**Resident Perception** and Willingness to Pay for the **Restoration and Revitalization of Urban Rivers** 

Dr. Lewis Cheung Associate Professor Department of Social Sciences The Education University of Hong Kong



Background of the study

- River management and modification work since the 1960s
- Channelizing, straightening, widening, deepening and diverting natural river courses.
- Flood prevention





#### Revitalization of the Urban River

- Reintroduce natural elements into channelized rivers
- Redesign and reconstruction of the river channel
- Physically and ecologically resemble the natural river course
- The completed revitalization projects were predominantly trials and small in scale.
- In 2015, the Drainage Service Department Proposed a strategy to restore a large-scale drainage and development drainage networks in newly developed areas

## Environmental & ecological

- Flood prevention
- Provide habitats for wildlife
- Reduce surrounding temperature
- Improve water and air quality





# Recreational & social

- Provide spaces and facilities for outdoor recreational
- Provide public social spaces





# Recreational & social

- Provide spaces and facilities for outdoor recreational
- Provide public social spaces



#### Landscape & aesthetic

- Improve the surrounding landscape and image of city
- Attract tourists
- Raise surrounding housing prices











Foreign case of river revitalization: Cheonggyecheon (Seoul, Korea)

- Located at downtown Seoul
- Revitalization project started since 2003
- Revitalization works :
  - Redesign and reconstruction of the river channel
  - Introduction of vegetation
  - Building of recreational facilities (e.g., man-made bridges)
- Outcome of revitalization :
  - Recovery of the river ecosystem <sup>,</sup>
  - Lowered the temperature of the surrounding environment
  - Conserved the history and culture of Seoul
  - Fostered economic and tourism development
- Cheonggyecheon is currently one of the most well-known tourist destination in Seoul



#### **Aims and Objectives**

- Understand how people value and perceive river restoration project.
- Adopt an economic valuation method (i.e. Willingness to Pay) to gauge the value of nonmarket environmental good such as the value of rivers to citizens.
- Explore the citizen's attitudes or other sociopsychological attributes (Place Attachment) that drive their WTP (Willingness to Pay) for river revitalization.

### Literature Review: Non-Market Environmental Goods Valuation

- Contingent Valuation Method (CVM) has been broadly adopted in environmental studies and valuation. E.g. sustainable energy use (Borchers et al, 2007; Hansla et al, 2008), and biodiversity conservation (Cheung et al. 2019; Martin-Lopez, 2007)
- Chen et al (2014) employed the CVM as a valuation tool to investigate the WTP of Belgium citizens regarding the restoration of meadows and reported that half of the respondents were willing to pay EUR 50 to support the project.
- Nielsen-Pincus et al (2017) studied the WTP of citizens for safeguarding ecosystem services in the Mackenzie River watershed (Oregon, USA) and reported that majority of respondents were willing to pay at least USD 0.50 per month, over 40% were willing to pay USD 1 a month.
- All these studies have successfully gleaned an idea on how much the local citizen support the project allowing relevant authority to determine whether the project should be done.

#### Literature Review: Attitude toward Ecosystem Restoration and Placement Attachment

- Some scholars have attempted to incorporate attitudes into their CVM studies of river restoration.
- Halkis and Matsiori (2014) ascertained that attitude in terms of option, direct use value and indirect use value had positive influences on the bid amount of people in a water conservation project in Greece.
- Mayerhoff ad Juergen (2006) developed an attitude-behaviour model and demonstrated that the environmental attitude of people was significantly and indirectly correlated with WTP
- Very limited studies have included place attachment in investigations of river restoration and indicated that place attachment was associated with their willingness to contribute money to river restoration programmes. Sarvilinna et al. (2018) demonstrated that place attachment could be a leading factor in influencing high-level WTP in Finland.

Questionnaire survey on resident's perception of river revitalization in Hong Kong

- Survey sites: 6 urban rivers in Hong Kong
- Target: Hong Kong residents aged 18 or above
- Total number of samples: 400
- This study aims to assess residents'
  - 1) Attitude on river revitalization and their level of place attachment
  - 2) Perceptions on the potential benefits of river revitalization
  - 3) Willingness to pay for river revitalization

#### Survey sites and Procedures

- The questionnaire survey was administered along 6 urban rivers in Hong Kong across Kowloon and the New Territories i.e. Kai Tak River, Shing Mun River, Lam Tsuen River, Kam Tin River, Tuen Mun River and Tung Chung River
- Target participants: aged 18 or above and administered between Sept and Dec 2020.
- A total of 520 individuals were approached, of whom 400 agreed to participate and complete the survey yielding a response rate of 76.9%

#### Perceptions on current conditions of urban river

- Residents generally have poor impressions on the conditions of urban river
- Especially in terms of water quality and turbidity



Note : Score 1 = Very poor, Score 5 = Very good

### Attitude on river revitalization

- Residents generally show support on river revitalization
- Particularly, as it may
  - Improve the landscape of the city
  - Provide recreational spaces and natural resources



