the policy-maker about how people respond to the proposal for change to particular environments.

The Theory of Planned Behavior (Pratkanis, Breckler, & Greenwald, 1989) provided a clear *picture* about the linkages among environmental preferences and public behavior to pay for restoration and protection goals. This theory, developed earlier by Ajzen & Fishbein (1980), asserts that people systematically use the information available to them to shape their beliefs and attitudes about certain actions before deciding to take those actions. Give between external variables (e.g., socio-demographic characteristics, knowledge, past behavior), the individual's environmental preferences including beliefs, attitudes, intended behavior, and real behavior, will significantly impact their final decisions.

Despite growing worldwide interest, restoration river ecosystem has had little research to check how the residents respond these interventions in local environment (Tunstall, Tapsell, & Eden, 1999). Previous research revealing public's support on environmental management is always focused on how people respond to their proposals of changing particular environmental issues (Dunlap, 1991; Kempton, Boster, & Hartley, 1996; Milon, Adams, & Carter, 1998). Deriving evidences, like whether and how much people are willing to pay for restoration programs, is necessary to prove future benefits and expenditure (Bae, 2011). Numbers of studies have made connections between socio-demographic characteristics and concerns for the environment (Jones et al., 1999). Others drawn connections between value orientations and policy preferences (Steel, List, & Shindler, 1994), or risk perceptions (Steel, Soden, & Warner, 1990). Those researchers pay more attention on environmental restoration, such as in agriculture, industrial sectors, ecological systems, and Reservation Parks (Carnes et al., 1998; McCoy et al, 2002; Wilkins et al., 2003; Gunawardena et al., 2005; Chen et al., 2010). Few exams publicize environmental attitudes to the local urban river restoration (Schmidt et al., 1998; Loomis et al., 2000; Downs et al., 2002; Zhang et al., 2007).

By conducting a survey in Hangzhou and Nanjing, the objectives of this paper are to estimate: the environmental preferences impacts on public's supporting for the river ecosystem restoration Program in China by included the factors including beliefs about the environment and economic development, knowledge and involvement of ecosystem protection and restoration, and socio-demographic characteristics (such as age, gender, distance home is from the river, length of residence in the area, and stated political orientation).

Survey Design and Implementation

Study areas

Our study area, locating in Yangtze River Delta, is one of the largest city agglomerations in China (Huang and Jiang, 2009). Hangzhou and Nanjing are two of the most developed cities in this area, ranking 8th and 16th respectively in the 2010 Chinese city GDP. A number of streams cross the cities and influence people's daily lives. Growing population and

industrialization has resulted in severe contamination in the urban rivers. Becoming the wealthiest region in China, the citizens are starting to pay more attention to improve their environmental quality and health safety, allowing the restoration or improvement programs to be conducted in this area. The public is possibly willing to support the restoration project when they gain more from environmental improvement the costs (payment). Therefore, there is a need to reveal the public preferences as important measures toward the change environment quality. Alternatively, governments also can use this information to evaluate policies implemented.

The main rivers in the study areas are Can Hua Xiang River in Hangzhou and Qing Huai River in Nanjing. Along the rivers, some buildings, for example, residential houses, primarily temporary workers 'rooms, elementary schools, and universities are located along the riverside. Residents prefer getting leisure in green areas with some exercise facilities. Numbers of discharge holes are set along the banks, causing serious pollution such as water black, strong odor, and some green bubbles on the surface. Recently, some restoration projects have been executed on the rivers in the cities.

Survey implementation

In survey mode, the NOAA panel recommended face-to-face interviews over the telephone and through postal surveys, since it is one of the most reliable surveys in the studies of developing countries (FAO, 2000). Hadker et al. (1997)states the difference of this method compared from the mailed questionnaires and telephone surveys in those countries. Our survey was conducted by a face to face interview in May 2011. We defined the study area for residents as the Can Hua Xiang River and Qing Huai, including the land on either side of the river. Respondents are sampled randomly including pedestrians, residents, peddlers, and white-collar worker. Of 1586 contacted individuals, 1459 were successfully interviewed, yielding the response rate of 92%.

