europass

Marcello Arosio

ABOUT ME

I am a specialist in disaster risk assessment of natural hazard. I have hands-on working experience in projects related to water engineer, climate-proofing infrastructure, climate risk management and academic research in complex adaptive systems. I am Assistant Professor in flood risk assessment at IUSS University in Pavia.

I am now working on the MEDiate research project and in the past I worked on NEW FRAME, NOCTUA and **RIDES** projects: respectively multi-hazard and graph theory applied to risk assessment, satellite sources to monitor and assess the risks and CBA analysis to design infrastructure.

I coordinate the elaboration of an Adaptation Fund's proposal for UNESCO **"***Haiti Implementing Measures for Climate Change Adaptation and Disaster Risk Reduction Mitigation of School Facilities in Haiti***"** (10 million budget for 3 year projects, accepted and financed).

I achieved a PhD in Understanding and Managing Extremes, I have been a UNV Specialist in Climate Change Adaptation and Disaster Risk Reduction at UNDP Viet Nam and a researcher at RIMES (Thailand) as Engineer-Risk Assessment on extreme weather related to climate change. I wrote the Technical-organisational guidelines for a local Civil Protection system (UNI/PdR 47:2018).

✓

WORK EXPERIENCE

[15 Feb 2024 – Current]

Assistant Professor

IUSS-Pavia - School of Advanced Studies of Pavia

City: Pavia | **Country:** Italy

The research activities are implemented through the scientific participation and management assistant to the MEDiate project ("Multi-hazard and Risk-informed System for Enhanced Local and Regional Disaster Risk Management"): Improving multi-hazard assessments of natural hazards and highlighting potential trends due to climate change. The project is studying how the natural hazards interact and cascade at various scales and how these hazards will change with time due to the changing climate.

My teaching activities include the following courses:

- Graphs in Complex Systems
- Hydrological Risk
- Knowledge Transfer and Digital Innovation

Communication Manager of the National PhD Program in Sustainable Development and Climate Change (SDC): responsible for managing and overseeing all communication strategies and activities for the National PhD Program in

Sustainable Development and Climate Change. This includes internal and external communications and social media presence.

Supervisor of 3 PhD SDC Candidates: Supervised and mentored three PhD candidates in the field of Sustainable Development and Climate Change. Provided guidance on research projects, academic writing, and professional development.

Member of the Academic Board: Participated in the Academic Board of the PhD Program in Sustainable Development and Climate Change. Contributed to curriculum development, program evaluation, and strategic planning.

Scientific Committee Member of the CARISMA Research Group: Served on the Scientific Committee of the CARISMA research group. Involved in overseeing research projects, providing expert advice, and contributing to the development of research agendas and objectives.

[1 Sep 2018 – 14 Feb 2024]

Postdoctoral Researcher

IUSS-Pavia - School of Advanced Studies of Pavia

City: Pavia | **Country:** Italy

My research areas are focused on risk assessment of natural hazard with specialization on: 1)extreme events related to climate variability (e.g. flood, drought, etc.); 2) holistic and indirect impacts estimation based on graph theory; 3) exploit the use of satellite images in the context of disaster risk reduction.

The research activities are implemented through the scientific participation and management assistant to the following projects:

- NEWFRAME project financed by *Fodanzione Cariplo*: a real application in the study case of Monza city of the theoretical methodology that I developed during my doctoral. The whole system of the city is considered to be a unique entity of interconnected elements, where those connections are taken into account in order to assess risk more thoroughly (website).
- NOCTUA project, which aims to provide information on the displacement of buildings, bridges and highways to government agencies and private citizens in Italy's Lombardia Region (news).
- RIDES-IDRO project financed by Ministero dell'Ambiente e della Tutela del Territorio e del Mare (Risk-based design for the infrastructure of flood infrastructure mitigation). The project aims to develop a CBA analysis for designing civil infrastructure to mitigate the flood risk.
- Flood damage assessment in the Po basin: together with many other universities from north-italy, we estimate the risk of different assets: residential, industrial, agriculture, cultural heritage, environmental and population.
- 3CSA – Center for Climate Change Sustainable Actions (Scuole Universitarie Federate): interuniversity center for the study of climate change and sustainable actions wants to develop new interdisciplinary approaches that help everyone to understand how the climate is changing, and to identify sustainable actions that help us mitigate the impact and adapt.

