

**INTERNATIONAL COMMISSION ON LARGE DAMS
SPANISH NATIONAL COMMITTEE**

**INTERNATIONAL SYMPOSIUM ON
DAMS AND EXTREME FLOODS**

**GRANADA. WEDNESDAY 16 SEP. 1992
SPAIN**

Tomo I
TOPIC A) DESING

THE INSTITUTE OF WAR & PEACE STUDIES
SCHOOL OF POLITICAL SCIENCE

DEMOCRATIC GOVERNANCE
DAYS AND DREAMS

CONFERENCE ON THE STATE OF THE ART

19-20 APRIL 2006

PRESENTATION

This publication includes all of the communications to be presented at the symposium "DAMS AND EXTREME FLOODS" in Granada.

The undoubtable interest which this topic has generated is reflected in the large number of communications received. This has led to the decision to divide the presentation into two separate volumes, dedicated to themes A and B respectively. There will be a third volume which will include the general reports, interventions by the experts and decisions taken during the symposium.

We are especially grateful for the contributions made by the Chairmen, General Reporters, Experts and authors of communications, in order that this symposium be useful to the professionals who are faced with important decisions on the design and efficient operation of dams in situations of extreme flooding.

The Technical Committee

ACKNOWLEDGMENTS

We thank our students, and the 907 individuals who participated in the survey, for their participation.

This research was funded by grants from the National Institute on Aging (R01AG18033) and the National Institute of Child Health and Human Development (R01HD06463). We thank the National Institute on Aging and the National Institute of Child Health and Human Development for their support of this research.

Financial support was provided by the National Institute on Aging, the National Institute of Child Health and Human Development, and the Robert Wood Johnson Foundation. We thank the National Institute on Aging and the National Institute of Child Health and Human Development for their support of this research.

REFERENCES

TOPIC A: DESIGN

TABLE OF CONTENTS

FOREWORD

A-1) INFLOW DESIGN FLOODS FOR DAMS IN JAPAN S. Takebayashi, K. Niwa, M. Hirose Japan	1
A-2) DESIGN FLOOD. REGULATIONS FOR THE SAFETY OF DAMS PORTUGAL. A. Alvares Portugal	9
A-3) NEW GUIDELINES FOR EVALUATION OF EXTREME FLOODS IN SWEDEN G. Lindstrom, J. Harlin, S. Bergström Sweden	16
A-4) APPLICATION OF THE NEW SWEDISH DESIGN FLOOD GUIDELINES IN THE LULE RIVER, NORTHERN SWEDEN C. Bradesten, J. Sandell, B. Möller Sweden	26
A-5) NEW PROCEDURES FOR FLOOD ESTIMATION IN NORWAY N.R. Saelthun, T. Tveit, K. Molkersrod, M.L. Fossdal Norway	32
A-6) REGIONAL ESTIMATES OF EXTREME RAINFALL IN SOUTHEASTERN SPAIN. THE EFFECT OF INTERSTATION CORRELATION F. Sáenz, E. Rodríguez Spain	41
A-7) FLOOD SIMULATION FROM RAINFALL/RUNOFF MODELLING F. Cernesson, J. Lavabre, J.M. Masson France	46
A-8) SPILLWAY DESIGN FLOOD FOR MOUNTAINOUS CATCHMENTS USING DISTRIBUTED MODELING APPROACH R.D. Singh, S.M. Seth India	56
A-9) EXTREME FLOOD HYDROGRAPHS OF CHOSEN PROBABILITY G.G.S. Pegram, M.P. Deacon South Africa	69
A-10) DISTRIBUTION FUNCTIONS FOR EXTREME VALUES R. Conejo, R. Conejo, J.L. Pérez Spain	81

A-11) ASSESSING THE PMF FOR ITS USE IN THE ALGAR DAM PROJECT (VALENCIA, SPAIN) E. Cifres, P. Abad Spain	91
A-12) FLOOD STUDIES FOR A CASCADE OF RESERVOIRS IN KARNATAKA P.R. Rao, G. Aswathanarayana, K. Subrahmanyam India	101
A-13) THE EXTREME FLOODS IN THE GUADALENTIN RIVER AND THE SPILLWAY DESIGN OF THE NEW PUENTES DAM J. Jodar, J. López, J.A. Marín Spain	111
A-14) DESIGN OF VERY LONG WEIRS IN NARROW MOUNTAIN PASSES R. López Spain	125
A-15) MORNING GLORY SPILLWAYS AND ITALIAN REGULATIONS: A CASE HISTORY G. Visentini Italy	135
A-16) DESIGN OF OVERFLOW SPILLWAYS A. Araoz Spain	144
A-17) HYDROPLUS SUBMERSIBLE FUSEGATES FOR SURFACE SPILLWAY C. Bessiere France	150
A-18) COST OF INVESTIMENT v. DESIGN FLOW IN UNGATED SPILLWAYS R. López Spain	160
A-19) SAFETY ASSESSMENT AND DESIGN OF GATED SPILLWAYS S. Ionescu Romania	170
A-20) SPILLWAYS WITH A FIXED DEPTH A. Ferrer Spain	180
A-21) VORTEX SPILLWAYS A.B. Zhivotovsky, N. Rozanova, I. Novikova, V. Rodionov, A. Shlenev, G. Tsedrov Russia	187
A-22) EMPIRICAL CRITERIA IN WEIR DESIGN C.T. Iamandi, G. Armencea Romania	196

