

COMMUNITY VALUATION OF WATER AS A RESOURCE
A CASE OF KATOSI LANDING SITE ON SHORES OF LAKE VICTORIA

BY

MUGALU SIMON

BU/UG/2012/123

SUPERVISOR

ASSOCIATE PROFESSOR: ISABIRYE MOSES

**A RESEARCH REPORT SUBMITTED IN PARTIAL FULLFILMENT OF THE REQUIREMENT
FOR THE AWARD OF A DEGREE IN BACHELOR OF SCIENCE IN NATURAL RESOURCE
ECONOMICS OF BUSITEMA UNIVERSITY.**

JUNE, 2015

DECLARATION

I **Mugalu Simon** hereby declare that this report is my original work. It has never been submitted to any university or any higher institution of learning for any academic award. Thus, I accept to be responsible for everything contained in it.

Signature.....



Date.....

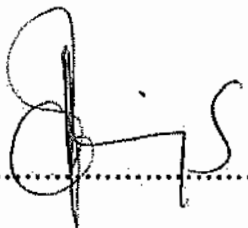


Mugalu Simon.

Student

APPROVAL

This is to acknowledge that the work entitled "Community valuation of water as a resource. A case of Katosi landing site on shores of Lake Victoria" has been done by Mugalu Simon under my close supervision and is now ready for submission to the Faculty of Natural Resource and Environmental Science.

Signature 

Date..... 17/06/2015

ASSOCIATE PROFESSOR: ISABIRYE MOSES

BUSITEMA UNIVERSITY

SUPERVISOR

DEDICATION

I dedicate this report to father Mr Lukowe James who has sacrificed everything to ensure my academic success, my mum the late Nalumu Jessica Nakyobe, mum Namusoke Rose and mum Nabawanuka Alice my brothers and sisters. I also dedicate it to my granny Nakibowa Aidah as a sign of appreciation for her unending efforts and good up bringing to my wellbeing. Thank you for giving me such a moral foundation on which I have managed to come this far. May the good lord reward you abundantly.

ACKNOWLEDGEMENT

I convey my sincere appreciation to the almighty God for the gift of life, knowledge, wisdom, courage and guidance he always avails me.

I appreciate the support, love, care and guidance my family always extends to me despite their meagre resources in comparison to my infinite needs, they always strive to make my ends meet. For that reason, I express my heart felt gratitude to my family members, Mr Lukowe James, Bukirwa Jane, Nakibowa Aidah, Namusoke rose, Mr Katantazi Yakobo, Nabawanuka Alice among others.

My sincere thankful goes to my research supervisor professor Isabirye Moses for the academic guidance and advice he always rendered to me despite his tight schedules for the successful completion of this research critique.

I extend my deep indebtedness to the Busitema University Namasagali campus teaching and non-teaching staff whose moral, friendly and academic support has enabled me to accomplish this work. Thank you very much for your encouragement, guidance and supervision towards my academic flourishing.

My appreciation goes to the Fisheries Officer Katosi landing site Mr. Luyombya silage and Mukono District Fisheries Officer Mr. Mulambi Romulus who guided me during data collection to come up with high quality data.

I also express my sincere gratitude to all my friends who have contributed positively to my academic excellence, Atugumya Armstrong Barcelona, Natrindah Zerubabeli, Kyomugasho Sharon, Ssemakula Isma, Katabarwa Collins Atwiine, Nahayo Wyclif, Nambooze Josephine, Namaweje Winnie, Ssuubi victoria and all my course mates who have provided academic and friendly support during the hard times. May the lord bless you for your kind hearts.

TABLE OF CONTENTS

DECLARATION	i
APPROVAL	ii
DEDICATION	iii
ACKNOWLEDGEMENT	iv
TABLE OF CONTENTS	v
LIST OF TABLES	x
LIST OF FIGURES	xi
LIST OF ACRONYMS	xii
ABSTRACT	xiii
CHAPTER ONE	1
INTRODUCTION	1
1.1 Background of water valuation and community	1
1.1.1 Water	1
1.1.2 Water valuation	1
1.1.3 Community conservation and willingness to pay	2
1.2 Water valuation	3
1.2.1 Global perspective	3
1.2.2 Ugandan perspective	5
1.2.3 Water in Lake Victoria	6
1.3 Statement of Problem	7
1.4 Significance of the study	8
1.5 Limitations of the study	8
1.6 Objectives	9
1.6.1 Main objective	9