My activities as teaching were:

- DRMKC-Cov-UniJoin training on disaster risk management - Erasmus plus: course on "*A holistic graph based assessment approach for natural hazard risk of complex systems*" (Coventry University, 02/2020);
- Hydrological risk (assistant to professor Mario Martina, IUSS, 12/2019);

- Catastrophic models for natural hazard (assistant to professor Mario Martina, IUSS, 12/2018).
- During the IUSS summer school of "Natural disasters emergency management: From the survey to the disaster policy" I taught the classes on "Flood risk, emergency preparedness and risk management" and "Regional scale flood risk".

[1 Feb 2022 – 31 Jul 2022]

Risk consultant

UNESCO

City: Paris | **Country:** France

A Technical consultancy to elaborate and develop an Adaptation Fund's proposal for UNESCO

Project title**: "***Haiti Implementing Measures for Climate Change Adaptation and Disaster Risk Reduction Mitigation of School Facilities in Haiti***"** (10 million budget for 3 year projects, accepted and financed).The aim of the project is to enhance the adaptive capacity and resilience of the Haitian education sector to disaster risk of natural hazards related to climate change, through the establishment of appropriate risk assessment tool, schools retrofitting and implementing adaptation actions in Haiti.

[1 Jan 2013 – 31 Aug 2015]

Civil engineering consultant

MMI srl http://mmidro.it/

I have collaborated in different design projects with the following duties:

A. Intervention to mitigate flood risk in the towns of Fasano Torre Canne and Pezze di Greco.

- Mono-dimensional (1D) hydraulic modelling and analysis of channel floodway diverters; bi-dimensional (2D) analysis for the assessment of flooded areas;
- Developed technical drawings of all the design elements and drafting and final technical reports.

B. Preparatory Hydraulic analysis for urban renewal with the simultaneous securing of existing volumes, as a result of morphological changes of the land.

- Critique Engineering Analysis of the different modelling assumptions: existing and project scenarios;
- Combined 1D and 2D hydraulic modelling for the assessment of flooded areas in the different scenarios, parameterization and calibration of the model;

C. Detention Basin Pratolungo (Roma): Technical Report in support of the specialized flood study.

Analysis of Dam Breach phenomena: comparison of values with different empirical approaches and numerical combined simulation in 1D and 2D;

D. EXPO 2015: "Interventions for navigation Locarno - Milan - Venice (Lot 2): Navigation Lock.

- Final and construction Design, the project ended before the beginning of EXPO;
- Hydraulic analysis of the navigation lock;
- Definition of the program, installation, implementation of the monitoring campaigns: measurement of the waves in the Enel channel (6km stretch); lead the manoeuvres in power stations;
- Calibration and 1D modeling of wave propagation in the channel;
- Drew the final technical report.

E. Monitored campaign of the Seveso river in Cormano (Milan).

- Supported for the installation and sample data;
- Hydraulic analysis to estimate the discharge.

F Technical consultancy in penal process related to the Civil Protection during an emergency:

1. Review of the Italian Civil Protection system;
2. Analysis of the event under process from all three main categories of risk:
    a. the hazard: heavy precipitation (T>500) and consequent flood(T>200) in a particular morphological environment;
    b. the exposed system: extremely urbanized area;
    c. the system's vulnerability: focus on the children's school and the municipal procedure for emergencies;
3. Providing logical arguments to defend our thesis.

[1 Mar 2014 – 28 Feb 2015]

Disaster Risk Reduction and Climate Change Specialist

UNDP https://www.undp.org/vietnam

City: Hanoi | **Country:** Vietnam | **Business or sector:** Professional, scientific and technical activities

A. Promoting Climate Resilient Infrastructure in Northern Mountain Provinces of Viet Nam

with the Ministry of Agriculture and Rural Development.

