

ESTIMATION OF THE TOTAL ECONOMIC VALUE OF IMPROVING WATER QUALITY IN URBAN AREA (CASE STUDY ON METRO MANILA WATERBODIES)

Shokhrukh Jalilov

Water & Urban Initiative, United Nations University –
Institute for the Advanced Study of Sustainability

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BACKGROUND: WATER RESOURCES

- Crucial to human health and the natural environment
- Vital for the world economy

However, have been degraded and depleted, in terms of:

- Water quantity
- Water quality

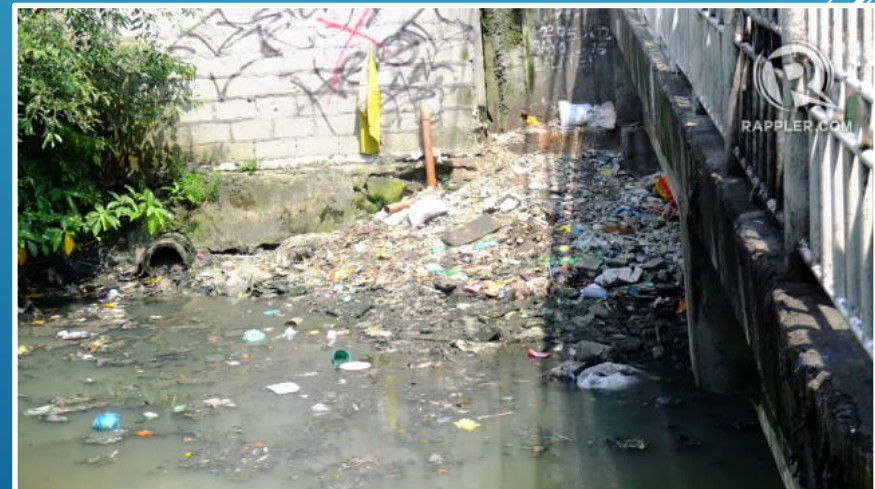
From economic perspective, water resources are over-extracted and are not efficiently allocated due to:

- Market and government failures
- Private costs and benefits diverge from social costs and benefits

INTRODUCTION: LOW QUALITY OF METRO MANILA WATERBODIES

According to DENR (*Department of Environment and Natural Resources*):

- only 20% to 30% of Metro Manila homes are connected to central sewage system (*Manila Water and Maynilad Water Services*).
- The other 70% depend on septic tanks, which may leak human waster into underground aquifers.



INTRODUCTION: LOW QUALITY OF METRO MANILA WATERBODIES

- Some may not even have septic tanks – meaning untreated residential waste flows directly into the waterbodies.
- Informal settlers who live right next to waterways cause another problem. Lack of awareness and discipline means they throw trash and defecate directly into the water.
- Low quality of urban waterways means low quality of Manila Bay.



GOVERNMENT RESPONSE: METRO MANILA ADOPT-AN-ESTERO OR WATERBODY PROGRAM

- Increasing of local awareness – Information campaign.
- Cleaning of waterbodies (out of the more than 240 waterbodies in the mega city, only 27 or 11% are covered by the program).
- The DENR has enforced a deadline for utility companies to achieve 100% coverage of Metro Manila by 2035.
- By law, no structures are allowed in the 3-meter easement beside waterbodies - after the 3rd warning, a team goes to the houses and begins demolition.
- New water treatment facilities.

