ScuDo
Scuola di Dottorato – Doctoral School
WHAT YOU ARE, TAKES YOU FAR

2020 - Number 4
ISSN 2533-2139

Urban and Regional Development Ph.D. Programme
ANNUAL REPORT 2020

POLITECNICO DI TORINO
UNIVERSITÀ DEGLI STUDI DI TORINO

Dipartimento Interateneo di Scienze, Progetto e Politiche del Territorio

Urban and Regional Development Ph.D. Programme - ANNUAL REPORT

Editorial coordination: Umberto JANIN RIVOLIN and Luca STARICCO
Graphic design: Cinzia PAGANO

Viale Mattioli, 39 - 10125 Torino, Italy

2020 - Number 4
ISSN 2533-2139

MAIN SPONSORS

Compagnia di San Paolo

MIUR

REGIONE PIEMONTE

Istituto Superiore sui Sistemi Territoriali per l'Innovazione

RFI RETE FERROVIARIA ITALIANA
GRUPPO FERROVIE DELLO STATO ITALIANE

EXTRA.TO
LA PROVINCIA È SERVITA

anas

Lombardi

JUVENTUS

MAIN PARTNERS

R3C Responsible Risk Resilience Centre

Future Urban Legacy Lab

PIC4SeR

IRES PIEMONTE

PARIS SORBONNE UNIVERSITÉ

VUB VRIJE UNIVERSITEIT BRUSSEL

Newcastle University

uic barcelona

UNIVERSITÉ Grenoble Alpes

KU LEUVEN

EPFL ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

THE HONG KONG POLYTECHNIC UNIVERSITY 香港理工大學

ACADEMIC BOARD

Coordinator:
Umberto JANIN RIVOLIN, Politecnico di Torino

Formal members:
Francesca ABASTANTE, Politecnico di Torino
Fabio ARMAO, Università degli Studi di Torino
Piero BOCCARDO, Politecnico di Torino
Andrea BOCCO, Politecnico di Torino
Sara BONINI BARALDI, Università degli Studi di Torino
Marta Carla BOTTERO, Politecnico di Torino
Grazia BRUNETTA, Politecnico di Torino
Luigi BUZZACCHI, Politecnico di Torino
Davide CANONE, Università degli Studi di Torino
Nadia CARUSO, Politecnico di Torino
Claudio CASSARDO, Università degli Studi di Torino
Claudia CASSATELLA, Politecnico di Torino
Giancarlo COTELLA, Politecnico di Torino
Silvia CRIVELLO, Politecnico di Torino
Luca D'ACCI, Politecnico di Torino
Egidio DANSERO, Università degli Studi di Torino
Fabrizio DI MASCIO, Università degli Studi di Torino
Stefano FERRARIS, Università degli Studi di Torino
Paolo GIACCARIA, Università degli Studi di Torino
Francesca GOVERNA, Politecnico di Torino
Isabella Maria LAMI, Politecnico di Torino
Federica LARCHER, Politecnico di Torino
Andrea Maria LINGUA, Politecnico di Torino
Stefano LO RUSSO, Politecnico di Torino
Patrizia LOMBARDI, Politecnico di Torino
Ambrogio MANZINO, Politecnico di Torino
Gugliemina MUTANI, Politecnico di Torino
Anna OSELLO, Politecnico di Torino
Edoardo PATTI, Politecnico di Torino
Alessandro PEZZOLI, Politecnico di Torino
Marco PIRAS, Politecnico di Torino
Cristina PRONELLO, Politecnico di Torino
Valentina RAPPAZZO, Politecnico di Torino
Ugo ROSSI, Politecnico di Torino
Cristiana ROSSIGNOLO, Politecnico di Torino
Carlo SALONE, Università degli Studi di Torino
Loris SERVILLO, Politecnico di Torino
Angelo SAMPIERI, Politecnico di Torino
Marco SANTANGELO, Politecnico di Torino
Luca STARICCO, Politecnico di Torino
Glenda TADDIA, Politecnico di Torino
Maurizio TIEPOLO, Politecnico di Torino
Angioletta VOGHERA, Politecnico di Torino

Additional members:
Andrea AJMAR, Politecnico di Torino
Silvia ARU, Politecnico di Torino
Cristina BECCHIO, Politecnico di Torino
Tamara BELLONE, Politecnico di Torino
Angelo BESANA, Università degli Studi di Torino
Elisa BIGNANTE, Università degli Studi di Torino
Camillo BOANO, Politecnico di Torino
Ombretta CALDARICE, Politecnico di Torino
Federico CAVALLARO, Politecnico di Torino
Francesco CHIODELLI, Università degli Studi di Torino
Antonio DI CAMPLI, Politecnico di Torino
Elena Camilla PEDE, Politecnico di Torino
Alberto VANOLO, Università degli Studi di Torino
Bartolomeo VIGNA, Politecnico di Torino

INTRODUCTION

This document contains a series of one-page reports from the students enrolled in the Urban and Regional Development Ph.D. Programme at the Interuniversity Department of Urban and regional studies and planning of Politecnico and Università di Torino.

The programme is designed to train highly-qualified specialists in urban and territorial development, while promoting the appropriate exploitation of their individual talents, to develop a distinctly multidisciplinary figure, a professional able to adapt to a wide variety of scientific knowledge and areas in a flexible and dynamic way.

The offered training will therefore give to PhD students the possibility to exploit specific skills acquired, to effectively interact with other professionals participating in urban and regional planning projects. Based on multi- and inter-disciplinary PhD skills, the programme intends to move fluidly through the conventional boundaries that separate social sciences from applied technical, engineering, physical-natural sciences.

