



# PhD in INGEGNERIA AMBIENTALE E DELLE INFRASTRUTTURE / ENVIRONMENTAL AND INFRASTRUCTURE ENGINEERING - 37th cycle

Research Area n. 3 - Environmental and Hydraulic Engineering and Geomatics

**THEMATIC Research Field: PROGETTO INNOVAZIONE POLIMI - REGIONE LOMBARDIA:  
COMPREHENSIVE DAMAGE ASSESSMENT IN SUPPORT OF FLOOD RISK MANAGEMENT**

**Monthly net income of PhDscholarship (max 36 months)**

**€ 1400.0**

In case of a change of the welfare rates during the three-year period, the amount could be modified.

## Context of the research activity

**Motivation and objectives of the research  
in this field**

This research addresses the challenges that public administrations are facing in the digital era that were accelerated by the COVID-19 events. Among them, the capability of performing reliable flood damage assessments (FDA) is of paramount importance to achieve objectives of sustainability and resilience of societies, set at the European and International level. Indeed, FDA has gained increased importance in the last decades as key information tool for effective flood risk management. Knowledge of flood damage is crucial both in the emergency (to identify priorities of intervention and to support the compensation of damage by private and public bodies) and in the peace time (to identify areas at higher risk and to evaluate benefits of flood mitigation strategies). However, we are far from the capability of performing comprehensive FDA including all potentially affected assets and kinds of damage, especially in the Italian context, so far characterised by an approach to flood risk management more concentrated on hazard control rather than damage reduction. This is reflected in the paucity of damage data related to past flood events, and in the consequent lack of damage modelling tools. The ongoing MOVIDA project, conducted with many



	<p>public administrations and aimed at performing a comprehensive FDA in the Po District, highlights that a quantitative estimate of flood damage is currently possible only for limited types of assets, i.e., residential buildings and certain crops. For the others, only damage proxies can be identified, like the value of exposed assets or qualitative indicators of expected impacts. Therefore, the need arises of developing tools for estimating damage to those assets which are strategic for the resilience of a community (like economic activities, transport networks, etc.) but also to such goods that are intangible by nature but are crucial for the wellbeing of a society, or that are distinctive of their cultural background (like environmental and cultural heritage). From another perspective, MOVIDA put into light how the availability of reliable, homogenous and complete datasets to feed damage models is still an issue, preventing, in some cases, even the implementation of available models. Last but not least, the paucity of damage data related to past events prevents not only the definition of new modelling tools but also the validation of existing ones and then their transferability in space and time.</p> <p>This research wants to partially fill these gaps, with a specific focus on the Italian context and the peace time. In this way, the PhD will contribute to renew competences and instruments with the final goal to improve public administration governance and management. In detail, activities will be aimed at increasing present capabilities of performing cost-benefit analysis or multi-criteria analysis of structural and non-structural flood risk mitigation strategies.</p>
<p><b>Methods and techniques that will be developed and used to carry out the research</b></p>	<p>The research will be conducted in collaboration with the Regione Lombardia Directorate on Civil Protection. A mixed empirical-expert based approach will be implemented. Starting from the investigation of case studies, new modelling tools will be developed, focusing on those assets for which the paucity of models is more evident. In fact, the choice of the sector to focus on will strongly depend on the choice of case studies and available data. At the same time, the possibility of exploiting non-conventional/non-institutional data for both</p>



	the calibration/validation of models and their application will be explored.
<b>Educational objectives</b>	<p>The project will provide candidate with: advanced knowledge on flood risk management; methodological competences at both the theoretical and applied level, with specific reference to damage modelling (advanced), statistical analysis, ICT and spatial planning (basics); capabilities to interact with people of diverse background; problem setting and solving capabilities. He/she will be in contact with several practitioners having the possibility to investigate links between research and practice. Among them representatives from:</p> <ol style="list-style-type: none"> <li>1. Regione Lombardia - DG Civil Protection</li> <li>2. Autorità di Bacino Distrettuale del fiume Po</li> <li>3. Agenzia interregionale per il fiume Po</li> <li>4. CNR - IGAG</li> <li>5. Università de L'Aquila</li> </ol>
<b>Job opportunities</b>	Research agencies, Research Institutions, Insurance companies, Public Bodies and Authorities involved in environmental policies.
<b>Composition of the research group</b>	<p>1 Full Professors                  2 Associated Professors                  1 Assistant Professors                  2 PhD Students</p>
<b>Name of the research directors</b>	Francesco Ballio and a Regione Lombardia tutor

<b>Contacts</b>
<p>Francesco Ballio 02-23996236  <a href="http://www.polimi.it">www.polimi.it</a></p>

<b>Additional support - Financial aid per PhD student per year (gross amount)</b>	
<b>Housing - Foreign Students</b>	--
<b>Housing - Out-of-town residents (more than 80Km out of Milano)</b>	--

<b>Scholarship Increase for a period abroad</b>	
<b>Amount monthly</b>	566.36 €
<b>By number of months</b>	6



**Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information**

Educational activities (purchase of study books and material, funding for participation to courses, summer schools, workshops and conferences): financial aid per PhD student per 2nd and 3rd year: max 1534,33 euros per student per year on average.

Teaching assistantship (availability of funding in recognition of support to teaching activities by the PhD student) :there are various forms of financial aid for activities of support to the teaching practice. The PhD student is encouraged to take part in these activities, within the limits allowed by the regulations. Increase in the scholarship for stays abroad: 566,36 euros per month, for up to 6 months.

Computer availability and desk availability: 1st year + 2nd year + 3rd year: individual use.