The questions begin with some description of scenarios, the status quo, and changes in environmental quality, so that the respondents can evaluate their environmental preference for ecosystem changes. Mangione (1995) developed an efficient method, called Total Survey Design Method (TSD), which attempted to meet a best balance across all effort areas. TSD has been successful in securing high response rates from general and special investigations (Hager et al., 2003; Tourangeau, Couper, & Conrad, 2004; Van der Stede, Young, & Chen, 2005). The survey covered the topics including: the level of knowledge and involvement of residents with the urban river; beliefs about the relationship of humans and environment; the perception of environmental problems formed over a long time and awareness of environment influenced by the specific event; the willingness to pay for four different types of ecosystem restoration, and socio-demographic characteristics.

The knowledge scale is created by summing the number of correct answers to three questions. Each question measured a different aspect of a respondent's knowledge about environmental issues and protection. The beliefs scale was generated by using two questions that asked respondents' concern for environment. This is similar to Barro & Bright's (1998) study, who tested beliefs associated with restrictions on land use. We particularly create a perception of environmental problems scale by collecting five indexes about the awareness of environment influenced by the specific impression. Those indexes covered the color, smell, oil in the surface, rubbish, and green belt in the urban river region. We also generate an environmental activism scale by summing the number of environmentally related activities the respondent had participated in the past 24 months. The items included voting for political candidates, joining organizations, and donating.

Referendum method is applied in the collection of respondents' willingness to pay (WTP) by asking a binary question. The sample was divided into four subsamples. Each subsample was provided some values to estimate the preference in different level of payment. The respondents should answer a question if they were willing to pay the price in the form of increasing tax for the urban river restoration program. In order to avoid the bias from defining the range of payment as either too high or too low, we refer to previous studies in the relevant fields and offer the choice of paying a price from 5 to 100 Yuan in the survey (τ_i =5, 10, 20, 50,100) striving to make the payment more feasible and realistic. If $WTP_i>\tau_i$ was selected, the probability of *yes* used in the profit model is $\Pr(WTP_i>\tau_i)$, otherwise the probability is 1-$\Pr(WTP_i>\tau_i)$.(Cameron 1988) argued that adding one more choice, *don't know*, in the binary choice may significantly improve the survey results. Hite (2002)claimed although explicitly modeling *don't know* can alleviate the error in survey process, the bias in econometric estimation cannot be avoided. She suggests an ideal way is to create a follow-up question asking if they would pay any positive amount for the program after people's response *no* or *don't know*. This follow-up question can change the WTP from full censored to partial censored, which is sure to improve the precision of econometric estimates.

Table 1 is the summary of the characteristics of the sample. The sample consists of 42% male and 57% female respondents. The age ranges from 35 to 44 accounted for 60% of all respondents. Seventy two percent of households have been registered as local residents or saying they have local *HUJI*. 50% of respondents reported they have elders in the family, and 29% and 19% respondents reported that children and pets live together with them. Household income

Table 1. Description of Socio-demographic characteristics variables using in the analysis

Socio-demographic characteristics	Mean	S.D.	Min	Max
Gender (0= Male, 1=female)	0.6	0.5	0	1
Household size	3.7	1.3	0	13
Baby (0= no, 1=yes)	0.1	0.3	0	1
Children (0= no, 1=yes)	0.3	0.5	0	1
Old man (0= no, 1=yes)	0.5	0.5	0	1
Age (1= 18~34, 2=35~44,3=45~59,4=60~75, 5=75 or above)	2.0	1.2	1	5
Pet (0= no, 1=yes)	0.2	0.4	0	1
Huji (0= no, 1=yes)	0.7	0.5	0	1
Years residential in this area	16.3	17.1	0	80
Employment (0= no, 1=yes)	0.6	0.5	0	1
Household income (1=less than 12,000 RMB, 2=12,000 RMB~ 36,000RMB, 3=36,000 RMB~ 60,000RMB, 4=50,000 RMB~ 84,000RMB, 5=84,000 RMB~ 120,000RMB), 6=120,000 RMB~ 240,000RMB, 7=240,000 RMB~ 360,000RMB; 8= above 360,000RMB)	3.8	1.6	1	8
Education level (1=primary school, 2=middle school 3=high school, 4=undergraduate, 5=graduate school, 6=others)	3.4	1.1	1	6