In order to train specialists who are able to effectively navigate in the global context, the doctoral programme should adopt also a strong international nature, both in the sense of attracting young motivated and qualified scholars from abroad, as well as offering to students a training which corresponds to the highest academic and professional standards, also thank to the contribution of foreign scholars and the organisations of internships in highly qualified institutions. To stay coherent with the adopted approach the training activity is also developed entirely in English.

The PhD programme is mainly focused on twenty topics, which can be related to four Sustainable Development Goals adopted by the United Nations Member States:

SDG 11: Sustainable cities and communities
1. Urban and regional governance
2. Spatial planning
3. Urban studies
4. Human, economic and political geography
5. Built environment
6. Real estate
7. Natural environment
8. Landscape
9. Cultural heritage
10. Cultura and social innovation

SDG 13: Climate actions
11. Climate change
12. Sustainable land use and territorial resilience
13. Risk prevention and management
14. Geomatics

SDG 9: Industry, innovation and infrastructure
15. Transport systems
16. Building information modeling
17. Big data for spatial development
18. Virtual and augmented reality for spatial development

SDG 7: Affordable and clean energy
19. Renewable energy and energy transition
20. Water management

For more info:
dottorato.d.ist@polito.it
http://dottorato.polito.it/urb/en/overview

CONTENT

XXXIII CYCLE - 3rd YEAR STUDENTS p. 8

Vanessa ASSUMMA
Maurizio BACCI
Andrea BARBERO
Elena BELCORE
Giacomo CAZZOLA
Sara CRAVERO
M. Valentina DI NICOLI
Agata ELIA
Davide GISOLO
Chiara IACOVONE
Eloy LLEVAT SOY
Viola MARI
Francesca MATRONE
Maria Angela MUSCI
Giuditta SOCCALI
Roberta TARAMINO
AlbertoVALZ GRIS

XXXIV CYCLE - 2nd YEAR STUDENTS p. 26

Fabrizio AIMAR
Velia BIGI
Francesca BLANC
Francesca Caterina BRAGAGLIA
Alessandra BUFFA
Caterina CAPRIOLI
Elisabetta COLUCCI
Giulia DATOLA
Arianna FONSATI
Chiara GENTA
Elena GIGLIO
Martina GIZZI
Pinky KUMAWAT
Erica MANGIONE
Danial MOHABAT DOOST
Stefano QUAGLIA
Carlotta SCIOLDO
Francesca TAORMINA

XXXV CYCLE - 1st YEAR STUDENTS p. 45

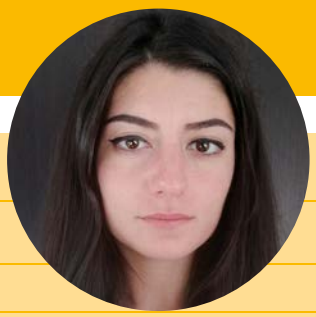
Martina BOCCI
Daniela DE LUCA
Mirko GRECO
Karl Benjamin KRAEHMER
Marco MASSANO
Cecilia MEREGHETTI
Francesco NURRA
Carlotta QUAGLIOLO

Claudia REMIAO AZZOLIN
Manuela RONCI
Federica ROTONDO
Ornella SALIMBENE
Ingrid VIGNA

PAST CYCLES p. 59

XXXIII CYCLE – 3rd YEAR STUDENTS

NAME **Vanessa ASSUMMA**
E-MAIL vanessa.assumma@polito.it



COURSE XXXIII cycle - 3rd year

RESEARCH TITLE Assessing the Resilience of Socio-Ecological Systems (SES) to Shape Scenarios of Transformation

TUTOR(S) Marta Carla BOTTERO, Elena DE ANGELIS and Roberto MONACO (Politecnico di Torino)

ACADEMIC CONTEXT

Amer M., Daim T.U., Jetter A., 2013. A review of scenario planning. *Futures*, 46, pp. 23-40.
Monaco R., Soares A.J., 2017. A new mathematical model for environmental monitoring and assessment. From Particle Systems to Partial Differential Equations IV. *Springer Proceedings in Mathematics and Statistics*, pp. 263-283.
Elmqvist T., Andersson E., Frantzeskaki N. *et.al*., 2019. Sustainability and resilience for transformation in the urban century. *Nature Sustainability*, 2, pp. 267-273.
Assumma V., Bottero M., Datola G., De Angelis E., Monaco R., 2020. Dynamic models for exploring the resilience in territorial scenarios. *Sustainability*, 12(3).

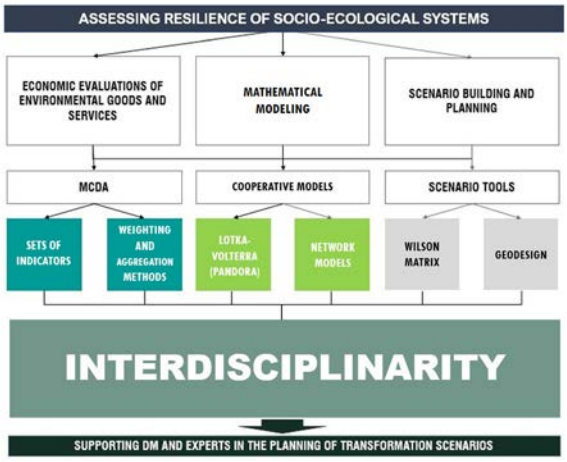
EXTERNAL COLLABORATIONS

- Centro de Matematica (CMAT) & Centro de Território, Ambiente e Construção (C-TAC), Universidade do Minho, Portugal
- NEOMA Business School, France
- ResCult project, Increasing Resilience of Cultural heritage: a supporting decision tool for the safeguarding of cultural assets, Turin

