PhD in SCIENCE, TECHNOLOGY AND POLICY FOR SUSTAINABLE CHANGE - 41st cycle

CDP Research Field: BEYOND CLIMATE TIPPING POINTS: UNDERSTANDING SOCIO-ECONOMIC CASCADES FOR SUSTAINABLE ADAPTATION

Monthly net income of PhDscholarship (max 36 months)
1600.0 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	The increasing frequency of compound and extreme climate events highlights the growing risk that societies may face cascading impacts once critical Earth system thresholds — or *tipping points* — are crossed. Such dynamics can trigger profound disruptions not only in biophysical systems but also in socio-economic networks, affecting livelihoods, trade, and governance structures. Traditional approaches to adaptation planning often overlook the systemic nature of these interactions, limiting their capacity to anticipate indirect and cross-sectoral consequences. This PhD project situates tipping points within the broader framework of socio-economic resilience, aiming to bridge climate science, economics, and policy analysis.This PhD aims to explore how climate tipping points can induce socio-economic cascades, reshape risk landscapes, and challenge adaptation strategies. The objectives are to: • Characterize pathways of socio-economic vulnerability and resilience triggered by regional and global tipping elements (e.g., glacier retreat, monsoon shifts, sea-level rise). • Quantify distributional and economic consequences of tipping-induced disruptions across key sectors such as agriculture, energy, and water. • Develop risk-informed and equitable adaptation pathways, integrating governance, behavioral, and policy

	dimensions. By connecting physical tipping elements with human systems and decision processes, the research will contribute to a better understanding of when and how adaptation becomes transformative rather than incremental.
Methods and techniques that will be developed and used to carry out the research	The project will combine system-level data analysis, integrated assessment modeling, and socio-economic scenario exploration to assess cascading risks. Analytical tools will include network-based approaches to map interdependencies across sectors and regions, as well as agent-based or econometric models to simulate behavioral and policy responses under stress. While data-driven methods (including AI and causal inference) will support the identification of critical linkages, the focus will remain on interpreting socio-economic consequences and actionable adaptation options. The PhD is cofounded by Unit E.1 Disaster Risk Management at the European Joint Research Centre (JRC), Ispra (Dr. Andrea Toreti) and will be developed in strict collaboration.
Educational objectives	The doctoral program offers advanced training organized in three pillars: - Basic Research, which includes methodological courses related to key aspects of theoretical and applied research in science, policy, and technology of sustainable change; - Specific Research, designed to strengthen candidates' knowledge on specific topics aligned with their research interests and increase their presence in the international scientific community through participation in conferences and presentation of their scientific work in academic contexts. - Development of the Doctoral Thesis, which allows candidates to develop leading-edge research competencies and produce original scientific work on a topic that contributes to scientific debate and has societal impacts. A period of study in worldwide most recognized research institutions is supported by the doctoral school and the

	supervisor.
Job opportunities	The PhD graduates will be equipped with distinctive skills and advanced trans-disciplinary knowledge that open up career opportunities as analysts, researchers, or planners at universities, international research centers, public and international institutions, R&D departments, regulatory authorities, policy institutions, and other public bodies.
Composition of the research group	1 Full Professors 1 Associated Professors 4 Assistant Professors 11 PhD Students
Name of the research directors	Prof. Andrea Castelletti

Contacts
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Additional support - Financial aid per PhD student per year (gross amount)

	1st year	2nd year	3rd year
Housing - Foreign Students	2500.0 € per student	2500.0 € per student	2500.0 € per student
	max number of financial aid available: 1, given in order of merit ..		
Housing - Out-of-town residents	2500.0 € per student	2500.0 € per student	2500.0 € per student
	max number of financial aid available: 1, given in order of merit ..		

Scholarship Increase for a period abroad	
Amount monthly	800.0 €
By number of months	3

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

This PhD project is a part of the **Collaborative Doctoral Partnerships programme (CDP),** an initiative by the Joint Research Centre to train a new generation of doctoral graduates on the science-policy interface.

POSITION

The position belongs to the Collaborative Doctoral Partnership Programme (CDP) of Politecnico di Milano and the Joint Research Centre (JRC) of the European Commission.
The selection is carried out jointly by Politecnico di Milano and the JRC.
The PhD candidate, enrolled in the XLI cycle of the programme, a.y. 2025/26, will spend the first 18 months at Politecnico di Milano, funded by a PhD scholarship according to the university's regulations; the following 18 months at the Joint Research Centre in Ispra (Varese), Italy, the PhD candidate will be employed by the JRC as a Grantholder Category 20 pursuant to the Grantholder Rules of 30.10.2012 or any future rules that will replace the GH Rules. The national law of the JRC site where the Grantholder will be based shall apply to their contract of employment with the JRC.

EDUCATIONAL ACTIVITY:

The PhD programme includes a structured training plan with advanced courses, seminars, and workshops covering core and transversal research skills. During the 18 months at Politecnico di Milano each PhD candidate is provided with an individual budget to support participation in international conferences, summer schools, and research exchange programmes. Additional support for these activities can also be provided through the research group's funds.

TEACHING ASSISTANTSHIP:

PhD candidates will have the opportunity to contribute to the teaching activities of the research group, with a maximum of 40 paid hours per year for teaching assistantship. Additional paid opportunities for tutoring and support to students enrolled in the courses offered by the group are also available.

COMPUTER AVAILABILITY:

A personal laptop will be provided for the entire duration of the PhD programme. High-performance computing (HPC) facilities are available both within the department and through external partners. Campus-wide software licenses for major applications are freely accessible.

DESK AVAILABILITY:

At Politecnico di Milano a dedicated desk equipped with a 27-inch monitor is provided in the laboratory for the entire duration of the programme.

ANY OTHER INFORMATION:

The PhD programme offers a vibrant research environment with interdisciplinary collaboration opportunities and access to international networks. Career development support and mentoring activities are also provided.