

CLEANUP OF THE BURIGANGA RIVER
INTEGRATING THE ENVIRONMENT INTO
DECISION MAKING

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This thesis is presented for the degree of Doctor of Philosophy
Murdoch University
2003

I declare that this thesis is my own account of my research
and contains as its main content work which has not
previously been submitted for a degree at any tertiary
institution.

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Abstract

This research attempts to fill in some specific gaps in the area of economic valuation of non-market goods and services with respect to development projects, and the integration of those values in the policy decision-making process. The concept and theory of non-market valuation and project appraisal are examined. In a developing country context, the conventional contingent valuation method is extended to include respondents' contribution in terms of time, irrespective of their decision to contribute money. This extension of the conventional contingent valuation method allows the inclusion of economic activities that are non-monetized and transactions in the form of 'barter exchange', which are typical for developing countries such as Bangladesh. The values generated by this new approach are integrated into an extended cost-benefit analysis, which reveals that the cleanup of dying rivers is not only an environmental imperative, but is also socially and economically justifiable. Apart from the theoretical investigation, another important dimension of this research is to contribute to the policy decision-making process with regard to public sector investment in developing countries.

The Buriganga River, which passes through Dhaka City, the capital of Bangladesh, has been selected as the case study for this research. Although considered to be the lifeline of the capital, the city part of the Buriganga River has become biologically and hydrologically dead because of the indiscriminate dumping of domestic and industrial wastes, encroachment by unscrupulous people, and negligence on the part of the authority to enforce rules and regulations pertaining to the ecological health of the river. A cleanup programme has been designed for the Buriganga River to restore its water quality and develop new facilities in and around the river. This hypothetical cleanup programme is used: (i) to estimate the non-market benefits of an environmentally healthy waterway; (ii) to measure the total benefits; and (iii) to examine the desirability of public funding for the cleanup programme.

An extended contingent valuation (ECV) survey of 400 households was carried out in Dhaka City in 2001. It reveals that not only are a significant proportion of the respondents willing to contribute direct cash for the environmental improvement of the river, they are also willing to contribute their time. When the contribution in terms of

time is monetized, it is estimated to represent about 60 percent of the total contribution (the remaining 40 percent being cash payment).

The total non-market benefits from the Buriganga River cleanup programme are estimated at Tk 388 million (US\$ 6.80 million) in the first year, rising to Tk 1805 million (US\$ 31.66 million) by the 10th year of the programme. The public decision-making process in Bangladesh does not consider such benefits. Failures to do so lead to gross under-estimation of the potential for, and contribution of, undertaking environmental improvement activities.

The total benefits of the cleanup programme are estimated within the framework of total economic value: the non-market benefits are estimated using the ECV survey inputs, and the market benefits are measured using secondary information, market methods and a benefit transfer approach. The cost estimate of the cleanup programme is made using market and secondary information with appropriate adjustments. The extended cost-benefit analysis (ECBA), which integrates the non-market benefits of the cleanup programme, shows that such public funding is worth undertaking. The study also reveals that a significant portion (68 percent) of this investable funding can be generated from the community.

The need for a cleanup programme of the Buriganga River is not an isolated case in Bangladesh. Many rivers in that country, and also throughout the developed and developing world are under threat of becoming biologically and hydrologically dead. This study provides a framework for addressing such environmental problems. It demonstrates that the ECV survey is a useful tool in estimating economic values of resources even in extremely poor economies. The modification of the contingent valuation method takes into account the local context, including cultural, economic, social and political settings. The extended cost-benefit analysis, which integrates better resource values could provide important information for the policy decision-making process. This is particularly useful for countries where the democratic system is not fully developed and there is limited experience in integrating the environment into the decision making.

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Explanatory notes to the tables

- Details and percentages do not necessarily add up to totals, because of rounding.
- The term ‘dollar’ (\$) refers to US dollar, unless otherwise stated.
- 1 Crore = 100 Lakhs = 10 Million = 0.01 Billion
- Fiscal year (FY) is from July 1 to June 30 which is referred to as 2001/2002 meaning July 01, 2001 to June 30, 2002. Calender year is referred to as 2001 meaning January 01, 2001 to December 31, 2001.
- In all cases the data referred to MOF (2001) for 2000/2001 are estimated.
- During the period of the survey, the official exchange rate of the Bangladesh currency (Taka) on June 30, 2001 was Tk 57.00 per US dollar (US\$). Therefore, US\$ 1 = Tk 57.00 or Tk 1 = US\$ 0.0175 is used as currency conversion in this study.

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Abbreviations and Acronyms

ADB	Asian Development Bank
ADOF	Australian Department of Finance
ADP	Annual Development Programme
BAPA	Bangladesh Poribesh Andolon (Bangladesh Environmental Movement)
BBS	Bangladesh Bureau of Statistics
BCAS	Bangladesh Centre for Advanced Studies
BCR	Benefit-cost ratio
BELA	Bangladesh Environment Lawyers' Association
BIWTA	Bangladesh Inland Water Transport Authority
BOD	Biochemical oxygen demand
BRA	Buriganga River area
BRCP	Buriganga River cleanup programme
BUP	Bangladesh Unnayan Parishad (Bangladesh Development Forum)
BV	Bequest value
BWDB	Bangladesh Water Development Board
CBA	Cost-benefit analysis
CBO	Community-based organization
CETP	Common effluent treatment plant
COD	Chemical oxygen demand
CPI	Consumer price index
CS	Consumer surplus
CV	Contingent valuation
CVM	Contingent valuation method
DA	District Administration
DC	Dichotomous choice
DCC	Dhaka City Corporation
DDRA	Dhaka District Revenue Administration
DO	Dissolved oxygen
DOE	Department of Environment
DND	Dhaka-Narayanganj-Demra
DPHE	Department of Public Health Engineering
DUV	Direct use value
DWASA	Dhaka Water and Sewerage Authority
EC	Electrical conductivity
ECA	Environmental Conservation Act
ECBA	Extended cost-benefit analysis
ECNEC	Executive Committee of the National Economic Council
ECR	Environmental Conservation Rules