Table 2. Description of environmental preferences using in the analysis

Variable	Mean	S.D	Min	Max
Knowledge scale *(KNOW)* (Quadratic Mean)	7.8	3.9	2.4	18
The knowledge about how the water quality of the river has been polluted.(1=unknown, 3= clear)	2.3	0.7	1	3
The knowledge about how the water pollution may harm the health. (1=unknown, 3= clear)	1.9	0.6	1	3
Beliefs scale (*BELIEF*) (Quadratic Mean)	8.5	2.3	2.4	18
Concern for environment issues. (1=weak, 3= serious)	1.2	0.4	1	3
Concern for environment policies scale. (1=weak, 3= serious)	2.8	0.5	1	3
How clean today? (1= very good, 4=extremely bad)	3.4	0.6	1	4
Perception scale (*PERCEP*) (Quadratic Mean)	29.0	9.6	5	45
The color of the river (1= very clear, 2= grey, 3=black)	2.3	0.5	1	3
The smell of the river (1= fresh, 2=slightly uncomfortable, 3= bad smell)	2.3	0.6	1	4
The oil in the surface (1= no oil, 2=slightly oil, 3=full of oil)	2.3	0.6	1	3
The rubbish in the river (1= no rubbish, 2=slightly rubbish, 3=full of rubbish)	2.3	0.6	1	3
The green belt along the river (1= very clean, 2= slightly duty, 3=very duty)	2.3	0.6	1	3
Environmental activism scale (*ACTION*) (Quadratic Mean)	17.4	8.7	1.3	48.8
Donation for any environmental restoration projects in the past 24 month. (0= no, 1=yes)	0.2	0.4	0	1.
Pass away from the river (0= no, 1=yes)	0.8	0.4	0	1
Walking participation (1= every day, 6=never)	3.3	1.8	1	6
Boating and fishing participation (1= every day, 6=never)	3.6	1.5	1	6

Table3. Description of Respondents' perception grade

	Overall		Color		Smell		Oil		Garbage		Green Belt	
Score	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
1	7	0.5	31	2.0	90	5.9	133	8.8	63	4.2	289	19.1
2	869	57.3	1,023	67.4	876	57.8	898	59.2	947	62.4	962	63.4
3	640	42.2	463	30.5	551	36.3	486	32.0	507	33.4	266	17.5

Note: the higher grade means worse condition. 1 represent satisfy; 2 represent intermediate; 3 represent worst.

is reported ranges between the interval of 40,000RMB~70,000RMB. Most of the respondents have a high school or above educational experience.

Results

Environmental Preferences for urban river ecosystem

Local residents on average felt the river pollution has been serious (Table 2). Eighty seven percent of respondents believe that water pollutants threaten human health. About 85% of respondents consider that control of environmental pollution is important for development, indicating that environmental issues have become a popular topic in recent years. 93% of respondents were unsatisfied with the river quality, suggesting potential wide demand for better environmental services. More than three quarters of respondents were concerned about the current environmental policies. The respondents have great enthusiasm on the environmental protected activates, but they have few confidences on the governmental program from the earlier experience. Information asymmetry aggravates the discrepancies between publics and governments, which makes most ecosystem restoration projects inefficient.

