

HIS MAJESTY'S GOVERNMENT OF NEPAL  
Ministry of Population and Environment

Kathmandu, Nepal

JAPAN INTERNATIONAL  
COOPERATION AGENCY

Nepal Office  
Kathmandu, Nepal

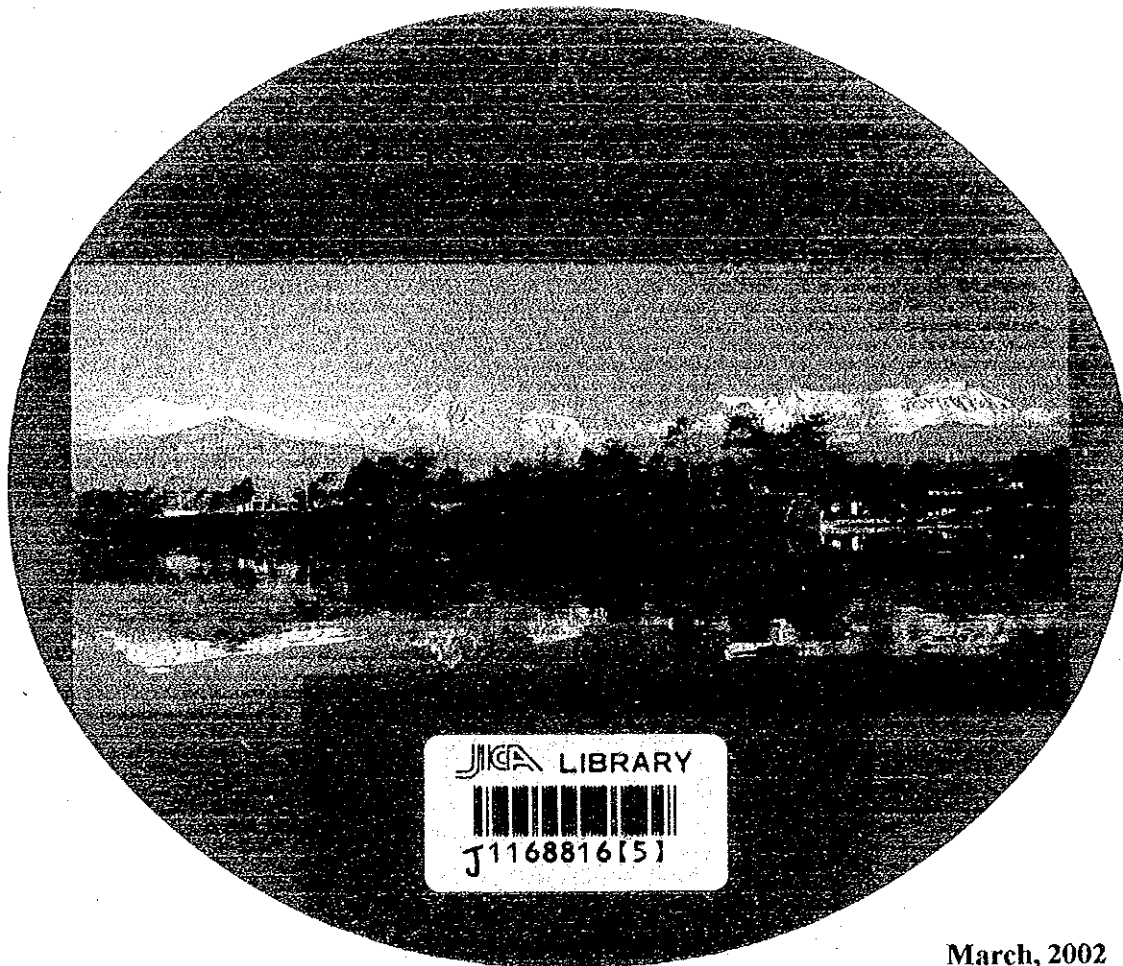
# FINAL REPORT

**VOLUME - II  
MAIN REPORT**

On

*The Development Study on*

**THE ENVIRONMENTAL CONSERVATION OF PHEWA LAKE IN POKHARA, NEPAL**



March, 2002

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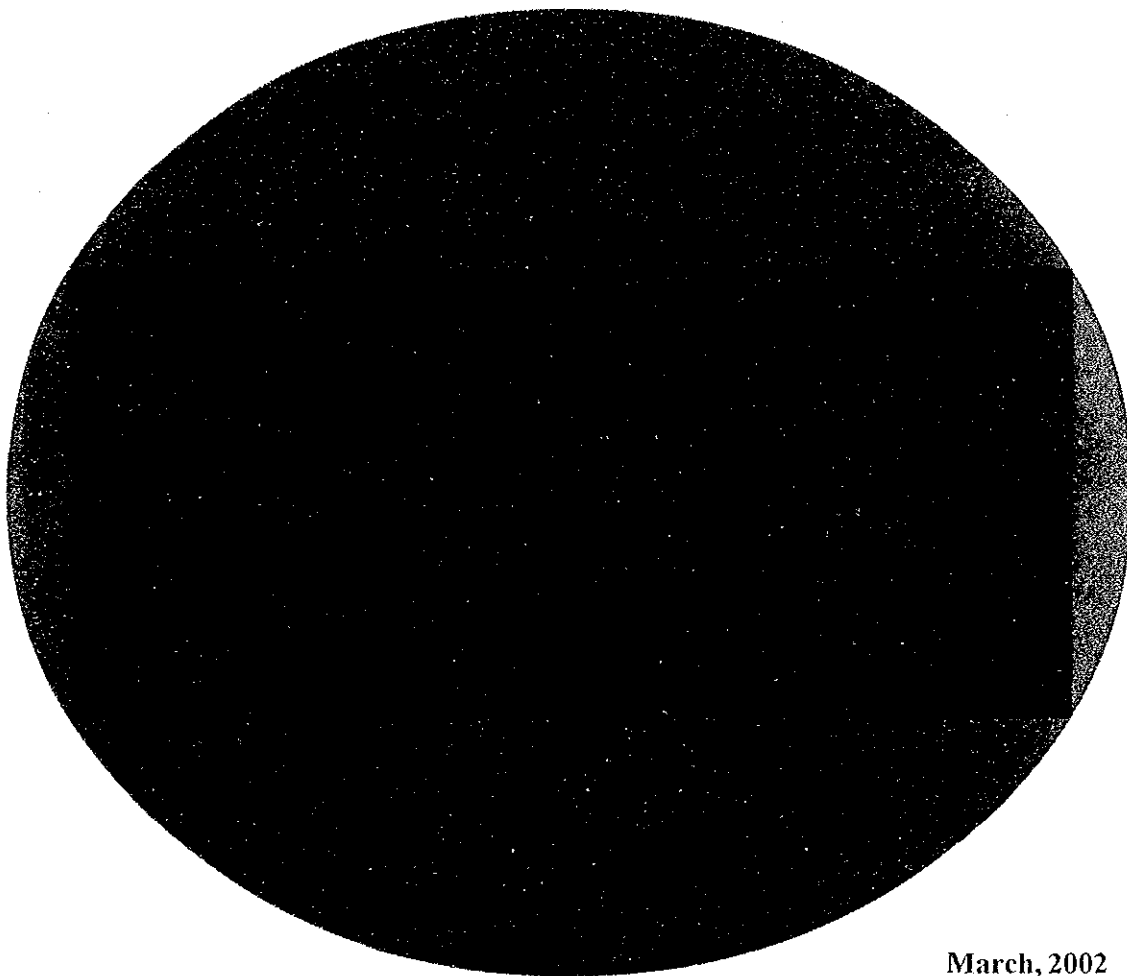
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## **PREFACE**

Nepal is renowned in the world on account of her natural beauty, biological diversity, and cultural heritage. But, due to inadequate conservation, these are being degraded to critical extent and are in dire need of sustainable management. One of such important natural heritage areas is Phewa Lake, lying in Pokhara Valley at the base of the Annapurna Himalayan Range.

Phewa Lake, which is a major tourist destination of Nepal is at present facing high human pressure at both its urban and rural watershed areas. In the absence of proper sewerage system in Pokhara city, the household wastewater and sewage is directly discharged into the Phewa Lake. Similarly, sub-surface seepage of septage from urban Lakeshore areas also pollutes the Lake. Large amount of sediment load is carried into the Lake by different Kholas (streams) flowing into it, the major one being the Harpan Khola. These streams and surface runoff from agricultural lands also add nutrient load into the Lake. All these are causing pollution of the Lake water making it beyond fit for recreational use. The nutrient load is causing eutrophication of the Lake with proliferation of water hyacinth and algal bloom, increasing rate of fish mortality and destruction of Lake ecosystem. High sedimentation rate of the Lake has half reduced its size since 1956.

In such situation, if the Lake continues to be polluted and filled up by sediment at present rate, it's recreational and aesthetic value will be diminished. Due to this, the tourism industry will sharply decline, which will have direct negative impact on local as well as national economy and livelihood of the people of Pokhara.

In the above context, the necessity of environmental conservation of Phewa Lake has been realized. The major issues includes immediate need for restricting further pollution of Lake water, minimizing sedimentation of the Lake, generating awareness among the people for it's conservation, and establishing mechanism and resources for carrying out routine developmental activities that contributes towards the conservation of the Lake.

Considering all these, His Majesty's Government of Nepal (HMGN) requested Government of Japan (GOJ) to assist through Grant Aid in environmental conservation of the Phewa Lake. Such request to GOJ was made based on the fact that GOJ has been a leading donor country, which has continually and immensely contributed in the development endeavors of Nepal.

The GOJ advised HMGN to address the environmental conservation of the Lake through an integrated study, where both technical intervention and educating people on sustainable environmental development should be interlinked.

An understanding was reached between the HMGN and GOJ, and an arrangement for implementing this **Development Study** was signed between Ministry of Population and Environment (MOPE) and Japan International Cooperation Agency (JICA) on July 13, 2001.