1.6.2 Specific objectives	9
1.7 Research questions	9
1.8 Conceptual framework	10
CHAPTER TWO	11
LITRETURE REVIEW	11
2.1 Introduction	11
2.2 Water in Uganda	11
2.3 Major uses of water	12
2.4 Community's willingness to pay for the water as a resource	16
2.2.1 Valuation of water	17
2.5 Practices that reduce water quality and those that preserve	21
2.5.1 Practices that reduce water quality.	21
2.5.2 Practices that conserve water resources:	27
2.6 ways through which the community can adopt to water conservation practices.....	28
CHAPTER THREE	29
METHODOLOGY	29
3.1 Introduction	29
3.2 Research designs.....	29
3.3. Study area	29
3.4 Sample size and sampling techniques	30
3.4.1 Study population.	30
3.4.2 Sample size	30
3.4.3 Sampling techniques	30
3.5 Data types and collection.....	30
3.5.1 Data types.....	30

3.5.2 Methods of data collection.....	31
3.6 Data collection tools.....	32
3.7 Data processing and analysis.....	32
3.8 Scope of the study.....	32
3.9 Ethical considerations.....	32
CHAPTER FOUR.....	33
RESULT PRESENTATION AND DISCUSSIONS.....	33
4.1 socio-economic characteristics.....	33
4.1.1 Location of the respondents.....	33
4.1.2 Sex of respondents.....	34
4.1.3 Education level of respondents.....	34
4.1.4 Age of respondents.....	35
4.1.5 Marital status of respondents.....	36
4.1.6 Main occupation of respondents.....	37
4.1.7 Monthly financial status of respondents.....	38
4.1.8 Household Members who are working and not working.....	39
4.1.9 Household size.....	40
4.2 Social economics and water use.....	41
4.2.1 Uses of water by most community members.....	41
4.2.2 Water sources.....	42
4.2.3 Amount of water used from different alternative water sources.....	44
4.2.4 The largest group that engage in fetching water from the lake.....	44
4.2.5 Expected time to stay in Katosi.....	45
4.2.6 Information about water resource conservation.....	46
4.3 Typical valuation of water resource and other benefits from the water resource.....	48

4.3.1	Cost of water	48
4.3.2	Willingness to pay for the water resource.....	49
4.3.3	Willingness to pay in relation to different socio-economic characters.....	50
4.3.4	Willingness to pay basing on environmental awareness.....	52
4.3.5	Modeling willingness to pay over different multiple variables.....	53
4.3.6	Analysis of willingness to pay values	55
4.3.7	Analysis of willingness to pay for improved lake water per 20litre jerrycan.....	55
4.3.8	Other benefits from the water resource.....	56
4.3.9	Willingness to pay for other benefits of the water resource.	58
4.3.10	Analysis of the relationship between the willingness to pay to improve water quality and other multiple benefits from the water resource.....	59
4.3.11	Analysis of the difference between the actual costs in relation to willingness to pay values for water quality improvement.....	60
4.4	Community practices that reduce and conserve water as a resource.....	61
4.4.1	Practice that reduce water quality.....	61
4.4.2	Practices that conserve water resource.	64
4.5	Strategies on how the community can adapt to water conservation practices.....	65
	CHAPTER FIVE	70
	CONCLUSIONS AND RECOMMENDATIONS	70
5.1	Conclusions	70
5.2	Recommendations	71
5.3	Areas of future research.....	71
	REFERENCES	72
	APPENDICES	76
	Appendix 1 research questionnaire.....	76
	Appendix 2: Willingness to pay to improve the water quality with in respondents who boil lake water for drinking Cross tabulation	79

Appendix 3: field photos.....	79
Appendix 4: Cross tabulation of age of the respondent in relation main occupation of the respondents.....	81

LIST OF TABLES

Table: 2. 1. Domestic water demand (000m ³ /year) by catchment	14
Table: 4. 1. Selected characteristics of the urban population	38
Table: 4. 2. Different uses of water from the lake	41
Table: 4. 3. The alternative source of water used by the respondents	43
Table: 4. 4. Jerrycans of water the respondent fetch from the another source per day.....	44
Table: 4. 5. Correlation between Households with other members who do not fetch water and willingness to pay	45
Table: 4. 6. Cross tabulation of Willingness to pay to improve the water quality and how long the person expect to stay at this place in months.....	46
Table: 4. 7. Different means through which respondents obtains information about environmental awareness.....	47
Table: 4. 8. Viability of environmental information given to community members.....	48
Table: 4. 9 Summary of willingness to pay perception over different categories of the socio-economic variables	50
Table: 4. 10. Willingness to pay basing on environmental awareness.....	52
Table: 4. 11. Results of modeling WTP in relation to environmental awareness.....	52
Table: 4. 12. Results of the multinomial logistic regression analysis.....	53
Table: 4. 13. Descriptive statistics for willingness to pay values per month.....	55
Table: 4. 14. Other benefits of the water resource	56
Table: 4. 15. Cross tabulation of the WTP for other benefits and main occupation of the respondents	58
Table: 4. 16. The chi-square test for the statistical significance of expenditure of respondents in explaining the response to WTP.....	59
Table: 4. 17. Difference between WTP for water quality improvement and other benefits.....	60
Table: 4. 18. Different practices which majorities of respondents engage in to protect water from being polluted:	64
Table: 4. 19. Best ways of reaching environmental information to community members.....	66