Respondents' perception toward the river is terrible (Table 3). In general, only 0.5% of respondents are satisfied with the river's condition. Over 42% of respondents felt that the river problem was extremely serious. Evidences comes from five indices, including color, smell, water surface (oil and garbage), and green belt. Each index ranges from 1 to 3 and the higher score means better perception. The results show that less than 10% of scores pass the mean value. Only 2% of residents can accept the river's color and 6% of them said they were comfortable with the smell. Oil and garbage on the water surface was widely thought to be serious. A relatively better feedback was referring to the green belt, with about 20% of the public approval rate.

Respondents' concern for the river, on average, has no significant influence on their specific restoration actions. Only 20% of respondents have participated in environmental protection action although 83% of them will pass the river every day, and half have ever used the river for entertainment purposes. Usually, there are two situations: lack of specific project prevented those who have willingness to pay for the restoration; another situation is that most of the respondents may be a *free ride*. Although they cannot accept the pollution, they will refuse make a payment for the public goods.

Intended support for river restoration: Willingness to pay for ecosystem restoration

Willingness to pay for the special project on river restoration is reported pessimistically (Table 4). Only 47.8% of the respondents voted for the program to promote restoration and 46.6% voted against the program; 6.6% of respondents voted *don't Know*, and were subsequently coded as *no* votes for the econometric analysis. The mean annually individual's WTP from the statistical estimation is only 36 RMB. Respondents may believe the program will offer no improvement in river quality, or respondents might believe the project will actually improve water quality by some unknown amount. Respondents who have had an experience on environmental actions show much higher accepted ratio, 56% of acceptors against 45% rejecters. The mean annually individual's WTP is 43 RMB, which provides an evidence that the environmental activities could definitely influence the respondents' preferences.

Willingness to pay for payment in the subsamples are various (Table 5). Hangzhou obviously has higher accepted ratios and mean WTP. It might be due to the water quality is more valuable for the public in Hangzhou since the city is famous from water, such as, the West Lake and XiXi wetland. Environmental improving can significantly improve attraction to tourists, which will indirectly increase the household's benefits.

In sum, the respondents' *demand* and *supply* on environment goods are mismatch. People are always pursuing higher quality environment; however, they reject to build the ideal environments to satisfy their demand rather than waiting the actions from governments or others. Various environmental theories have assumed that individuals' preference for environment is reflective of perceptual mechanisms that allow the individual to assess whether a particular environment should be accessed or avoided (Appleton, 1975; Appleton, 1975; Ulrich, 1984; Kaplan, 1987). Following this theorizing, respondents' environmental preference is determined by environmental properties that possess a potential functional significance for the perceiver and properties that gradually formed in a long time.

The above theory can interpret why the respondents' *demand* and *supply* on environment are mismatch. For people who are feeling the environment weak or low and chasing a higher quality, they might experience the process of environmental deprivation. They have a highest demand in the environmental quality, but they deeply understand the source of pollution, even though they are also pollutants, publics unwilling to be funding providers or pay less in the restoration. Since the *demand* and *supply* cannot be coincided, most environmental programs always go to failure.

Explaining support for urban river restoration

To explain the factors impact on the public's support for the urban river ecosystem restoration, the econometric analyses are separated two stages. In the first stage, we particularly interest in how to explain the *finished* payment actions for the environmental protection. A Logit model will be employed to estimate the factors impact the *finished* payment actions. In

Table 4. The distribution of bids and respondents in pool data

Bid	Freq.	Percent (%)	Accept Freq.	Accept Ratio (%)
5	311	20.75	230	73.95
10	312	20.81	182	58.33
20	292	19.48	143	48.97
50	298	19.88	113	37.92
100	286	19.08	91	31.82
Total	1499	1	759	-
Mean WTP: 36.03				

Table 5. The distribution of bids and respondents in sub-groups

Bid	Freq.	Percent (%)	Accept Freq.	Accept Ratio (%)	Freq.	Percent (%)	Accept Freq.	Accept Ratio (%)
	Hangzhou				Nanjing			
5	164	20.02	120	73.17	147	21.62	110	74.83
10	168	20.51	115	68.45	144	21.18	67	46.53
20	159	19.41	83	52.2	133	19.56	60	45.11
50	163	19.9	60	36.81	135	19.85	53	39.26
100	165	20.15	59	35.76	121	17.79	32	26.45
Total	819	1	473	-	680	1	332	-
Mean WTP: 37.03					Mean WTP: 34.83			

