



## **A model to evaluate the “social risk” due to geodynamic events: the situation of the Vesuvius area**

C. Pesaresi (1), M. Marta (1), **C. Palagiano** (1), R. Scandone (2)

(1) Department of Human Geography, University of Rome “La Sapienza”, Italy (cristiano.pesaresi@uniroma1.it, miriam.marta@uniroma1.it, cosimo.palagiano@uniroma1.it, Tel +39-0649913917, Fax +39-0649913874), (2) Department of Physics, University of “Roma Tre”, Italy, (scandone@fis.uniroma3.it, Tel +39-0655177250, Fax +39-065579303)

Between 1951 and 2001 the population and the infrastructural estate exposed to high volcanic risk in the Vesuvius area have recorded a very remarkable increase. Particularly, the population living in the 18 villages of the “red zone”, according to the definition provided by the Presidency of the Council of Ministers – Civil Protection Department for the area that will possibly be destroyed in case of a new eruption, has passed from 353,172 to 551,837 inhabitants (+56.3%). Thus, even if the last decade has showed a reversal of trend, with a decrease of 30,683 inhabitants (-5.3%), the population density in these villages is always more than 1,000 inhabitants/kmq (excluding Terzigno), with the maximum density at Portici (13,323) and San Giorgio a Cremano (12,351), respectively the first and the third villages with the highest population density in Italy. Eight villages have lost population, notably Portici (-8,762 inhabitants) and San Giorgio a Cremano (-11,495 inhabitants), with the addition of Torre del Greco (-10,754 inhabitants), while ten villages recorded an increase, causing a “mixing” of the risk values.

In the same 50 years the number of houses has dramatically increased from 73,141 to 187,407 (+156.2%) with a significant increase also between 1991 and 2001 (+5.8%) while San Giorgio a Cremano is the only village to record a decrease in the number of houses during the last decade.

Analysis of the data shows the importance of extending the observations to neighbouring villages that could have attracted population from the “red zone”, increased the infrastructural estate and consequently recorded an advancement of the risk level.

The main yardstick is in fact the number of people that could die and the potential infrastructural and economic damage.

Since one of the major limits for the evaluation of risk is the estimate of the economic value of real property, archaeological objects, cultural heritage, agricultural areas, we present a model to provide a preliminary evaluation that can be used also for other volcanoes and to make spatial and temporal comparisons. For this purpose we have selected and combined a set of demographic, social and infrastructural data that can be extracted for all villages of Italy by Census of ISTAT. Then, with the use of Geographical Information Systems (GIS) we have elaborated the data recorded in different overlaying maps in order to have a more reliable estimate and visualization of what we call “social risk” due to geodynamic events. On the other hand, the emergency plans have to be supported by continuous analysis based, at least, on the evolution of the more relevant and variable local aspects. The arrangement of continuously updated database and specific maps is particularly important in the case of Vesuvius because of the high potential damage and since 1999 a series of exercises have begun to evaluate the validity of measures expected in the emergency plan. In 2006, for the first time, the exercise involved all the villages of the “red zone” and became the widest simulation carried out in Italy, showing the importance of preparation measures.

On the basis of these experiences, an analysis of the risk perception should be considered; for example, by interviewing the Mayors of the villages of the “red zone”, according to a standard questionnaire, additional information and opinions would be collected regarding: the level of perceived risk, the adequacy of road network and the validity of the different steps to evacuate the population.