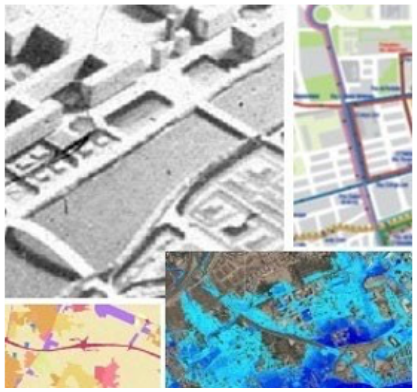
2nd International Conference on Future Challenges in Sustainable Urban Planning & Territorial Management



ASSESSMENT OF DAMAGES FROM RIVER FLOODING: PRINCIPLES, METHODS, AND IMPACTS ON THE TERRITORY

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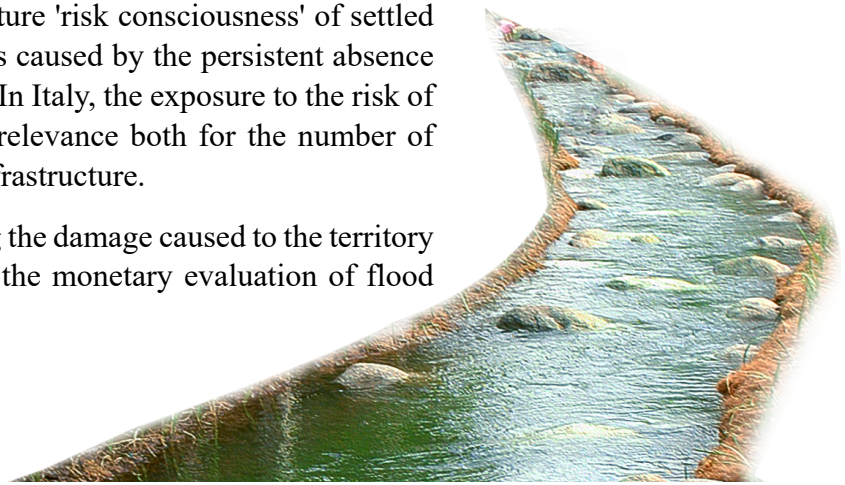
INTRODUCTION

The floods caused by river flooding are increasingly at the center of public attention and government agencies, both due to increased cultural awareness and a more mature 'risk consciousness' of settled populations, and to the worsening state of disrepair of water basins caused by the persistent absence of appropriate controls on the use of mountain and hilly territories. In Italy, the exposure to the risk of flooding is particularly high and constitutes a problem of social relevance both for the number of victims and for the damage caused to properties, industries, and infrastructure.

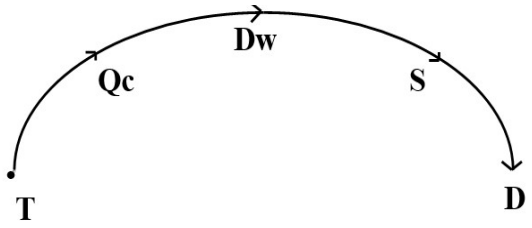
This work aims to examine the principles and methods of evaluating the damage caused to the territory by river flooding. The principles and methods considered aim at the monetary evaluation of flood damage to productive resources and environmental re-sources.



DAMAGE AND ITS CLASSIFICATIONS

- **Private damage and public damage**
- **Physical damage and monetary damage**
- **Economic damage, material damage, and financial damage**
- **Tangible damage and intangible damage**
- **Primary damage and secondary damage**
- **Preventive damage and consumptive damage**

MODELS FOR FLOOD DAMAGE EVALUATION



T = return time of the flood event;

Q_c = maximum flood discharge;

D_w = flood volume;

S = flooded area;

D_p= amount of damage

$$Q_c = \alpha(T), D_w = \beta(Q_c), S = \gamma(D_w), D_p = \delta(S),$$

$$Dp = \delta\{\gamma[\beta(\alpha(T))]\}$$

$$x \in X \ \emptyset \ f(x), \quad y \in Y \ \emptyset \ g(y),$$

$$S = \gamma\{\beta[\alpha(T)]\},$$

$$D_p = \delta(S),$$

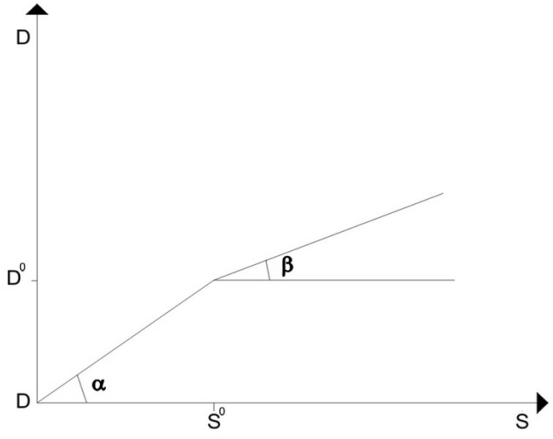
$$D_p = d_u S,$$

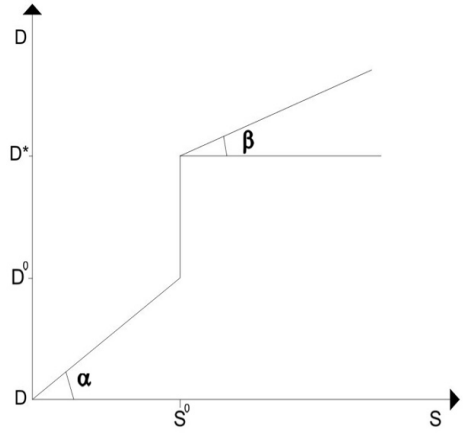
$$d_u = d_{ua} + d_{uu} + d_{ui},$$

$$d_u = \sum_j d_{uj}$$

$$D_p = d_{u1} S, \qquad 0 \le S \le S^0$$

$$D_p = d_{u2}(S - S^0) + D^0, \qquad S \ge S^0$$





CASE STUDY

RESULTS

T_{E_i} (Years)	S_{TE_i} (Ha)	D_{TE_i} (€·10³)	n'_i (N)	$n'_i \cdot D_{TE_i}$ (€·10³)
5	333	540,730	10	5.407,304
10	466	757,126	5	3.785,629
20	466	757,126	2	1.514,252
30	542	880,559	1	880,559
50	763	1.239,496	1	1.239,496
				D=12.827,240

The methodology presented in this study highlights the existence of a method for estimating the economic damage caused by flood events.