

Report

**of the
Expert Group on
Natural Disaster Prevention, Preparedness &
Mitigation having bearing on Housing and
Related Infrastructure**

Part - III Guidelines

**for
Improving Hazard Resistant
Construction of Buildings and Land Use Zoning**

1998

Report Submitted to
**Ministry of Urban Affairs & Employment,
Government of India**

**GUIDELINES FOR IMPROVING HAZARD RESISTANT
CONSTRUCTION OF BUILDINGS
AND LAND USE ZONING**
(For Earthquake, Windstorm and Flood Hazards)

**REPORT OF EXPERT GROUP ON
NATURAL DISASTER PREVENTION, PREPAREDNESS AND MITIGATION
HAVING BEARING ON HOUSING AND RELATED INFRASTRUCTURE**

Part - III

Submitted to
Ministry of Urban Affairs and Employment, Government of India

EXPERT GROUP

Anand S. Arya (Chairman)
G.S. Mandal (Member)
V.C. Thakur (Member)
Prem Krishna (Member)
N.Lakshmanan (Member)
S.K. Chaudhuri (Member)
T.N. Gupta (Member Convenor)

Building Material & Technology Promotion Council,
Ministry of Urban Affairs and Employment, Government of India, New Delhi

1998

PREFACE

One of the important observations from the occurrence of natural disasters, namely earthquakes, floods and cyclones in the past is that most human lives are lost due to the collapse of housing and other buildings. The only exception is that large number of people have been swept away in the past cyclones by receding storm surges to the sea. It is therefore, often said "Disasters don't kill people, buildings do". Realising the importance of the protection of buildings and related infrastructure for saving lives and economic losses in future hazard occurrences, the Ministry of Urban Affairs & Employment appointed an Expert Group under my chairmanship to prepare appropriate guidelines and bring out suggestions for consideration of the Government in this regard.

As a first step towards this objective the Group had prepared the Vulnerability Atlas of India which was submitted to the Government in June 1997 as a part (now titled as Part II) of the Group's Report. The First part of the Report consists of technological aspects concerning the three hazards including their impact on housing and related infrastructure and the Strategies for Disaster Prevention, Recommendations and Action Plan. This volume presents the third part of the Report consisting of Guidelines for improving hazard resistant construction of buildings and for land use zoning. An overall outline of the report is given on the facing page.

It is hoped that the implementation of the Vulnerability Atlas, the technical guidelines and the legislative measures as brought out by this Group in planning of new settlements, in the disaster protection of existing settlements, in disaster resistant new constructions and for improving the disaster resistance of the existing buildings and related infrastructure by retrofitting techniques will lead to very appreciable reduction of human deaths as well as economic losses in future disasters. It will also mark a qualitative shift from post disaster relief approach to pre-disaster pro-active approach to natural disaster reduction in the country through the process of prevention, mitigation and preparedness on the lines of the IDNDR Yokohama Strategy.

On behalf of the Group and my own, I would like to acknowledge the guidance and financial and logistics support to the Group provided by the Ministry of Urban Affairs and Employment, and the Building Materials and Technology Promotion Council, without which the Group would not have been able to perform its assigned functions as well as it did. I would like to place on record the invaluable contribution made by the members of the Expert Group and their enthusiastic cooperation extended to me in completing the various tasks.

The Group places on record its deep appreciation to the all around contribution of Shri T.N. Gupta, Executive Director of BMTPC & Advisor, MoUA&E and the Member Convenor of the Group in the preparation of this report and the willing assistance provided to the Group by the staff of BMTPC.

Dr. A.S. Arya
Chairman, Expert Group

OUTLINE OF THE REPORT

PART - TECHNO LEGAL ASPECTS OF EARTHQUAKE, WINDSTORM AND FLOOD HAZARDS AND LAND USE ZONING

- MAJOR NATURAL DISASTERS IN INDIA
- STATUS OF DISASTER MITIGATION IN INDIA
- VULNERABILITY ATLAS OF INDIA
- MULTI-HAZARD RISK IN VARIOUS DISTRICTS OF INDIA
- DAMAGE SCENARIO OF A HYPOTHETICAL 8.0 MAGNITUDE EARTHQUAKE IN KANGRA REGION OF HIMACHAL PRADESH
- DISASTER SCENARIO FOR A HYPOTHETICAL REPEAT OF 1977 CYCLONE STRIKING THE ANDHRA PRADESH COAST IN 1997
- FLOOD DAMAGE SCENARIO IN BURHI-DEHING SUB-BASIN
- COST-BENEFIT ASPECTS OF DISASTER MITIGATION
- TECHNO-LEGAL REGIME FOR NATURAL DISASTER REDUCTION
- STRATEGIES FOR DISASTER PREVENTION
- RECOMMENDATIONS
- ACTION PLAN FOR NATURAL DISASTER REDUCTION

Part - II VULNERABILITY ATLAS OF INDIA

- INTRODUCTION
- DESCRIPTION OF THE VULNERABILITY ATLAS
- THE SEISMIC HAZARD MAPS
- CYCLONE AND WIND HAZARD MAPS
- FLOOD HAZARD MAPS
- HOUSING VULNERABILITY TABLES
- USE OF VULNERABILITY ATLAS
- HAZARD MAPS OF STATES & DISTRICT-WISE TABLES OF DAMAGE RISK TO HOUSING

Part - III GUIDELINES FOR IMPROVING HAZARD RESISTANT CONSTRUCTION OF BUILDINGS AND LAND USE ZONING

- * LAND USE ZONING IN HAZARD PRONE AREAS --- GUIDELINES
- * IMPROVING FLOOD RESISTANCE OF HOUSING --- GUIDELINES
- * IMPROVING WIND/CYCLONE RESISTANCE OF BUILDINGS --- GUIDELINES
- * IMPROVING EARTHQUAKE RESISTANCE OF BUILDINGS --- GUIDELINES

CONTENTS

- 1 Land Use Zoning in Hazard Prone Areas -- Guidelines
- 2 Improving Flood Resistance of Housing -- Guidelines
- 3 Improving Wind/Cyclone Resistance of Housing -- Guidelines
- 4 Improving Earthquake Resistance of Housing -- Guidelines