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FLOODS IN ALPINE RIVER BASINS (ITALY): AN INTERDISCIPLINARY STUDY COMBINING HISTORICAL INFORMATION AND HYDROCLIMATIC DATA

ABSTRACT: NIGRELLI G. & AUDISIO C., *Floods in Alpine river basins (Italy): an interdisciplinary study combining historical information and hydroclimatic data.* (IT ISSN 0391-9838, 2010).

In the hydrographic basins of the Alps, well-defined meteorological configurations lasting several consecutive days give rise to extraordinary rain events. These events often impact on the catchments, with repercussions on the valley floors and along the main channels network. Floods are frequent with ever greater associated damage. The Research Institute for Geo-hydrological Protection of the National Research Council (IRPI-CNR) has developed an interdisciplinary procedure for flood study. In this procedure, hydropluviometric data and information acquired from historical documentary sources are combined. The method is specifically designed to identify areas exposed to flood danger. The procedure has been applied in the Orco river basin and this paper reports the results of this work.

KEY WORDS: Rain events, Floods, Historical data, GIS, European Alps.

RIASSUNTO: NIGRELLI G. & AUDISIO C., *Studio dei fenomeni alluvionali nei bacini alpini mediante l'utilizzo di informazioni storiche e dati idropluviometrici.* (IT ISSN 0391-9838, 2010).

Nei bacini idrografici alpini, gli eventi pluviometrici più importanti si originano da poche e ben definite configurazioni bariche e durano di norma alcuni giorni consecutivi. Questi eventi hanno spesso ripercussioni sul territorio ed i loro effetti si manifestano con maggior evidenza nei fondivalle e lungo la rete idrografica principale, dando origine in molti casi a fenomeni alluvionali. I danni alle attività antropiche sono spesso molto gravi. Per lo studio di queste problematiche, l'Istituto di Ricerca per la Protezione Idrogeologica del CNR, ha messo a punto una metodologia di analisi particolarmente indicata per l'individuazione delle aree esposte al pericolo di inondazione. Essa si basa sull'analisi integrata evento-fenome-

no-danno. Le diverse tipologie di informazioni raccolte vengono inserite in un GIS, opportunamente modificato per poter gestire in forma integrata e secondo criteri oggettivi le notizie storiche e d'archivio relative ai tipi di fenomeno ed ai danni. In questo lavoro viene illustrato l'approccio metodologico seguito ed un caso di studio in cui questo è stato applicato.

TERMINI CHIAVE: Eventi pluviometrici, Alluvioni, Dati storici, GIS, Alpi.

INTRODUCTION

Over the past 25 years, the annual number of flood events and flood victims has increased alarmingly. Since 1990, 259 major river floods have been reported in Europe, of which 165 have been reported since 2000 (EEA, 2008). Within Europe, Italy ranks first in the variety of natural instability processes. According to historical research, 11 000 landslides and 5 400 flood events have occurred in the past 80 years, incurring billions of euros in damage. Since 1980, some 42.4 billion euros have been paid out by the Italian government (Luino, 2005). Climate change among other factors is likely to further increase the frequency of extreme flood and flash flood events, which carry the highest risk of fatality.

The climate of the Alpine region is characterized by a high degree of complexity due to the interactions between the mountain environment and the general circulation of the atmosphere (Beniston, 2005). Throughout the Alps, annual winter and summer temperature records indicate a gradual warming as compared to the colder conditions prevalent before 1900; 2003 holds the record as the warmest year since 1500 (Casty & alii, 2005). Since 1980, another 20-30% of the remaining ice has been lost. Since 1850, glaciers in the Alps have lost approximately two-thirds of their volume, with a clear acceleration since the 1980s. In the hot, dry summer of 2003 alone, 10% of the remaining glacier mass was lost (EEA, 2008). A gridded precipitation analysis of the European Alps (1901-1990)

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We wish to thank ARPA Piemonte for providing data, the Società Meteorologica Italiana for information and data, and Dr. Tropeano (IRPI, UOS di Torino) for his useful suggestions during revision of the manuscript. Special thanks are due to anonymous reviewers for their helpful comments and suggestions.