HIGHLIGHTS OF THE RESEARCH ACTIVITY

Today resilience is at the center of debate of scientists and governments to understand the interacting relations within Socio-Ecological Systems (SES) and to support the decision-making process in the definition of long-term strategies. Despite the great attention on this issue, an incorrect and overuse of resilience generated overlays and misunderstandings: sustainable choices cannot guarantee the increase of resilience and resilient choices cannot guarantee sustainable transformations (Elmqvist et al. 2019). There is an evident need to analyse, organize and monitor amounts of data in integrated spatial frameworks for urban transformation purposes (Atzori et al. 2010; Kraneburg 2008; Campagna, 2014). The definition and employment of an interdisciplinary evaluation framework to explore the resilience of SES and predict its potential future scenarios is the main challenge of this thesis to shape scenarios of transformation. In particular, this framework intends to bridge the gap between resilience thinking and practice in wine regions.

The first step of the research focused on the resilience thinking and practice and the literature review on traditional and innovative evaluation methods belonging to the evaluation of environmental goods, the mathematical modeling and the scenario building, with the purpose to design the integrated evaluation framework. The second step refers to the application of the framework to understand resilience: in particular, sets of indicators have been defined through Multicriteria Decision Analysis (MCDA) to calculate a synthetic index of resilience; subsequently, the output of MCDA have been combined with Lotka-Volterra cooperative models (LV) PANDORA and of network type, finalized to predict possible future scenarios in terms of ecological evolution or population dynamics. The third part refers to the integration of both MCDA and LV models' outputs within scenario building tools to support real actors and stakeholders in the definition of scenarios of transformation. The SES considered in this thesis are the following wine regions, which are in part or totally included within UNESCO cultural landscapes: the vineyard landscape of Langhe, Roero and Monferrato, the Monferrato Ovadese, the Douro Valley, the polycentric system in Cuneo province and the Champagne-Ardenne landscape. It is expected to define a suitable evaluation framework to support procedures of strategic planning and assessment of transformation projects (i.e. EIA and SEA), as well as within UNESCO Management Plans to monitor wine regions considering both conservation and resilience features.



NAME **Maurizio BACCI**
E-MAIL maurizio.bacci@polito.it

COURSE XXXIII cycle - 3rd year

RESEARCH TITLE Multi-Hazard Risk Analysis in Developing Countries under Climate Change

TUTOR(S) Alessandro PEZZOLI, Maurizio TIEPOLO

ACADEMIC CONTEXT

Nicholson S.E., 2001. Climatic and environmental change in Africa during the last two centuries. *Climate research*, 17, pp. 123-144.
Niang I., Ruppel O.C., Abdrobo M.A., Essel A., Lennard C., Padgam J., Urguhart P., Africa, 2014. In Climate change 2014: Impacts, adaptation, and vulnerability. Part B: regional aspects. *WG II to the Fifth assessment report of the IPCC*. Cambridge: Cambridge University Press, pp. 1199-1265.
Tiepolo M., Bacci M., Braccio S., 2018. Multihazard Risk Assessment for Planning with Climate in the Dosso Region, Niger. *Climate 2018*, 6, pp. 67.
Tiepolo M.; Bacci M., Braccio S., Bechis S., 2019. Multi-Hazard Risk Assessment at Community Level Integrating Local and Scientific Knowledge in the Hodh Chargui, Mauritania. *Sustainability*, 11, pp. 50-63.

EXTERNAL COLLABORATIONS

- Direction de la Météorologie Nationale au Niger
- FAO, Angola

HIGHLIGHTS OF THE RESEARCH ACTIVITY

Developing countries are increasingly challenged to respond to increased exposure to risk and vulnerability under climate change (desertification, floods, climate related hazards, mass migration, etc.). However, responsive local governance for climate adaptation is constrained by weak technical and managerial capacity, poor linkages with other institutions at different levels, weak systems for gathering and disseminating information, and unclear mandates and conflicting priorities between levels and agencies of government. This has particularly serious implications for the poorest and most vulnerable groups that are frequently the most adversely impacted by climate stress.

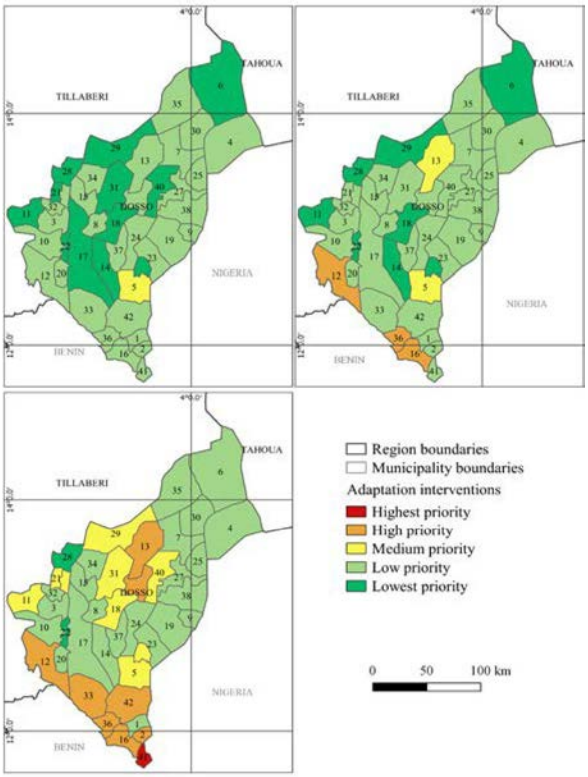
The Sendai Framework for disaster risk reduction and the Sustainable Development Goals recommend that more efforts should be made to carry out risk analysis with a holistic vision. This should orient new-generation plans and projects towards communities that are most at risk, towards the main hydro-climatic threats and should help monitoring, evaluation, communication and awareness-raising activities.