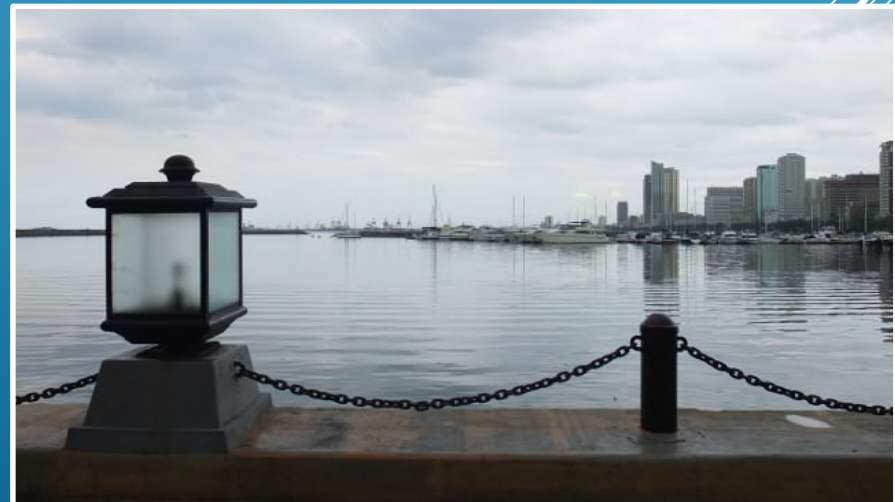
WATER QUALITY MANAGEMENT ISSUES

CURRENT STUDY QUESTION

- Generally, water quality improvement programs can be very significant even for the mega city like Manila
- The costs could vary considerably depending on existing or planned water quality standards, scale and characteristics of the adopted measure, etc.
- Cost of potential treatment measures helps water managers to evaluate costs of water quality improvement
- **However, what are the benefits of maintaining or improving the quality of the urban waterbodies in Manila?**
- **Because water quality regulation is expensive this study is intended to estimate the benefits of water quality improvement**

STUDY OBJECTIVES: ESTIMATION OF BENEFITS OF WATER QUALITY IMPROVEMENT

1. Highlight the need for economic analysis
2. Conduct economic evaluation of improving water quality
3. Demonstrate how method can be used for sustainable water resources management



ECONOMIC VALUE OF WATER

USE VALUE	NON-USE VALUE
Direct use values (irrigation, domestic and industrial supply, energy resources, transport and navigation, recreation, wildlife harvesting, etc.)	Existence value (value the conservation of a resource which will never be directly used by you or by future generations)
Indirect use values (flood control, nutrient retention, storm protection, etc.)	Bequest value (value the fact that future generations will have opportunity to enjoy a resource)
	Altruistic value (resource will be available to others in the current generation)
	Option values (potential to provide economic benefits to humans in the future)
	Biodiversity
	Cultural heritage

VALUATION METHODS

□ Revealed preferences

or Indirect valuation methods look for related or surrogate markets in which the environmental good is implicitly traded

- Hedonic pricing
- Travel cost method

□ Stated preferences

Or Direct valuation methods have been developed to solve the problem of valuing those environmental resources that are not traded in any market, including surrogate ones.

- Contingent valuation method
- Choice experiment method

STUDY METHODOLOGY: CONTINGENT VALUATION METHOD (CVM)

- CVM to estimate Willingness To Pay (WTP) to prevent water quality degradation and WTP to support improvements in water quality in a city's waterbodies
- Scenario of action: feasible and reliable
- Enforcement mechanisms through: increased income taxes, property taxes, and increased housing costs

STRUCTURE OF CVM

THE TARGET POPULATION – METRO MANILA HOUSEHOLDS

Survey consists of three parts:

1. Introductory section - Information about the city's waterbodies, water quality, pollution sources, and the resulting ecological impacts from water quality degradation. Reveal people's behavior – ask to identify which factors, if any, motivate them to prevent degradation of water ecosystems
2. Main section – identify Willingness To Pay (WTP)
3. Demographic questions

DIMENSIONS OF WATER QUALITY

Level	Water clarity	Color	Algae	Nutrient levels	Oxygen	Odor	Aquatic life
1	Excellent	None	Very little	Very low	Very high	No	Very healthy, abundant
2	Good	Little	Little	Low	High	Little	Healthy, abundant
3	Fair	Some	Moderate	Moderate	Moderate	Little	Somewhat healthy, abundant
4	Poor	Noticeable	High	High	Low	Noticeable	Unhealthy, scarce
5	Poor	Considerable	Very high	Very high	Low to no	Strong offensive	Unhealthy, scarce or none present

Source: Van Houtven et al., 2014

WATER QUALITY SCENARIOS



I. Current condition



II. Irrigation & Livestock







III. Fishery & boating



IV. Bathing & swimming

SURVEY DESIGN: SCENARIOS

HOW MUCH ARE YOU WILLING TO PAY FOR?

