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0521840465 - Flooding and Environmental Challenges for Venice and its Lagoon: State of Knowledge

Edited by C. A. Fletcher and T. Spencer

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Flooding and Environmental Challenges for Venice and its Lagoon: State of Knowledge

Time may be running out for Venice. With rising average water levels, the frequency of city flooding is increasing and the threat of a repeat of the November 1966 event, when a violent storm surge took water levels nearly two metres higher than usual, remains. Surrounding the city is a severely degraded lagoon ecosystem. This timely scientific and technical volume synthesises the great wealth and diversity of recent interdisciplinary research on Venice and its Lagoon and the prospects for large engineering interventions to separate the lagoon and sea, as well as other measures in the built environment, discussed at an International Conference held at Churchill College, Cambridge in September 2003. The lessons and inferences reported here show how Venice, with its mix of challenges to protect its prestigious cultural heritage within one of the largest coastal wetlands in the Mediterranean, and against a background of pressures brought about by industry, port activities and tourism, shares many issues with other areas threatened by coastal flooding, including areas of the Netherlands, the USA and the cities of London and St Petersburg.

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Venice in Peril

THE BRITISH COMMITTEE FOR THE PRESERVATION OF VENICE



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Preface

CONVERTING RESEARCH INTO ACTION

The 16 million visitors who come to Venice annually see restoration going on everywhere. This is a city where property values are booming and monuments are expertly protected by the Superintendencies, the responsible government officials. But the deeper reality is less happy. Time is running out for this loveliest of cities. Even on a calm day, the water laps above the stone foundations of many of the buildings and attacks the brickwork above. The frequency of flooding is increasing, and Venice is essentially no better protected from an extreme weather event than it was at the time of the great flood of 1966. The future effects of climate change (difficult to predict precisely, but capable of being factored in nonetheless) are barely being considered. And yet large sums have been spent since the 1970s on scientific research into what should be done to defend Venice from the sea. The problem has been in converting that research into action. When the Venice in Peril, the British fund for the safeguarding of Venice, turned itself from an organization that mainly restored monuments into one that also looked into the chief peril facing Venice, the waters, we realized that the fundamental reason for this inaction was a lack of agreement about what science was actually telling us. The arguments about whether the proposed mobile barriers are vital or actually damaging have fiercely divided the citizens of Venice and Italian politicians and both sides invoke science. We discovered, also, that the reliable evidence was difficult to track down. Most of it was unpublished, some was not even listed in an accessible way and very little was in English, which was a loss to the international scientific community that has a lot to learn from the work done on Venice and its lagoon. In 2001, Venice in Peril began funding its collaboration with the Coastal Research

Unit of Cambridge University and CORILA in Venice with the aim of helping specialists link up with non-specialists; of encouraging free, open and informed debate among the scientists concerned; of making the world especially those who have the power to decide on the future for Venice, realize that Venice can be saved. A healthy, collaborative research environment may produce the knowledge that will save Venice, which is why this book is important. It is the broadest, most up-to-date published scientific survey of the question since research into this field began. It is a milestone in the endless process that is essential if we want our great-grand-children to see this incomparable achievement of man.

Anna Somers Cocks

Chairman

Venice in Peril

COLLABORATION BETWEEN THE WORLDS OF SCIENCE AND CULTURE

For many of my generation, Venice would be first encountered through those stark, black-and-white images of November 1966, and the harrowing scenes we witnessed of damage brought on by the devastating flooding. It was to be our first recognition of the fragile and vulnerable nature of that most exceptional of cities on the globe. The Campaign for the Safeguarding of Venice had its origins in the immediate reaction by UNESCO to that dramatic event, when an international campaign was launched by the then Director-General of the Organization, René Maheu. In response to the appeal of Maheu, many private bodies (some fifty-nine) were set up around the world to gather funds and use them in the