The goal of the research activity is to propose a multi-hazard risk assessment on a regional scale identifying a methodology able to characterize natural risks that impact the studied area and producing the future evolution of these risks. The identification of significant changes in risk distribution provides the key to understand natural disaster evolution and guide regional and urban planning and development.

The study draw conclusions on the applicability of the method to different case studies in Sub-Saharan Africa characterized by a systematic lack of field data and by a reduced capability of local authorities to produce a medium-long term planning of interventions due to lack of human and financial resources.

The proposed case studies are:

- Tillaberi and Dosso Regions, Niger (ANADIA Project),
- Hodh Chargui Region, Mauritania.



NAME **Andrea BARBERO**
E-MAIL andrea.barbero@polito.it

COURSE XXXIII cycle - 3rd year

RESEARCH TITLE BIM Methodology tandardization for Facility Management: Data Organization, Integration and Visualization for a New Concept of Stadium

TUTOR(S) Anna OSELLO, Fabio MANZONE (Politecnico di Torino)

ACADEMIC CONTEXT

Barbero A., Del Giudice M., Manzone F., 2018. BIM model methods for suppliers in the building process. eWork and eBusiness in Architecture. *Engineering and Construction, proceedings of ECPPM 2018*, pp. 291-296.
Barbero A., Ugliotti F.M., Del Giudice M., 2019. BIM-based collaborative process for Facility Management/Impostazione di un processo collaborativo BIM per il Facility Management. *Dienne - Building Information Modeling, Data & Semantics*, 4, pp. 6-14.
Barbero A., Del Giudice M., Ugliotti F.M., Osello A., 2020. BIM model uses through BIM methodology standardization. *eWork and eBusiness in Architecture, Engineering and Construction, proceedings of ECPPM 2020*.

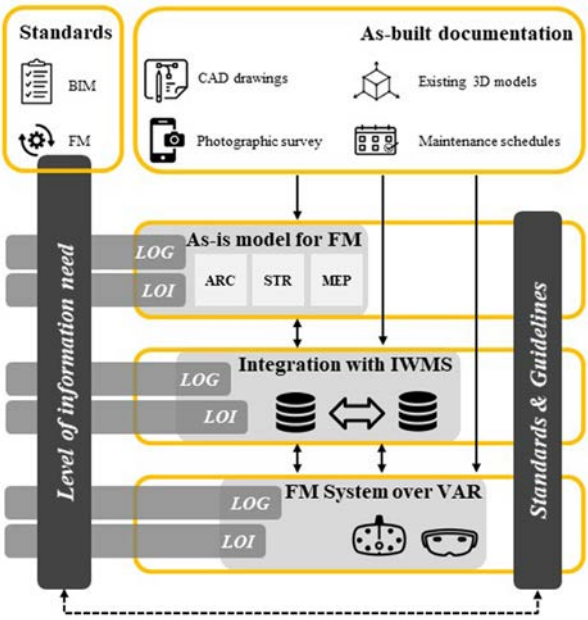
EXTERNAL COLLABORATIONS

- JUVENTUS F.C. S.p.A., Facility and Maintenance department

HIGHLIGHTS OF THE RESEARCH ACTIVITY

The research topic highlights the potentialities provided by the application of the Building Information Modelling (BIM) methodology for Facility Management (FM). The aim is to analyze and evaluate the definition of a methodology standardization in the meaning of setting the activities necessary to start a digitization process aimed at using BIM models in management activities. The case study of the research is represented by the Allianz Stadium, a complex building that evolves constantly overtime. Starting from the research questions, the definition of different model uses has been done to the correct definition of the objects and the implementation of models. These are: i) As-is model for FM; ii) Integration with an Integrated Workplace Management System (IWMS) platform; iii) FM system over Virtual and Augmented Reality (VAR).

As visible in the figure below, the methodology approach started from the analysis of the As-built documentation and the investigation of various BIM standards in order to define the level of information need for each model uses. The development of the BIM model oriented to each FM uses culminates with the definition of model requirements that have to be included in standards and guidelines.



These BIM guidelines contain the BIM procurement dispositions, enriched with a series of technical standards that could be achieved following specific operating protocols defined for the FM uses. These protocols are the results produced by the application of defined activities related to the development, management, and visualization of the models, based on the objectives of the research:

- Data Organization related to the definition and the structure of the data content for the creation of an As-is model for FM.
- Data Integration related to the development of different tests that aim to identify specific characteristics that data must have in order to integrate correctly the IWMS platform, which can have a great impact on the models' structure.
- Data Visualization related to the implementation of the models in order to allow the visualization of geometric and alphanumeric information with a predefined tool.

The resulting BIM guidelines will be updated during the entire building life cycle through continuous implementation loops, thanks to the collaboration between all the actors involved. Their application allows enriching an innovative methodology that represents the starting point for a new concept of stadium: the stadium 2.0.