A-23)	ANALYSIS OF HYDRODYNAMIC ACTIONS IN STILLING BASINS UNDER EXTREME FLOOD CONDITIONS - A CASE STUDY C. Matias, J. Falcao Portugal	206
A-24)	DISASTER SPILLWAY N.B. Kereselidze, L.G. Gogiberidze Georgia	215
A-25)	UNIQUE PLUNGE POOL DISSIPATES DISCHARGE ENERGY FROM FREE-FALL SPILLWAY M. Gómez, J. Legas República Dominicana, U.S.A.	222
A-26)	SCALE MODEL STUDY OF THE KATSE DAM SPILLWAY (LESOTHO) P. Jehanno, J.P. Huraut France	232
A-27)	THE USE OF STEPPED SPILLWAYS IN ENERGY DISSIPATION C. Mateos, V. Elviro España	241
A-28)	LA PUEBLA DE CAZALLA'S DAM SPILLWAY WITH ROLLED CONCRETE STEPS B.J. Bayan España	251
A-29)	NUMERICAL ANALYSIS OF EMBANKMENT OVERTOPPING FLOWS A.K. Chugh U.S.A.	259
A-30)	COMPUTER-AIDED DESIGN OF DAM CREST OVERFLOW BY HIGH WAVES T.L. Gvelissiani, G.P. Mamradze, G.I. Jinjikhashvili, N.T. Margeulashvili, Z.A. Magomedov Georgia	268
A-31)	MEASURES TO IMPROVE THE DISCHARGE CAPACITY OF SPILLWAYS PROPOSED SOLUTION C. Matias, A. Pinto Portugal	277
A-32)	MODIFICATION OF SPILLWAY SYSTEMS IN CONNECTION WITH THE REHABILITATION OF OLD DAMS A. Lehmkühler, E. Ritterbach, G. Rouvé Germany	287
A-33)	THE SALZA ARCH DAM SPILLWAY MODIFICATION TO ALLOW FOR INCREASED DESIGN FLOOD E. Kresnik, H. Stranner, A. Kröll Austria	297

A-34)	MODIFICATION OF THE SPILLWAYS IN THE ASWAN HIGH DAM W.K. Shenouda Egypt	308
A-35)	SPILLWAY MODIFICATIONS. SAN ESTEBAN SPILLWAY J.L. Blanco Spain	318
A-36)	DESIGN OF THE NEW SPILLWAY FOR LA CIERVA DAM J. Osuna, A. Fernández-Aller, F. Santos, G. Navarro Spain	328
A-37)	HEIGHTENNING OF EARTHFILL SADDLE DAMS OF BARCENA RESERVOIR FOR EXTREME FLOOD CONTROL J. González, M.A. Martínez, J.M. Villarroel, K.M. Esteras Spain	340
A-38)	AUXILIARY SPILLWAY OF MRICA HYDRO ELECTRIC PLANT S. Siswowidjono Indonesia	350
A-39)	SELECTION OF TYPE OF EMERGENCY SPILLWAY AT HINACHI DAM T. Kegai, S. Nakamura, A. AOE Japan	360
A-40)	REVISION OF THE DESIGN FLOOD OF PELIGRE DAM (HAITI) H. Garros, B. Chancy, C. Elisma, B. Goguel France, Haiti	370
A-41)	SPILLWAY FOR THE EXTREME FLOOD PAK MUN BARRAGE: SPILLWAY DESIGN CRITERIA AND HYDRAULIC MODEL DETERMINATION N. Udayasen Thailand	380
A-42)	PIEDRA DEL AGUILA DAM SPILLWAY M. Serrano Spain	390
A-43)	RIVER DIVERSION IN THE ALMANZORA DAM A. Alvarez, M.A. Gutierrez Spain	402