Table 6. Estimation results with two stage model

Dependent variable =DONATION		*Dependent variable=WTP*		
		Model 1	Model 2	Model 3
Environmental Preferences				
KNOW	0.0851***(0.0163)	0.0590**(0.0271)	0.0649**(0.0256)	0.0604**(0.0258)
BELIEF	0.0508*(0.0282)	0.172***(0.0428)	0.106***(0.0388)	0.0949**(0.0390)
PERCEP	0.0195***(0.00741)	0.0251**(0.0104)	0.0148(0.00977)	0.0122(0.00990)
ACTION	0.0159**(0.00775)	0.0168*(0.0109)	-0.000109(0.0103)	0.00214(0.0105)
Demographic Characteristics				
HUJI	0.313**(0.136)		1.044***(0.218)	1.063***(0.220)
GENDER	0.182(0.137)		0.256(0.195)	0.257(0.197)
INCO1	-0.319*(0.193)		-0.138(0.309)	-0.0702(0.311)
INCO2	-0.291*(0.153)		-0.473*(0.249)	-0.407(0.250)
AGE1	0.303(0.387)			
AGE2	-0.0142(0.398)			
EDU			0.801***(0.207)	0.849***(0.212)
OLDMAN				0.360*(0.208)
PET				0.541* (0.277)
EMPLOY				-0.0949(0.208)
Observations	1,518	1,505	1,505	1,505

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

the second stage, the *finished* payment actions will be treated as an endogenous variable, and an interval regression models with endogenous explanatory variables will be applied to exam how the environmental preferences the *intended* supporting for urban river restoration.

Cameron (1991) introduces an internal model into the Contingent valuation estimation to correspond the referendum survey. The groups *yes* or *no* should be treated as censored over the interval $[-\infty, \tau_i]$ and $[\tau_i, -\infty]$ separately. Such treatment is a standard first-price model in the Contingent valuation estimation. Hite (et al., 2002), Cameron (1991) and Hanemann (1991) applied it in the estimation of non-market value goods. The extension of interval model to the general case of endogenous variables was considered in a non-parametric setting by (Hong &Tamer, 2003), building on the same techniques as in

(Manski & Tamer, 2003). However, these techniques seem rare in the applied literature, arguably because of their complexity. A simple two-step estimator can be defines in the same vein as the two-step estimator for interval models with endogenous explanatory variables by (Rivers & Vuong, 1988). The detail procedure will be show in the appendix.

The results from the econometric analysis are presented in Table 6. The dependent variable in the first stage is a binary variable *DONATION*, which means whether the respondent had a payment in the past two years. This variable represents if the action of payment have already be done before. Alternatively, the dependent variable in the second stage is WTP, which is the money willing to pay in the future. Since it is just a willingness rather than *true* payment, this information may be bias.

Correlations between two dependent variables and the preference variables (knowledge, belief, perception, and action) were strongest, with the expecting signs. The two variables encompassing knowledge about the environment (*KNOW*) and four variables encompassing perception for the existing pollution (*PERCEP*) best explained the public's behavior to support the restoration project, no matter what they *had already paid* or were *willing to pay*. The scale of environmental belief (*BELIEF*) and action (*ACTION*) are only strongly associated with the finished payment rather than the further payment, which implies the gap between *true* payment and willing to pay. Understanding this gap is important for the policy designs and carries out. Too high or too low payment will make the policy inefficient.

