



## Impacts of floods events on food security

Tommaso Pacetti (1), Enrica Caporali (1), and Maria Cristina Rulli (2)

(1) University of Firenze, Department of Civil and Environmental Engineering, (2) Politecnico di Milano, Department of Civil and Environmental Engineering

The objective of this study is to analyze the impact of flood events on food security. According to the definition elaborated by FAO in “The State of Food Insecurity 2001”, food security “exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life”. This official definition makes explicit reference to the comprehensive coverage of nutrition: “The four pillars of food security are availability, access, utilization and stability”.

The inner connections among natural disaster and food security are extremely relevant especially in developing countries where the availability (one of the four pillars above mentioned) can be highly jeopardized by extreme events that damage the primary access to food, i.e. agriculture.

The analysis has focused on the collection of hydrological data in order to define a proper case study that could highlight the effects of flood events on food availability. Based on existing literature on extreme floods, an event has been selected as an exemplary case study: the Pakistan flood in 2010.

In this study the evaluation loss of food security losses is based on a) estimation of stored food damaged or destroyed b) estimation of cultivation on site during the flood event and therefore damaged or destroyed c) estimation of future crop production losses due to field damages.

In particular the analysis focused on the common crops cultivated in Pakistan (rice, wheat and sugarcane), according to FAO food balance sheet. For example, the amount of food that could not be produced because of the flood event is calculated measuring the area covered by the flood and then multiplying these areas for the specific yield of the crops considered. The results are then compared to the average annual food supply elaborated by FAO in order to estimate the impact on food security.

The food losses have been then converted to energy content (kcal) in order to evaluate the impact on an average diet (assuming a human basic requirement of 3000 kcal/day per person).

In 2010 the results show a reduction of around 8.5% of Pakistan food availability compared to 2009. In terms of human food requirement, the available calories per person decrease from 81% to 74%. The impact of flood is also been estimated according to the concept of water footprint (Hoekstra). The water footprint of damaged production is equivalent to around 18 km<sup>3</sup> of water, which represent a loss of 13% of the total Pakistani water footprint. Considering that in Pakistan the annual water footprint per person is 1290 m<sup>3</sup>/year, these losses correspond to the vegetarian feed of 14 million of inhabitants.