LIST OF FIGURES

Figure: 1. 1. Conceptual framework	10
Figure: 2. 1. Total economic value of water	19
Figure: 4. 1. A pie chart showing location of respondents	33
Figure: 4. 2. A pie chart showing sex distribution of respondents	34
Figure: 4. 3. Pie chart showing segments of education level of respondents	35
Figure: 4. 4. A bar graph summarizing age brackets of respondents	36
Figure: 4. 5. Pie chart showing marital status of respondents	36
Figure: 4. 6. A bar graph illustrating different main occupation of respondents	37
Figure: 4. 7. A graph showing expenditure status of respondents in Ug shs/month	38
Figure: 4. 8. Number of household members who are working	39
Figure: 4. 9. Number of dependents in households	40
Figure4: 10. A histogram showing the household size of respondents.....	40
Figure: 4. 11. A comparative bar graph showing the relationship between WTP and expected time to stay in current place (Katosi).....	46
Figure: 4. 12. Cost of water from different water sources in relation to number of respondents...	48
Figure: 4. 13. Major identified practices that reduce water quality	62

LIST OF ACRYONMS

BMU	Beach Management Unit
CVM	Contingent Valuation Method
DWD	Directorate of Water Development
EHD	Environmental Health Division
EMA	Environmental Management Authority
EPA	Environmental Protection Agency
FAO	Food and Agriculture Organization
IPCC	Intergovernmental Penal on Climate Change
IRBM	Integrated River Basin Management
LVEMP	Lake Victoria Environmental Management Programme
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
MWE	Ministry of Water and Environment
NEMA	National Environment Management Authority
NGO	Non-Government Organization
NWAP	National Water Action Plan
NWP	National Water Policy
NWSC	National Water and Sewage Cooperation
SPSS	Statistical Package for Social Scientist
TEV	Total Economic Value
UBOS	Uganda Bureau of Statistics
UNCED	United Nations Conference on Environment and Development
UNEP	United Nations Environmental Programme
WHO	World Health Organization
WTA	Willingness to Accept
WTP	Willingness to Pay

ABSTRACT

The study on Community valuation of water as a resource a case of Katosi landing site on the shores of Lake Victoria in Mukono district aimed at valuation of lake water as a resource. WTP is a valuation tool that can easily enable us to attach a monetary value to such open and multipurpose resource although there other methods like production factor, market price, hedonic pricing and others. There is a variety of benefits from the lake ranging from water which is almost a must to all community members for domestic, crop and livestock production and many others accompanied by other benefits such as fish, transport means, fresh air, recreation and good aesthetic view, pasture along the shore line, rainfall formation among other consumptive use and non-consumptive use. Although all these services and product from the lake are declining due to escalating contamination of water quality due to the disposal of solid and liquid waste by members around it, encroaching on vegetation near the lake among others. Never the less, some people engage in practices which help in reducing lake water contamination such as proper waste management, practicing better agronomic practices and spreading environmental awareness information. Majority of people are really willing to pay for lake water improvement with a mean pay value of 150 Ug shs per 20litre of improved lake water although the value is less than the mean cost they incur to obtain a 20litre jerrycan from other sources which is approximately 400 Ug shs. While the willingness to pay for multiple benefits form the lake is slightly higher than for one product that is water. Socio-economic characteristics some of them are significant in explaining the variation in the willingness to pay perception and values at large. This was tested using a multinomial logistic regression model. Different strategies were mentioned through which the community can adopt the concept of lake water conservation using the available measures put in place by the local governing community and the government. Strategies such as setting up and enforcing laws and ordnance that govern lake water use, setting up general cleaning days, prepackaging measures with in some income generating activities, massive sensitization, mobilization and monitoring people who conduct their activities near the lake among others. From the research, recommendations to the government if it's to conserve these open water resources with a multiple uses such as lakes which provide water, fish, and others non-consumptive uses, massive sensitization should be done to the local users to ensure that they are availed with the relevant environmental information which will enable them to use the lake in a sustainable manner to ensure continued provision of safe water and other non-water benefits.