ECV	Extended contingent valuation	
ECVM	Extended contingent valuation method	
EGIS	Environment and Geographical Information Service	
EIA	Environmental impact assessment	
EQS	Environmental quality standard	
EV	Existence value	
FAP	Flood Action Plan	xviii
FCDI	Flood control, drainage and irrigation	
FGDs	Focus group discussions	
GAP	Ganga (Ganges) Action Plan	
GBM	Ganges-Brahmaputra-Meghna	
GDP	Gross domestic product	
GO	Government	
GOB	Government of Bangladesh	
ha	Hectare	
HPM	Hedonic price method	
IADB	Inter-American Development Bank	
ICTP	International Conventions, Treaties and Protocols	
IRR	Internal Rate of Return	
IS	Interview schedule	
IUV	Indirect use Value	
kg	Kilogram	
km	Kilometre	
LGED	Local Government Engineering Department	
m	Metre	
m ²	Square metre	
m ³	Cubic metre	
m ³ /s	Cubic metre per second	
mg/l	Milligram per litre	
MLD	Million litres per day	
MLGRDC	Ministry of Local Government, Rural Development and Cooperatives	
mm	Millimetre	
MOE	Ministry of Establishment	
MOEF	Ministry of Environment and Forest	
MOF	Ministry of Finance	
MOI	Ministry of Industries	
MOL	Ministry of Land	
MOS	Ministry of Shipping	
MOW	Ministry of Works	
MOWR	Ministry of Water Resources	
NGOs	Non-government organizations	
NOAA	National Oceanic and Atmospheric Administration	

NPS	Non-point source
NPV	Net present value
NUV	Non-use value
NWP	National Water Policy
OBA	Outside Buriganga River area
ODA	Overseas Development Administration
OE	Open-ended
OECD	Organization for Economic Co-operation and Development
O&M	Operation and maintenance
OV	Option value
PC	Planning Commission
PCP	Project concept paper
PD	Planning Division
PER	Public Expenditure Review
POROSH	Poribesh Rakha Shopot (Pledge to Protect Environment)
PP	Project proforma
PPI	Potential Pareto Improvement
ppm	Parts per million
PS	Point source
PV	Present value
RAJUK	Rajdhani Unnayan Karttripakkya (Capital City Development Authority)
RRI	River Research Institute
SKS	Sena Kalyan Sangstha (Army Welfare Organization)
SMA	Statistical Metropolitan Area
SP	Shadow price
SSRC	Social Science Research Council
sq km	Square kilometre
SWMC	Surface Water Modelling Centre
SWTP	Saidabad Water Treatment Plant
TCF	Trillion cubic feet
TCM	Travel cost method
TDS	Total dissolved solid
TEV	Total economic value
Tk	Taka (Bangladesh currency)
TWTC	Total willingness to contribute
USACE	United States Army Corps of Engineers
UV	Use value
UNIDO	United Nations Industrial Development Organization
WARPO	Water Resource Planning Organization
WASA	Water and Sewerage Authority
WB	World Bank
WC	Waste Concern
WTA	Willingness to accept

WTC _T	Willingness to contribute time
WTP	Willingness to pay
WTC _M	Willingness to contribute money
χ^2	Chi-square

Glossary of Bengali Words

Abarjona O Poribesh	Waste and Environment
Badia and Bede	Itinerants who move from place to place in search of work as hunters, snake-charmers and folk healers
Bandh	Embankment
Bangladesh Poribesh Andolon (BAPA)	Bangladesh Environmental Movement (a forum of citizens and organizations concerned with the environment of Bangladesh)
Beel	Small lake or low-lying depression which generally retains water throughout the year
Buriganga Bachao Andolon	Save the Buriganga Movement (a sub-committee of the BAPA trying to mobilize public support to save the Buriganga River and create pressure on the regulatory authorities)
Char	Shoal or sandbar (newly-emerged land in a river channel)
Crore	Unit of measurement, 1 crore = 10 million
Hats and bazaars	Small and large market places (permanent or temporary)
Kaucha bazaar	Temporary or permanent market place mainly for selling fruits, vegetables and groceries
Khal	Local name for canal or water channel
Khas	Government-owned unallocated land
Lakh	Unit of measurement, 1 lakh = 0.01 million
Madrashas	Muslim religious educational institutions
Mohalla	Suburb consisting one or more streets
POROSH	Poribesh Rakha Shopot (Pledge to Protect Environment)
PROSHIKA	It is an acronym of three Bengali words, which stand for training (proshikkhan), education (shikkha) and action (karmo) and one of the largest NGOs in Bangladesh
RAJUK	Rajdhani Unnayan Kartripakkya (Capital City Development Authority)
Semi-pucca	A building of mixed construction with at least some brick and mortar
SKS	Sena Kalyan Sangstha (Army Welfare Organization)
Shishu Park	Children's Park
Taka (Tk)	Bangladesh currency
Thana	The lowest administrative but intermediate local government unit where central government bureaucracy works (formerly known as Upazila)
Ward	Lowest local government unit
Zila	District (main sub-regional administrative unit in Bangladesh)

