An interdisciplinary approach to flood risk assessment and forecast

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Human life, society and property are all essentially fragile elements, very susceptible to adverse pressures. Many traumas are caused by the environment we live in: to a greater or lesser degree every natural human environment is fraught with hazards, i.e. “conditions capable of exerting adverse effects on human life, property or activity”. Sometimes, and more frequently in some areas than others, such hazards may become so acute that they cause disasters. In turn, disasters may be defined as “serious, damaging effects on human life, property or activity which may be the results of the impacts of hazards which have exceeded some critical level or levels” (Barrett et al., 1991, Roth et al., 1996). Burton et al. (1978), in their classic work on “The Environment as Hazard”, suggested that 60 percent of the world’s disasters are caused by hurricanes (causing the greatest number of casualties) and floods (the most frequent causes of disasters).

Both hazards and disasters are not only of many different kinds, but are also varied in respect of the types of observations that are required to identify and evaluate them. In the case of hazards, frequent - even continuous - monitoring may be required to identify those areas and times when certain circumstances “go critical”. On the other hand, the disasters that may then result - because these tend to be more localized in space and time - often call for highly focused observations (Roth et al., 1996; Rudari et al., 2004).

Monitoring tools and hydrologic simulation techniques which are developed for - and thus provide information at - different spatial and temporal scales need to be properly integrated when the use of remote sensing in flood forecasting is invoked. Within this framework, a series of problems arise in the determination of both suitable validation techniques, and cross-fertilizing procedures able to allow for a wider use of remote sensing tools in monitoring and forecasting environmental variables. Integrated multi-sensor systems afford some promise of joining different monitoring resolutions and interpretation techniques into an operational procedure able to complement the remotely sensed perception of the large scale dynamics of the variables analyzed or modeled together with the assessment of their small scale variability. On the other side, effective systems for early warning against natural hazards should include, beside the scientific and technical basis, also a strong focus on the people exposed to risk. Similarly, a system approach that incorporates all of the relevant factors, arising from the

natural hazards or social vulnerabilities, and from short-term or long-term processes, is needed. As a result, in many Countries a lot of effort is put in empowering the social awareness of the hazard pending on certain portions of the territory.