Key words: Willingness to pay, water, alternative water sources, community, conservation

CHAPTER ONE

INTRODUCTION

1.1 Background of water valuation and community.

1.1.1 Water

Water is a binary compound that occurs at room temperature with a clear colorless and tasteless odorless liquid. It freezes into ice at 0 degrees centigrade and boils at 100 degrees centigrade and it's widely used as a solvent. Water covers 71% of the Earth's surface ("CIA - The world fact book" Central Intelligence Agency, Retrieved 20 December 2008), It is vital for all known forms of life. On Earth, 96.5% of the planet's water is found in seas and oceans, 1.7% in groundwater, 1.7% in glaciers and the ice caps of Antarctica and Greenland, a small fraction in other large water bodies, and 0.001% in the air as vapor, clouds (formed of solid and liquid water particles suspended in air), and precipitation (Gleick, P.H., ed. (1993). Only 2.5% of the Earth's water is fresh water, and 98.8% of that water is in ice and groundwater. Less than 0.3% of all freshwater is in rivers, lakes, and the atmosphere, and an even smaller amount of the Earth's freshwater (0.003%) is contained within biological bodies and manufactured products

Water is life. Without water there would not be life on Earth. We all depend on water people, business and ecosystems. At the same time, people and business also impact water. We use it without realizing its real value and often take the resource itself and the services it provides for granted.

1.1.2 Water valuation

Values are generally considered to define what stakeholders care about in water resources management. Therefore, understanding what drives stakeholders means understanding the values that water resources represent to them (Keeney, 1994a; Pearce, 2002).

Valuation is the process of expressing the value of a particular action or object (Farber, Costanza and Wilson, 2002). This is important because these values determine whether stakeholders consider an existing situation to be problematic and whether they regard a certain solution as favorable. In water resources management processes, stakeholders value certain actions or objects depending on their contribution to the goals and objectives (here including economic, social and political objectives, as well as objectives that are culturally defined, related to tradition or religion). Therefore, valuation

REFERENCES

- "Dublin Statement on Water and Sustainable Development" World Water Assessment Programme
http://www.unesco.org/water/wwap/facts_figures/valuing_water.shtml
- 2030 Water Resources Group, (2009)** Charting Our Future Water, Economic frameworks to inform decision making
- 2nd UN World Water Development Report (2006)** Uganda National Water Development Report
- Agudelo J.I. (2001)** "The Economic Valuation of Water Principles and Methods" Value of Water Research Report Series No. 5 August 2001. IHE, Delft, Netherlands (www.unesco-ihe.org/downloads/projects/value_of_water/05.pdf)
- Baker, L.A.A. herlily and P. Kaufmann (1991)** Acidic lakes and streams in the US. Role of acidic deposition science 252:1151-1154
- Barr engineering company (2008)** Water withdrawal and conservation practices, Prepared for Michigan chamber of commerce
- Canadian Council of Ministers of the Environment (2010)** Water Valuation Guidance Document
- Chandan chakraborty, et al (2013)** Analysis of the Causes and Impacts of Water Pollution of Buriganga River: A Critical Study
- Courant, P. and R. Porter (1981)** "Averting Expenditures and the Cost of Pollution", JEEM, 8,
- Directorate of Water Development (1999)** "National Water Policy Uganda
- Dr. Callist Tindimugaya (2010)** Presentation made during the Water is Life project workshop, 3rd November 2010, Makerere University, Kampala. Commissioner, Water Resources Regulation in Ministry of Water and Environment
- EMA (1999)** Annual report of the Environmental Management Authority (EMA), Prepared by the Environmental Management Authority of Trinidad and Tobago
- Freeman III A.M, R.J. Kopp & V.K. Smith (1993)** Non-use values in natural resource damage assessments. Valuing natural assets, the economics of natural resource damage assessment, Washington, D.C

Gitonga, M (2001) Report on Fish Stock Status in Lake Victoria, Ministry of Agriculture and Rural Development, Fisheries Department, Kenya

Gleick, P.H., ed (1993) Water in Crisis: A Guide to the World's Freshwater Resources. Oxford University Press. p. 13, Table 2.1 "Water reserves on the earth

Glenn, M. Lange (2008) Valuation of Water Resources, the Earth Institute at Columbia University

Hecky, R.E., Bugenyi, et al (1994) DE oxygenation of the deep water of Lake Victoria, East Africa Limnology and Oceanography 39 (6), 1476–1481

Hosking, S.G, Mario Preez (2004) The Valuation of Water for Conservation Projects in South Africa. Journal of Development Southern Africa, Vol. 21, No. 2, June

<http://www.conserve-energy-future.com/HowFossilFuelsWork.php>

<http://www.conserve-energy-future.com/sources-and-causes-of-water-pollution.php>

http://www.conserve-energy-future.com/wp-content/uploads/2013/04/Oil_Spille1430999125209.jpg

IPCC (2012) Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation, a Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge, UK, and New York, NY, USA, 582 fpp

Jochem Jantzen (2006) The economic value of natural and environmental resources

Kennedy & Donkin Power Ltd (1996) "Hydropower Development Master Plan - Part I, Uganda Electricity Board, Uganda"

Kulshreshtha, S.N (1998) "A Global Outlook for Water Resources to the Year 2025" Water Resources Management 12 (3): 167–184).