I supported the management and implementation of the projects under the responsibility of the Program Officer (PO):

- Regularly assist preparation/updates/revision of **the project work planning process** and advises for efficient work progress;
- **Assessed risks** and inform PO about any risks of the work plans and suggest potential risks that the project may encounter;
- Assisted in the finalization of TORs and the identification and **selection** of national consultants and international **consultants**;
- Supported the National Project Coordinator in **providing suitable technical and managerial** briefs to the Project Board
- Provided support and facilitated the national consultants, to the international experts and to project partners;
- Facilitated and made a contribution in **reviewing all major reports** in coordination with UNDP;
- **Coordinated and facilitated the finalisation of methodologies** that were submitted by project consultants, e.g.:
    - policy development for Climate Change (CC) proofed infrastructure;
    - calculations of risks and costs in climate proofing;
    - climate change vulnerability assessment;
    - rural infrastructure vulnerability assessment to climate change;

B.Preparation of new project relating to CC adaptation, specifically Climate Adaptation in Central Coastal Provinces.

- Contributed to identifying a new idea and area of support and intervention for the development of Viet Nam providing 3 different conceptual ideas;
- Executed a brief analysis of screening on the possibility of preparing National Adaptation Programmes of Action (NAPA).

C.Making a contribution to the operation of the UN Disaster Risk Management (DRM) Team (DRMT) under UN Programme Coordination Group (PCG) on Climate Change and Environment.

- Supported PO/UNDP – Supported the coordination work of the UNDP with other UN agencies participating in the UN DRMT;
- Developed fact sheets, updated strategies and tools for the UN-DRMT;
- Assisted PO and worked with other UN Volunteers, assisted in the development of UN Situation Reports and other communication and information sharing tools utilized by the UN DRMT before, during and after disasters; in particular by
    - Providing a presentation on **GIS tools**: "GIS basic information - focus on DRMT".
    - Leading the draft of the UNDP **factsheet on Drought** in Viet Nam, in relation with CC and El Nino phenomena.

D.Research on Integrated Water Resources Management in the context of climate change, sea level rise, and rapid socio-economic development in the Mekong Delta in Viet Nam.

- Active participation at the initial brainstorming with the Senior Technical Advisor (STA) on DRM and CC;
- Develop the TOR's draft and lead the coordination of the final version for the procurement notice;
- Design the selection criteria and lead the bidding selection in coordination with SDC head and STAs.

[1 Sep 2012 – 31 Dec 2012]

Engineering research scientist

Regional Integrated Multi-Hazard Early Warning System for Africa and Asia

City: Bangkok | **Country:** Thailand

Research and development **in risk assessment on extreme weather related to climate change**. Extreme weather events and climate change were reviewed to analyze whether past data or historical data can be enough to predict future events, and whether there is any other approach or methodology available to predict future extreme weather. **The hazard, exposure, vulnerability** and risk assessment for extreme weather events were also analyzed. The research process involved:

- Literal review of more than 200 scientific related papers;
- Developed a structure and well organized database of these papers;
- Wrote a report (around 60 pg);
- Wrote a paper (10 pg);
- Prepared a power point presentation.

In May 2013, I presented this research during a seminary at the "Politecnico di Milano".

The second area of research involved the study of "**Infrastructural vulnerability to the Tropical Cyclone**": this study considered all the important elements: system, attribute, hazard and temporal reference. The final results were different **vulnerability matrixes** that can be utilized as tool to assess the infrastructure.

My main achievements of this research was to increase my personal background in CC, and in particular:

· the relation between CC and extreme weather;

· critical review of the majority papers in the field of CC adaptation and mitigation;

· deep analysis of infrastructure vulnerability;

presenting the results of my research in my University in front of my former Professors who were quite new to this topics.

EDUCATION AND TRAINING

[1 Sep 2015 – 14 Feb 2019]

Doctorate in Understanding and Managing Extremes

IUSS-Pavia - School of Advanced Studies of Pavia https://www.iusspavia.it/it

City: Pavia | **Country:** Italy | **Field(s) of study:** Field unknown | **Level in EQF:** EQF level 8 | **Thesis:** Network based model analysis for natural catastrophes risk assessment in complex systems