NAME **Elena BELCORE**
E-MAIL elena.belcore@polito.it

COURSE	XXXIII cycle - 3rd year
RESEARCH TITLE	Generation of Land Cover Atlas of Environmental Critic Zones using unconventional tools
TUTOR(S)	Marco PIRAS, Alessandro PEZZOLI

ACADEMIC CONTEXT

Turner B.L., Lambin Eric F., Reenberg A., 2007. The emergence of land change science for global environmental change and sustainability. *Proceedings of the National Academy of Sciences*, 104(52), pp. 20666-20671.
Lewiński S., Aleksandrowicz S., Banaszkiewicz M., 2015. Testing Texture of VHR Panchromatic Data as a Feature of Land Cover Classification. *Acta Geophysica,* 63, pp. 547-567.
Aicardi I., Dabove P., Lingua A.M., Piras M., 2016. Integration between TLS and UAV photogrammetry techniques for forestry applications. *iForest,* 10, pp. 41-47.

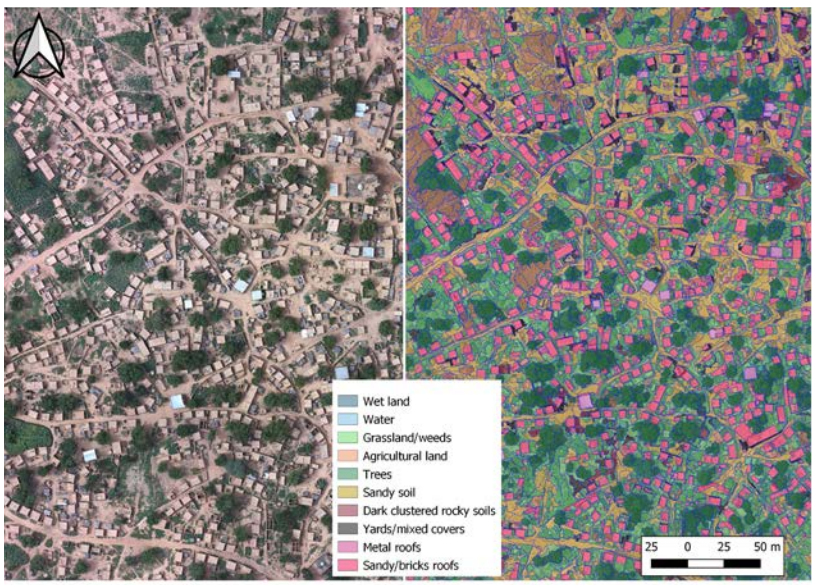
EXTERNAL COLLABORATIONS

- IBIMET-CNR, Istituto di Biometeorologia, Consiglio Nazionale delle Ricerche, Firenze
- IRSTEA, Institut national de recherche en sciences et technologies pour l'environnement et l'agriculture, France
- DISAFA, Dipartimento di Scienze Agrarie, Forestali e Alimentari, Università degli studi di Torino
- Space Research Centre, Polish Academy of Science, Warsaw, Poland

HIGHLIGHTS OF THE RESEARCH ACTIVITY

In the framework of planning for natural risk reduction and prevention, monitoring the most vulnerable areas of the world has become crucial. Nevertheless, monitoring activities can be resources consuming. This is particularly true in those areas characterized by a lack of infrastructure, peculiar land morphology, extreme climate conditions, and homogeneous land cover. In these critical areas, the emerging geomatics technologies can be powerful tools to monitor the processes taking place in areas affected – and potentially affected – by natural hazards and for the detection of Land Cover (LC). This research aims to investigate new and emerging technologies to create a high-resolution Land Cover (LC) Atlas for natural risk management and climate planning. Floods and rockfalls are the natural hazards analyzed in this study. The Atlas considers the relation between spatial and thematic detail, with a specific focus on the effort needed to collect data.

The Atlas is built upon the data collected through the combination of different geomatics techniques. Particularly, it has been used UAV (Unmanned Aerial Vehicles) multispectral imagery and Satellite Imagery. The UAV data are collected with low-costing and high-resolution optical sensors (spatial resolution ≤10cm) that are sensitive to Near InfraRed light. Radiometric and geometric calibrations were carried out for each sensor. The optical imagery was classified using machine learning techniques. The result is multi-resolution land cover information. For the multi-temporal analysis, Google Earth Engine has been tested for the elaboration of a large amount of data. The classifications will be inter- and intra- validated. The areas selected for testing the Atlas-generation methodology are the Tillabery region in sub-Saharan Niger and the barrier forests of subalpine areas of Alpine Arch.



NAME **Giacomo CAZZOLA**
E-MAIL giacomo.cazzola@polito.it

COURSE XXXIII cycle - 3rd year

RESEARCH TITLE Back to the Roots of Socially Constructed Disaster Risk. Envisioning and Revisioning Disaster Aid and Governance

TUTOR(S) Maurizio TIEPOLO

ACADEMIC CONTEXT

Blaikie P., Wisner B., Blaikie P.M., Cannon T., Davis I., 2004. *At Risk: Natural Hazards, People's Vulnerability and Disasters*. Psychology Press.
Lavell A., Maskrey A., 2014. The future of disaster risk management. *Environmental Hazards*, 13(4), pp. 267-280.
Oliver-Smith A., Alcántara-Ayala I., Burton I., Lavell A., 2017. The social construction of disaster risk: Seeking root causes. *International Journal of Disaster Risk Reduction*, 22, pp. 469-474.
Thomalla F., Boyland M., Johnson K., Ensor J., Tuhkanen H., Gerger Swartling Å. *et al.*, 2018. Transforming Development and Disaster Risk. *Sustainability*, 10(5), p. 1458.