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preservation and restoration of buildings, monuments and works of art in Venice. Even today, almost forty years on, there are well over twenty – in 11 countries – that are still active, and UNESCO, through its Office in the city and the Association of Private Committees, is pleased to play a part in their important work. UNESCO can also be satisfied to have quickly brought the attention of the international community to the need for extending the international campaign beyond the conservation of its monuments and works of art to more complex questions concerning the safeguarding of the entire lagoon system: questions that required close collaboration between the worlds of science and culture. (It is important to recall in this connection that it is ‘Venice and its Lagoon’ that appears on the World Heritage List.) UNESCO was thus to become one of the main actors in the Comitato Tecnico Scientifico (CTS), the scientific and technical committee for the safeguarding of Venice and its lagoon, which, during the 1980s, developed the idea of a major project to be later given life by the Italian Ministry for Universities and Scientific and Technological Research (MURST) under the title ‘Venice Lagoon Ecosystem’ Project. This provided a quantitative understanding of the major flows making up the coupling between pelagic and benthic systems within the lagoon waters, and related this understanding to the processes of eutrophication. Later, the UNESCO Office in Venice was to undertake a second initiative, the ‘Venice Inner Canals’ Project, which sought to develop, calibrate and validate a first water quality model for central Venice. The project included additional sampling and laboratory work on both the waters and sediments’ bio-chemical and microbiological characteristics and led to the final calibration of a new hydrodynamic model, as well as to the development of a water quality model to be applied to the Venice inner canal system. It was against this backdrop that the UNESCO Office in Venice – Regional Bureau for Science in Europe (ROSTE) was pleased to be involved in, and support, the Cambridge conference of which this book provides the all-important written record. The organizers, Venice in Peril, the University of Cambridge, Churchill College and CORILA, are to be congratulated on having brought together, in a timely way,

scholars, scientists and those whose professional life is bound up with the city and Venice and its lagoon. The Italian Government has now set in train the MOSES Project for the protection of the City and its lagoon, although as the meeting in Cambridge showed, there is far from unanimity among the experts as to whether or not it will prove to be an effective means by which Venice and its lagoon can be protected against extreme environmental events in the future. Either way, the need for multidisciplinary research on this most complex of systems will be as great as ever, and I am convinced that this volume will prove to have been an important milestone on the road to our understanding it.

*Howard Moore**Director**UNESCO Office in Venice**– Regional Bureau for Science in Europe (ROSTE)*

THE FRAGILE CITY

‘Sospesa sull’abisso, la vita degli abitanti d’Ottavia è meno incerta che in altre città. Sanno che più di tanto la rete non regge.’

(‘Suspended over the abyss, the life of Octavia’s inhabitants is less uncertain than in other cities. They know the net will last only so long.’)

(Italo Calvino, *Invisible Cities*)

In Calvino’s book, Marco Polo describes 55 mysterious cities, each bearing a woman’s name. They seem to expose the beauty and ugliness, the humanity and complexity, that can be found in any long-standing city; but slowly it dawns on us that each place is an aspect of Venice, and the overarching theme is that of fragility. There is a natural affinity between Cambridge and Venice, and Churchill College was more than pleased to support Venice in Peril and CORILA in the programme that has led to this book. One of our main functions as a College is to bring together researchers of different origins, interests and disciplines, and few causes can have a greater need of interdisciplinary understanding and cooperation than the survival of Venice and its lagoon. Our initial discussions with

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Venice in Peril, particularly with Anna Somers Cocks, brought in architects, ecologists, engineers and geographers and led to the appointment of our Venice in Peril Research Fellow, Dr Caroline Fletcher (herself an environmental chemist), and an interdisciplinary steering committee chaired by Dr Tom Spencer (a coastal geographer). They built bridges to the Venetian researchers in CORILA, and we came to know Pierpaolo Campostrini and Jane Da Mosto rather well. The huge range of relevant issues was demonstrated in the first workshops held in 2002, which in turn set the agenda for the International Meeting, held in Churchill College in September 2003, which is recorded in this volume. The fundamental objective of the programme is to reinforce support for those working on the survival of Venice and its environment by exposing their work to the international scientific community. Though Venice is unique, its problems have many parallels across the world, and we believe that this book demonstrates both the potential for international engagement, and the benefit that it will yield.

Marco smiled. 'What else do you believe I have been talking about? ... Every time I describe a city I am saying something about Venice.'

Paul Richens, Vice-Master

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EDITORIAL NOTE

All the substantive chapters in this volume have been subject to a full and thorough process of peer review, using at least two referees of international standing in their own particular specialism and with the editorial control of Dr Fletcher and Dr Spencer of Cambridge University. All authors have revised their contributions in the light of comments received. The chapters which appear here have been approved by Dr Fletcher, Dr Spencer and by the lead author of each chapter, on behalf of all authors of that chapter.

The editors wish to acknowledge here the exceptional contribution of Jane Da Mosto. She has played a major role to bring this large and complex work to fruition. Her assistance in liaising between the editors, individual authors and organizations in Venice and elsewhere, and her tireless contributions to the general editing of the volume, have been critical in maintaining the forward momentum of this publishing initiative.