JICA appointed Japanese Technical Advisors for the Study and SILT Consultants (P) Ltd. (SILT) was appointed to carry out the Study in close cooperation and supervision of JICA Technical Advisors. An agreement in this regard was signed between JICA Nepal Office and SILT on September 28, 2001. A Steering Committee was formed for periodic review of the progress of the Study and give constructive advise to the Study Team. The Study was carried out between September, 2001 to March, 2002.

March, 2002

*SILT Consultants (P) Ltd.*

This Final Report presents the findings of the Study and is organized in following three volumes in separate bindings:

(1) **VOLUME I : EXECUTIVE SUMMARY**

(2) **VOLUME II : MAIN REPORT**

**PART I - MASTER PLAN FOR INTEGRATED CONSERVATION OF PHEWA LAKE**

- Chapter 1 - Outline of the Study
- Chapter 2 - Present Environmental Condition of the Study Area
- Chapter 3 - Justifications and Components of the Integrated Environmental Conservation Plan
- Chapter 4 - Water Quality Control Plan Component (1)
- Chapter 5 - Sewerage System Plan Component (2)
- Chapter 6 - Solid Waste Management Plan Component (3)
- Chapter 7 - Watershed Management Plan Component (4)
- Chapter 8 - Ecosystem Conservation Plan Component (5)
- Chapter 9 - Monitoring Plan Component (6)
- Chapter 10 - Tourism Development Plan Component (7)
- Chapter 11 - Environmental Education and Capacity Building Plan Component (8)
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- Chapter 13 - Project Implementation
- Chapter 14 - Project Evaluation
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**PART II - FEASIBILITY STUDY OF PHEWA LAKE ENVIRONMENT IMPROVEMENT PROJECT**

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- Chapter 2 - Alternative Plans of Lake Water Treatment / Purification System
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- Chapter 7 - Cost Estimate and Implementation Program
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- Chapter 9 - Project Evaluation

**(3) VOLUME III – ANNEXES**

- Annex 1 - Hydrological and Water Quality Simulation
- Annex 2 - Geotechnical Investigation Report
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- Annex 4 - Design and Drawing of Proposed Sewerage System
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### ABBREVIATION/ACRONYMS USED

ADB	: Asian Development Bank
AI	: Appreciative Inquiry
amsl	: Above Mean Sea Level
CBD	: United Nations Convention on Biological Diversity
CBO	: Community Based Organization
CITES	: Convention on International Trade of Endangered Species of Wild Flora and Fauna
CRAMP	: Community Rules and Action Management Plan
DDC	: District Development Committee
DHM	: Department of Hydrology and Meteorology
DOF	: Department of Forest
EEP	: Environmental Education Program
EMMP	: Environment Management and Monitoring Plan
ESA	: Environmentally Sensitive Area
FAO	: Food and Agriculture Organization
FGD	: Focus Group Discussion
FRC	: Fisheries Research Center
GoJ	: Government of Japan
GO	: Government Organization
GTZ	: German Corporation for Technical Assistance
Ha	: Hectare
HMGN	: His Majesty's Government of Nepal
IEE	: Initial Environmental Examination
INGO	: International Non Governmental Organization
IWN	: Integrated Watershed Management
JC	: Japanese Consultant/Advisor
JICA	: Japan International Cooperation Agency
KAP	: Knowledge, Attitude and Practice
LC	: Local Consultant
LPAF	: Least Project Affected Families
lps	: Liter Per Second
m	: Meter
M/P	: Master Plan
MLD	: Million Liters Per Day
mm	: Millimeter



MOLD	: Ministry of Local Development
MOPE	: Ministry of Population and Environment
NARC	: Nepal Agriculture Research Council
NGO	: Non Governmental Organization
NTFP	: Non Timber Forest Products
NWSC	: Nepal Water Supply Corporation
PEIP	: Pokhara Environment Improvement Project
PERAMP	: Participatory Environmental Rules and Action Management Plan
PLACC	: Phewa Lake Area Conservation Committee
PLCC	: Phewa Lake Conservation Center
PLECC	: Phewa Lake Environment Conservation Committee
PLECF	: Phewa Lake Environment Conservation Fund
PSMC	: Pokhara Sub-metropolitan corporation
PTDC	: Pokhara Tourism Development Committee
PVTDC	: Pokhara Valley Town Development Committee
SALT	: Slope Agriculture Land Technology
SDC	: Swiss Development Cooperation
SILT	: SILT Consultants (P) Ltd.
SPAF	: Seriously Project Affected Families
sq. ft.	: Square Feet
STIDP	: Second Tourism Infrastructure Development Project
TL	: Team Leader
TN	: Total Nitrogen
TOR	: Terms of Reference
TP	: Total Phosphorous
UN	: United Nations
UNDP	: United Nations Development Program
USLE	: Universal Soil Loss Equation
VDC	: Village Development Committee
WB	: The World Bank
WHO	: World Health Organization
RRA	: Rapid Rural Appraisal
PRA	: Participatory Rural Appraisal

**EXCHANGE RATE:**

**1 US \$ = 78 NRs.**