From *09/2015 to now*: development of **PhD thesis:**

- **Extended review of the relevant scientific literature**: the review mostly followed two parallel rails: the first focused on scientific examples of mathematical models applied in different complex contexts and the latter regarding the state of the art of a holistic risk model framework. In particular, the literature review explored the advantages and limitations of mathematical models like: Bayesian Belief Network (BBN), Agent Based Model (ABM), Complex Adaptive Systems (CAS), Graph Theory and Percolation.
- **Development of a methodology:** The core of the proposed methodology is the application of the concepts of the Graph Theory in the field of risk assessment. Graph Theory is the branch of discrete mathematics that studied the properties of networks using the graph. The graph is the core of the methodological approach and its principal components are nodes and links. The nodes of the graph represent the exposed elements in the studied area and the links between nodes represent the connections between these elements.
- **Coordination of project submission** regarding my PhD research topics for Cariplo Foundation in April 2017. The team, composed by two universities, submitted a project closely related to my research topics on the study case of an important Italian Municipality. The title of the proposal is: "NEWFRAME - NEtWork-based Flood Risk Assessment and Management of Emergencies".

From *07/2017 to 12/2017*: research at **The Italian National Institute for Environmental Protection and Research** (ISPRA) on coastal vulnerability analysis by Bayesian Belief Network methodology. The coastal vulnerability analysis was part of a broader research with the team at ISPRA for the 2016 American Geophysical Union Fall Meeting. The objective was to make the best use of EO products, in situ data and modelling, in order to propose a multidimensional surge vulnerability assessment that aimed at combining geophysical variables based on the Bayesian Belief Network approach.

From *09/2015 to 06/2016*: **Master courses in Risk Emergency Management (69 ECTS):**

Probability and Statistics - Earth Sciences and Natural Disasters - Introduction to Disaster Risk Reduction and Humanitarian Assistance - Risk and Emergency Regulation - Flood Risk - GIS for Disaster Risk Management - Remote Sensing, Crowdsourcing and Telecommunications for Risk Management and Loss Estimation - Social Vulnerability and Disaster Resilience - Sustainable Emergency Architecture - Nuclear Risk and Emergency Preparedness - Risk Assessment and Loss Estimation - Emergency Management - Extreme Values Theory - Leadership Skills - Human Factor During Crisis Situations - Epidemiology in Natural Disasters - Data Assimilation -

Weather related risk - Stochastic Modelling of Weather Risk - Disaster Risk Financing - EU Grants & EU Affairs - Scientific Writing.

[1 Sep 2010 – 24 Apr 2012]

Civil Engineering for Risk Mitigation (MSc)

Politecnico di Milano

City: Milan | **Country:** Italy | **Field(s) of study:** Engineering, manufacturing and construction: ● *Building and civil engineering* | **Final grade:** 110 | **Level in EQF:** EQF level 7 | **Number of credits:** 120 | **Thesis:** Turbulence structure in open channel flow over highly permeable beds

Main fields:

- Risk Management;
- Hydro-Geological Risk;
- Flood and Landslide Hazards.
- Transport Risk;
- Structural analysis;
- Soil Structure interaction;

[11 Feb 2015 – 16 Feb 2015]

Monitoring and Evaluation for learning (M&E)

MDF Training and Consultancy

City: Vientiane | **Country:** Laos |

[9 Nov 2014 – 13 Nov 2014]

Community Participation in Project Cycle Management

MDF Training and Consultancy

City: Ha Noi | **Country:** Vietnam |

HONOURS AND AWARDS

[1 Sep 2018] **Best poster at the conference XXXVI Convegno Nazionale di Idraulica e Costruzioni Idrauliche**
Awarding institution: Gruppo Italiano Idraulica

[13 Mar 2012] **Scholarship for thesis abroad Awarding institution:** Politecnico di Milano

[12 Sep 2012] **National Abilitation to be Profssional Engineer in Italy Awarding institution:** Or dini Ingegneri

LANGUAGE SKILLS

Mother tongue(s): Italian

Other language(s):

English

LISTENING C2 **READING** C2 **WRITING** C2

SPOKEN PRODUCTION C2 **SPOKEN INTERACTION** C2

Levels: A1 and A2: Basic user; B1 and B2: Independent user; C1 and C2: Proficient user

DIGITAL SKILLS

My Digital Skills

Programming Language: R, C, and Fortran | Windows and Microsoft Office Package | GIS software: Arcgis/ArcMap and QGIS | Science and math simulation: R and Matlab | Civil drawing: Autocad | Hydraulic model: HEC-RAS (mono-dimensional) e Infoworks ICM (bi-dimensional for flooding mapping).