	Classification	Description	Attribute associated
1	Class AA	Waters intended as public water supply requiring only approved disinfection to meet the PNSDW	
2	Class A	Waters suitable as water supply requiring conventional treatment to meet the PNSDW	
3	Class B	Waters intended for primary contact recreation (e.g. bathing, swimming, skin diving, etc.)	
4	Class C	Waters for fishery, recreation/boating, and supply for manufacturing processes after treatment	
5	Class D	Waters intended for agriculture, irrigation, livestock watering, etc.	

METRO MANILA ADMINISTRATIVE DIVISION



Sampling size –
1186
households


Questions –
open-ended
and close-
ended

Methodology –
econometric
analysis

STRATIFIED RANDOM SAMPLING

	Absolute Numbers	%		Number of respondents	
Metro Manila	11,855,975	100.00	proportion	1186	which is 1% of total population
City of Malabon	353,337	2.98	0.03	35	respondents
City of Navotas	249,131	2.10	0.02	25	respondents
City of Valenzuela	575,356	4.85	0.05	58	respondents
Caloocan City	1,489,040	12.56	0.13	149	respondents
City of Marikina	424,150	3.58	0.04	42	respondents
City of Pasig	669,773	5.65	0.06	67	respondents
Pateros	64,147	0.54	0.01	6	respondents
Taguig City	644,473	5.44	0.05	64	respondents
Quezon City	2,761,720	23.29	0.23	276	respondents
City of Makati	529,039	4.46	0.04	53	respondents
City of Mandaluyong	328,699	2.77	0.03	33	respondents
City of San Juan	121,430	1.02	0.01	12	respondents
City of Manila	1,652,171	13.94	0.14	165	respondents
City of Las Piñas	552,573	4.66	0.05	55	respondents
City of Muntinlupa	459,941	3.88	0.04	46	respondents
City of Paranaque	588,126	4.96	0.05	59	respondents
Pasay City	392,869	3.31	0.03	39	respondents
Total	11,855,975	100.00	1.00	1186	respondents

STUDY PARTNERS: POSSIBLE LOCAL STAKEHOLDERS AND BENEFICIARIES

- Environmental Management Bureau (EMB) of DENR (Department of Environmental and Natural Resources)
 - PRRC (Pasig River Rehabilitation Commission)
 - Department of Health (DOH)
 - Local municipalities, universities
 - Others...
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CONCLUSION: POLICY IMPLICATIONS

- To assist in the design of efficient, equitable and sustainable policies for water resources management in face of water pollution
- The results can be used to compare benefits and costs of the specific management strategies for improving water quality of Metro Manila waterways. As expected, policy-making authorities will be able to compare costs of the certain water quality improvement measure with identified benefits
- Results of the study could be used by other Philippines cities' authorities through benefit transfer method

MAJOR ISSUES IN JAKARTA

□ Environment

- Water pollution: concentration of DO, Ni, Cu, Zn, Hg above standard
- Land subsidence
- Lack of open green spaces

□ Water Resources

- Low quality and quantity of clean and raw water especially in north Jakarta
- Limited coverage of piped wastewater network
- Excessive extraction of groundwater that causes land subsidence and sea water intrusion

Source: Jakarta Capital City Administration

THANK YOU!

QUESTIONS & COMMENTS?

Water & Urban Initiative

UNU-IAS (United Nations University

Institute for the Advanced Study of Sustainability)

5-53-70 Jingumae, Shibuya-ku,

Tokyo 150-8925

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REFERENCES

- Van Houtven G., Mansfield, C., Phaneuf, D. J., von Haefen, R., Milstead, B., Kenney, M.A., Reckhow, K.H. 2014. Combining expert elicitation and stated preference methods to value ecosystem services from improved lake water quality. *Ecological Economics*, 99, 40-52
- Grey Solutions for Urban Water Management: Jakarta case. Presentation by Feirulla Irzal, MBA. Senior Planner. Jakarta Capital City Administration.
- Photos from Google Images unless otherwise noted