Lake Victoria Environmental Management Program (Uganda) 1997. Project Report

Linsley, M.A, Kohler and J.L.H. Poulhus (1982) Hydrology for engineers 3rd edition McGraw-Hill new York

Louis, G, Magpili. L & Singleton. A (2006) Capacity assessment and mapping of the municipal sanitation infrastructure in Tobago. Working paper by The University of Virginia, Systems and Information Engineering, U.S.A

- MAAIF (2001)** Fisheries Department Annual Report.
- Ministry of water, lands and environment (1999)** National water policy for Uganda
- Miriam Z. Hammer (2002)** Valuation of American Indian land and water resources: a guidebook
- Mugi Raharjo and I. Awatara (2012)** Economic valuation of water resources conservation area in Surakarta city
- Mukono District 5 Year Development Plan (2010-2015)**
- Nam, O. Khanh and Son T. Vo Hung (2008)** Household Demand for Improved Water Services in Ho Chi Minh City: A Comparison of Contingent Valuation and Choice Modelling Estimates, Research Report, Vietnam.
- National Development Plan (2010/2011-2014/2015)**
- NEMA (2010)** State of the Environment Report for Uganda 2010, National Environment Management Authority (NEMA), Kampala
- NEMA (1998)** State of the environment report for Uganda 1998 National Environment Management Authority (NEMA), Kampala
- NEMA (2000)** State of the environment report for Uganda 2000, National Environment Management Authority (NEMA) Uganda Kampala
- NEMA (2005)** State of the Environment Report for Uganda, 2004/05, National Environment Management Authority (NEMA) Uganda Kampala
- Nesha B. Borg and R. Scarpa (2010)** Economic valuation of coastal water quality improvements in Tobago
- NOAA (2012)** Answers to La Niña Frequently Asked Questions. National Oceanic and Atmospheric Administration (NOAA) Available at www.climate.noaa.gov/lanina_new_faq.html
- Northern Ireland environmental agency (2009)**
- OECD (2012)** OECD Environmental Outlook to 2050: The Consequences of Inaction. Organization for Economic Co-operation and Development (OECD)

Olen Paul Matthews, David S. Brookshire, Michael E. Campana (2000) The economic value of water: results of a workshop in Caracas, Venezuela

Prof. Ahmed Mansour (2005) Environment and health impacts of water pollution

Republic of Uganda (1995) "The Constitution of the Republic of Uganda"

Roy J et al (2002) "An Analysis of Demand of Water Quality in Arsenic prone areas of West Bengal" South Asian Network for Development and Environmental Economics (www.sandeeonline.org).

Saundry, P (2013) Major rivers, lakes, mountains, and other terrestrial features of Uganda, Retrieved from <http://www.eoearth.org/view/article/154364>)

Seraj, Kazi Faisal (2008) Willingness to pay for Improved Sanitation Services and Its Implication on Demand Responsive Approach of BRAC Water, Sanitation, and Hygiene Program, Research and Evaluation Division (RED) Working Paper No 1, Bangladesh

Singh R, Franceys R, Kumar V (2003) "Water Supply Projects. A Case Study of Varanasi" and Chandauli Districts The Journal of the Institution of India V:84 Sept 2003

U.S. Environmental Protection Agency June (2012) Safe and Sustainable Water Resources, strategic research action plan 2012-2016

UBOS (2012) Statistical abstract

UBOS (2014) National population and housing census 2014, Provisional results, November revised edition.

UBOS (2002) Uganda population and housing census analytical report, Population size and distribution

UNCED (1992) Dublin water principles

UN-Water (2011) Policy Brief: Water quality. United Nations-Water

UN-Water, World Water Assessment Programme (2006) "National Water Development Report: Uganda. Prepared for 2nd UN World Water Development Report "Water, a shared responsibility" Retrieved 2008-05-05., p. 85

Water Aid (2006) "Uganda country strategy 2006 - 2011" Retrieved 2008-05-08., p. 8; 29