EXTERNAL COLLABORATIONS

- Cooperazione Internazionale (COOPI), Haiti and Guatemala

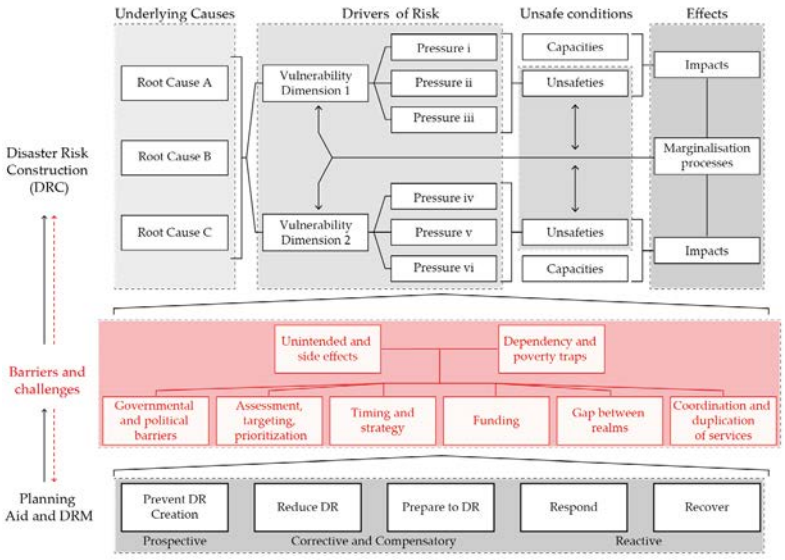
HIGHLIGHTS OF THE RESEARCH ACTIVITY

My dissertation frames in the Political Ecological Perspective grown up within disaster studies in the past forty years and thrive to meet the challenges arisen with the Vulnerability Paradigm: disaster risk and vulnerability can be explained, and should, therefore, be addressed, as socially constructed, as a puzzle of intertwined underlying historical, cultural, economic and political factors.

The main object of this investigation has been the unmet challenge of reducing and dealing with vulnerability enhancing urban attributes and human behaviors, components that brought David Alexander to classify vulnerability as: (1) newly generated, e.g. as a result of new urban development in hazard areas and unprepared and incapable to cope new residents, as (2) residual and un-ameliorated pre-existing sources of risk, and vulnerability as (3) delinquent, as the outcome of violated norms, codes and regulations.

The analytical process has been framed thinking of disaster-prone countries with dependent economies where, also due to multiple subsequent catastrophes, crises are creeping and/or forgotten, emergencies permanent and recovery processes everlasting. The case study of the research relates to those Arenas of Intervention resulting from the permanent establishment of International Organizations taking part to the disaster governance: this actor-based approach involved stakeholders belonging to UN agencies, NGOs, Governmental bodies and civil society organizations both in Haiti and Guatemala. Within these contexts, I recollected and related to each other (1) academic articles and reports regarding past events, (2) stakeholder's perceptions, explanations and approaches to the problem and (3) existing policies, projects and plans facing such complexity.

Recomposing aid workers' understandings, the resulting scenarios portrays an alarming warning for future planning strategies: in addition to the persistence and reinforcement of root causes and risk drivers, the succession of several catastrophic events added failed disaster recoveries (e.g. temporary and hazard-prone shelters turning into long-term informal settlements) and counterproductive effects (e.g. rural-to-urban migration as a result of the aid-related opportunities). This set of unintended dynamics call for a revision of short- term achievement-based projects towards a more coordinated Resistance to Disaster Risk Creation.



NAME **Sara CRAVERO**
E-MAIL sara.cravero@polito.it

COURSE XXXIII cycle - 3rd year

RESEARCH TITLE Sustainable Cities as Serious Games. How Games Application Can Contribute to Achieving Sustainable Urban Development

TUTOR(S) Patrizia LOMBARDI, Isabella LAMI, Edwin CHAN (The Hong Kong Polytechnic University)

ACADEMIC CONTEXT

Abt C.C., 1987. *Serious games*. University press of America.
Deterding S., Dixon D., Khaled R., Nacke L., 2011. From game design elements to gamefulness: defining gamification. In *Proceedings of the 15th international academic MindTrek conference: Envisioning future media environments*. ACM, pp. 9-15.
Stanitsas M., Kirytopoulos K., Vareilles E., 2018. Facilitating sustainability transition through serious games: A systematic literature review. *Journal of Cleaner Production*.
Cravero S., 2020. Methods, strategies and tools to improve citizens engagement in the smart cities' context: A Serious Games classification. *Valori e Valutazioni*, 24, pp. 45-60.

EXTERNAL COLLABORATIONS

- BRE Department, The Hong Kong Polytechnic University
- ETH Zurich, Department of Computer Science- Game Technology Center, Switzerland