Note: Score 1 = Totally disagree, Score 5 = Totally agree

Q2 – Q4 were reverse-coded, and the respective mean scores were 3.4, 3.59 and 3.27

# Perceptions on the potential benefits of river revitalization

- Residents generally perceived that benefits of river revitalization are important
- Residents do not pay as much attention on the economic benefits



## Proposed scenario of river revitalization in the questionnaire survey

Taking foreign cases like Cheonggyecheon as reference, the HK government will revitalize rivers in Hong Kong in multiple aspects, including:

- 1. Reconstruction and redesign of river course to resemble natural river forms
- 2. Reintroduction of vegetation and wildlife
- 3. Improve recreational and aesthetic features,

The revitalization is expected to improve the functions of rivers in all aspects, e.g., environmental, recreational, overall landscape

How much would you be willing to pay (per year) to support the rivers revitalization project mentioned above (HKD)?

#### Willingness to pay on river revitalization

- Around 67% of residents were willing to pay for the proposed scenario
- More residents were willingness to pay at the range of 50-300 HKD
- Median willingness to pay amount: 100 HKD



## Estimated potential amount of payment for river revitalization

#### Estimation formula : \$100 (HKD) x 67% x 6.33 million

Proportion of residents

that are willing to pay

Adult population of HK in 2021\*

Median willingness

to pay amount

### Total amount = 424 million

\*Based on the census figure by the Census and Statistics Department in June-Aug 2021

#### Data analysis on willingness to pay

- Logistic and ordinal regression analysis were employed
  - Logistic regression: To distinguish between positive & negative voters in willingness to pay
  - Ordinal regression: To find out the relationships between predictors
    & residents' willingness to pay
- Predictors of willingness to pay adopted:
  - Residents' attitude on river revitalization
  - Residents' place attachment

#### Logistic regression analysis of positive votes and negative votes in willingness to pay

 Residents with positive attitude, and higher level of place dependence & place identity were more likely to pay for the proposed revitalization Table 1. Logistic regression analysis of positive votes and negative votes in willingness to pay (n = 400).

	В	SE	Significance	Odds Ratio
(Constant)	-5.388	1.052	0.000	0.005
Attitude	0.582	0.251	0.020	1.790
Place attachment				
Place dependence	0.510	0.210	0.015	1.665
Place identity	0.819	0.240	0.001	2.267
Place affect	0.112	0.265	0.674	1.118
Place social bonding	0.028	0.223	0.900	1.028
Nagelkerke $R^2$	0.214			
Hosmer and Lemeshow test	35.508, df = 8, <i>p</i> > 0.05			

Reference category: Negative votes.

### Ordinal regression analysis of the relationship between willingness to pay with attitude and place attachment

- Residents with positive attitude, greater level of place dependence & place social bonding were willing to pay higher amounts
- Residents with greater level of place affect were willing to pay smaller amounts

Table 2. Ordinal regression analysis of the relationship between willingness to pay with attitude and place attachment (n = 268).

	Estimate (95% CI)	SE	Significance
Attitude	1.627 (1.166–2.087)	0.235	0.000
Place attachment			
Place dependence	0.736 (0.302-1.171)	0.222	0.001
Place identity	-0.289 (-0.81-0.231)	0.265	0.276
Place affect	-0.763(-1.310.215)	0.279	0.006
Place social bonding	0.752 (0.332-1.172)	0.214	0.000
Nagelkerke <i>R</i> <sup>2</sup>	0.323		
prondent variable: Willingness to pay			

Dependent variable: Willingness to pay.

### **Discussion & Implications**

- Residents were generally not satisfied with the current conditions of urban rivers & showed support towards river revitalization
- Emphasis on river revitalization should be placed on restoring the natural environment and creating a good overall image for the city and society
- Existing features and elements of urban rivers should be conserved to provide a feeling of familiarity
- The WTP amounts of respondents in current study were relatively low comparing with other studies in USA and Europe. However, having over 66% of the respondents to be willing to pay is still a considerable proportion indicating that they are perceiving river revitalization to be as significant as other public services that concerns the everyday lives of people.

### **Discussion & Implications**

- The place attachment subconstructs displayed varying results. It was particularly surprising that the place effect was negatively associated with the bid amount of WTP.
- The place effect is found uncommon to be negatively related to other proenvironmental variables. One reason to explain this correlation could be the triggering of protective behaviour by the place effect. Protected behaviour refers to when people with a high level of place affection want to preserve the current conditions of a place to which they are emotionally attached.
- Therefore, revitalization works may lead to negative emotions if the current setting changes.

#### **Discussion & Implications**

 All other subconstructs of place attachment namely place dependence, place identity and place social bonding are positively correlated with WTP votes or WTP amounts which are consistent with previous studies.

#### Conclusion

- This finding provides insight for future river revitalization work and policy formulation; notably, improving the environment of urban rivers and promoting nature may be keys for gaining support from the public.
- The study also suggested that river revitalization should be placed on restoring the natural environment and creating a good overall image for the city and society. Additionally, certain existing features and elements of urban rivers should be conserved to provide a feeling of familiarity.

### Thank You