Correlations with socio-demographic characteristics were mostly weakest, but were in the direction expected for significant comparisons. The respondents with families with elders, children, or pets have positive preferences for the river program although they are not significant in statistic. This implies the heterogeneities are among the reporters. An exception is from the household register policy. The coefficient of *HUJI* and *EDU* is positively significant at 5% and 1% level in the models, implying the importance of household policy placed and education level are associated with protecting, conserving, and cleaning up the urban river environment.

Subsamples are separated into the two cities of Hangzhou and Nanjing from the pool date after the Chow test. Econometric results indicated the similar result as our expectation that the correlation between preference and behavior supported the ecosystem restoration, environmental protection, and clearing project, that is much stronger in Hangzhou (Table7).

Discussion and Conclusion

Many studies suggest that public preference significantly affects the ecosystem restoration. However, most research only employs some subjective or obscure concepts to assess residents' environmental preferences, such as some questions like: *Do you believe the polluted water may harm your health*, or *Do you think the river environment is satisfactory* (Damigos & Kaliampakos, 2003; Pruckner, 1995; Adamowicz et al., 1998; Rosenberger & Walsh, 1997).

A drawback is that it may subjectively lead to some considerable biases, since individual usually have their own criterion on environment and environment improvement. The objective perceptions (come from appearance or smell, such as sight, flair, auditory sense as well as imagination) employed in this study significantly decrease the biases in the process of preference estimation.

Table 7. Estimation results with two stage model in Hangzhou and Nanjing

	Dependent variable=WTP		*Dependent variable=WTP*
	Hangzhou		Nanjing
KNOW	0.110***(0.0343)		0.00270(0.0409)
BELIEF	0.146***(0.0567)		0.103*(0.0538)
PERCEP	-0.0208(0.0141)		0.0437***(0.0156)
ACTION	0.0382**(0.0163)		-0.0170(0.0193)
HUJI	0.805***(0.295)		1.181***(0.324)
GENDER	0.377(0.264)		0.0495(0.288)
INC1	-0.0367(0.423)		-0.278(0.449)
INC2	-0.109(0.347)		-0.915**(0.365)
EDU	0.539*(0.279)		0.986***(0.311)
Observations	825		680

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

We found that past behaviors are better explanatory variables than socio-demographic characteristics for explaining peoples' support for ecosystem restoration actions, which mirrors the findings of (Smith et al., 1997). The model explaining people who had anticipated some actions for support environment might have the higher explanatory power. Understanding that past involvement may influence support for restoration activities may stimulate managers to learn more about the thoughts and past experiences of key stakeholders before developing proposals for restoration activities, or programs to evaluate such proposals.

Geographical diversity on preference for river restoration exists, but is modest. This is largely caused by different traditions and culture in geography. For example, in the study area, both GDP and income per capita in Hangzhou is much higher than those in Nanjing. Excepting habit and custom, environment endowment also influenced the public's preference. Hangzhou is famous largely due to the West Lake, which attracts many tourists as well as local residents to spend their leisure time near the lake or river. People in Hangzhou might have strong environmental preference for protection and restoration because of the importance of water and riverside recreation for the city.

In China, both central and local governments are attempting to address environmental protection and recreational resources in urban areas. Due to restricted space, it is hard to find new land for environmental improvement in cities, for example, building new parks, green belts, or man-made lakes. An efficient way is to restore or improve the status of exiting natural resources like urban rivers or streams for public use. The results indicate individuals' preference for river restoration can largely justify public action for the restoration. It provides an important reference and foundation for the program design and evaluation.

This study helped to illuminate an efficient ways to measure the respondents conceive of restoration activities focused on ecological criteria (protection, conservation) and public-use criteria (e.g., access). These results should provide some reference point for the policy makers in urban water restoration, and builds some foundation for future investigation. But we should interpret it with caution. The robustness of the result of CV studies has been criticized for a long time and still is debated not only in the survey and questionnaire design but also in the estimation choice (Stevens et al. 1991; Cicchetti and Peck 1989; Bohm 1994; Cobbing and Slee 1994). Information deviation or information asymmetry always occurs in the survey process which often leads to a biased result.

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