HIGHLIGHTS OF THE RESEARCH ACTIVITY

Nowadays smart cities are tackling urban and social challenges in terms of sustainability perspective. Although a shared definition is still missing, the smart cities involve several aspects and therefore they can be analyzed through different sustainable perspectives as social, technological, economic and environmental. This interdisciplinary intersection makes the proper understanding and design of the smart cities and communities a very difficult task (Albino et al., 2015; Dewalska-Opitek, 2014). Concerning these issues, the 2030 Agenda for Sustainable Development provides strategic directions to support the future development of cities and communities, identifying 17 Sustainable Development Goals (SDGs), as an urgent call for actions by developed and underdevelopment countries, in a global partnership (sustainabledevelopment.un.org). Notably, the SDG 11, "Make cities and human settlements inclusive, safe, resilient and sustainable", concerns urban growth and safety development empowering the citizens' involvement. Every projects, decisions, and actions done in cities have an impact on the citizen's quality of life. Allowing citizens to take part in urban projects and initiatives, and becoming them active stakeholders in the urban environment, it could improve the achievement of specific goals for cities development. Accordingly, the Citizen Design Science is recognized as being an interesting approach to involve citizens in urban design from a sustainable perspective, through an easily accessible design (Mueller et al., 2018). It can be recognized some activities to support the citizens' involvement in smart cities, such as questionnaires, focus groups, and workshops. However, according to the literature (Leydesdorff and Deakin, 2011; Nalbandian et al., 2013; Joshi S. et al., 2016), the need for new participatory methods emerges. Among several tools, the Serious Games (SG) have been identified for studying sustainable issues in smart cities contexts. SGs are full-fledged games able to get fun and achieve purposes at the same time. SGs are also defined as teaching tools with multiple learning aims, a means of entertainment, so they can be applied in many areas and target all age groups (Mouaheb, et al., 2012). SGs are main topic tackled in this study, passing through literature review, uses, strengths and weaknesses with a focus on their application in sustainable urban contexts. The final outcome of this thesis is a list of guidelines for designing and creating serious games as tools able to involve people towards sustainability urban issues.

NAME **Maria Valentina DI NICOLI**
E-MAIL mariavalentina.dinicoli@polito.it

COURSE	XXXIII cycle - 3rd year
RESEARCH TITLE	The Role of the Build Environment and the Human Dimension Towards a Sustainable Energy Transition
TUTOR(S)	Patrizia LOMBARDI, Stefano P. CORGNATI (Politecnico di Torino)

ACADEMIC CONTEXT

Becchio C., Corgnati S., Delmastro C., Fabi V., Lombardi P., 2015. The Role of Nearly-zero Energy Buildings in the Definition of Post-Carbon Cities. *Energy Procedia*, 78, pp. 687-692.
Kalkbrenner B. J., Roosen J., 2016. Citizens' willingness to participate in local renewable energy projects: The role of community and trust in Germany. *Energy Research and Social Science*, 13, pp. 60-70.
Torabi Moghadam S., Lombardi P., Mutani G., 2017. A Mixed Methodology for Defining a New Spatial Decision Analysis towards Low Carbon Cities. *Procedia Engineering,* 198, pp. 375-385.
Trotta G., 2018. Factors affecting energy saving behaviours and energy efficiency investments in British household. *Energy Policy,* 114, pp. 529-539.

EXTERNAL COLLABORATIONS

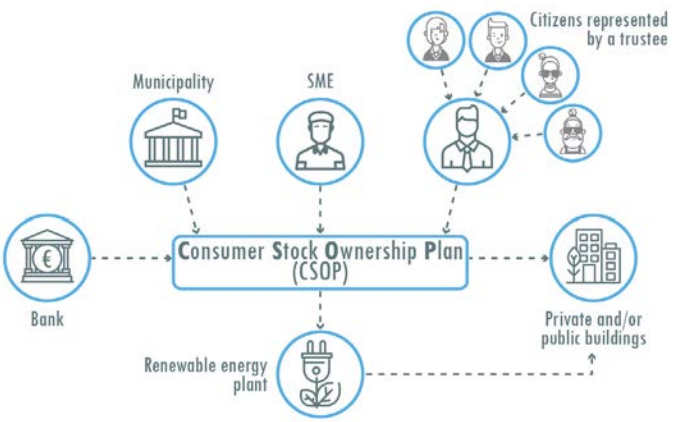
- H2020 SCORE project: Supporting CO-ownership in REnewable energies (2018-2021), Grant Agreement: 784960

HIGHLIGHTS OF THE RESEARCH ACTIVITY

Nowadays, due to several environmental issues, a "decarbonization process" should be applied. In this way, a series of law and incentives have been enacted but their common factor is the prescription of an energy efficiency target to be reach in a specific time. Only in the last years, a legislative framework (on different levels) is born, paying attention also to users and citizens, promoting their active role.

The main challenge is to foster user awareness, focussing on different population segments; not only men, high income people with an high level of education, but including vulnerable people (e.g. low income and/or unemployed people and single woman). The reference context is the energy communities and this is supported thanks to on-going Horizon 2020 project (named "SCORE") through an application in real context of Valle di Susa.

The main research objective is the creation of an energy community as a possible solution to achieve the energy transition and to understand the elements necessary for the birth of this community. The methodology is divided in 3 parts: the technical structure, the social structure and the legal and financial structure. The technical structure concerns the buildings identification and description, the definition of energy retrofit alternatives and the best scenario selection (through a multicriteria analysis). The social structure (focussed on citizens and mayors) concerns on one hand the identification of key persons and the organization of info event and workshop; on the other hand the administration of a questionnaire. The aim of this survey is to collect information on citizens' interest in engaging in local energy initiatives and understand which factors favour and / or hinder their participation. For this reason, the questionnaire is divided in four macro parts: 1) attitude and willingness information (level of degree interest towards EC project); 2) feeling related to community identity information (feeling related do trust, pride, hope, shame, fear, boredom towards the municipality and degree of trust towards other people): 3) technical information on building (type and age, heating system type, property); 4) socio-economic information and socio-demographic information (personal and family income, family composition, age, gender, education level, belonging municipality). The obtained answers were analysed through the Exploratory Factor Analysis, in order to identify the variable structure used in the survey, and the cluster analysis, in order to create different group based on the attitude and feeling variables. Finally, through the financial structure the effective creation of the energy community (through the innovative CSOP model) is promoted. In this way, all the involved stakeholders will become co-owners of the new renewable energy plant system.



NAME **Agata ELIA**
E-MAIL agata.elia@polito.it

COURSE XXXIII cycle - 3rd year

RESEARCH TITLE Geospatial Data and Information in Emergency. Information for Displacement Contexts

TUTOR(S) Piero BOCCARDO

ACADEMIC CONTEXT

Füreder P., Lang S., Hagenlocher M., Tiede D., Wendt L., Rogenhofer E., 2015. Earth observation and GIS to support humanitarian operations in refugee/IDP camps. *Geospatial Data and Geographical Information Science Proceedings of the ISCRAM 2015 Conference*.
Goldblatt R., You W., Hanson G., Khandelwal A., 2016. Detecting the Boundaries of Urban Areas in India: A Dataset for Pixel-Based Image Classification in Google Earth Engine. *Remote Sensing*, 8(8), 634.
Wendt L., Lang S., Rogenhofer E., 2017. Monitoring of Refugee and Camps for Internally Displaced Persons Using Sentinel-2 Imagery – A Feasibility Study. *GI_Forum 2017*, Issue 1, p.p. 172-182.
Quinn J. A., Nyhan M. M., Navarro C., Coluccia D., Bromley L., Luengo-Oroz M., *2018. Humanitarian applications of machine learning with remote-sensing data: review and case study in refugee settlement mapping*. Phil. Trans. R. Soc. A 376: 20170363.

EXTERNAL COLLABORATIONS

- Geoinformatics Z_GIS, University of Salzburg, Austria

HIGHLIGHTS OF THE RESEARCH ACTIVITY

Geoinformation systems and remote sensing proved the extent to which they can significantly contribute to emergency response. In decision making in emergency, high-quality and timely information, accessibility, defined standards, user-friendly interfaces and appropriate visualisations are all factors of great significance and help.

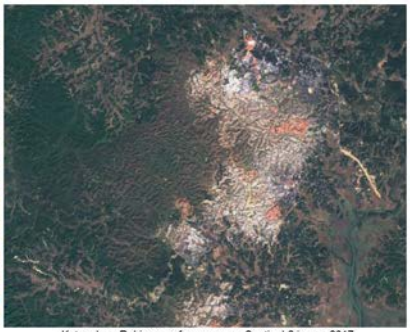
Displacement settings represent a particularly complex case of emergency. The magnitude of displacement is rising. Nowadays, it represents a global theme involving both developed and developing countries. Displaced people's camps and settlements are getting more numerous and more crowded and the tendency of a high fraction of them is to lose their temporary nature to become permanent and extensive. Managing displacement settings and providing humanitarian support is crucial.

At the same time, the geospatial world is expanding. The availability of open data and free and open source tools is vast. The capacities made freely available to extract information from them are growing, starting to be based on cloud infrastructures. The starting point of the proposed research is the impression of an existing gap between available data and the operational use of it. The amount of data generated is impressive and its quality has proven to be good or high, embedding characteristics such as timeliness and accessibility. The majority of remote sensing applications in the field of displaced populations recurs to Very High-Resolution imagery, whose cost is not negligible and whose temporal resolution and spatial coverage is lower compared to High-Resolution imagery. From field experience it has also emerged that the information extraction task for operational use is generally left to the end user, who sometimes might not have the ability or the resources to use or make best use out of the available data.

Hence, the research questions arise. Is it possible to apply in the context of humanitarian operations in displacement contexts a standardized, operationally focused and simple (relatively to the end user) method to take advantage of the large quantity of data and of the most recent processing capacities available? Can and how can High Resolution open imagery be implemented in applications to displacement contexts?

A set of applications of Sentinel-2 imagery in the context of displacement is explored: from photo interpretation to classification of displacement setting features and secondary applications to potential indicators of displacement.


The Rohingya exodus in Bangladesh – Paula Bronstein Photojournalist 2017


Kutupalong Rohingya refugee camp - Sentinel-2 image 2017

NAME **Davide GISOLO**
E-MAIL davide.gisolo@polito.it

COURSE XXXIII cycle - 3rd year

RESEARCH TITLE Water, Carbon and Energy Fluxes on Grasslands of an Alpine Region

TUTOR(S) Stefano FERRARIS, Davide CANONE

ACADEMIC CONTEXT

Lee X., Massman W., Law B., eds., 2005. *Handbook of micrometeorology - a guide for surface flux measurement and analysis*. Springer Science + Business media.
Hiller R., Zeeman M.J., Eugster W., 2008. *Eddy covariance flux measurements in the complex terrain of an Alpine valley in Switzerland, Boundary-Layer Meteorol*. 127, pp. 449-467.
Raffelli G., Previati M., Canone D., Gisolo D., Bevilacqua I., Capello G., Biddoccu M., Cavallo E., Deiana R., Cassiani G., Ferraris S., 2017. Local- and plot-scale Measurements of soil moisture: time and spatially resolved field techniques in plain, hill and mountain sites. *Water Journal.* 9, 706.
Gisolo D., Canone D., Previati M., Bechis S. and Ferraris S., 2018. Eddy covariance analyses and measures on a mountain slope. In Ferro V., Niedda M., *Attualità dell'Idraulica agraria e delle Sistemazioni idraulico-forestali al cambiare dei tempi*. EdiBios, pp. 464.

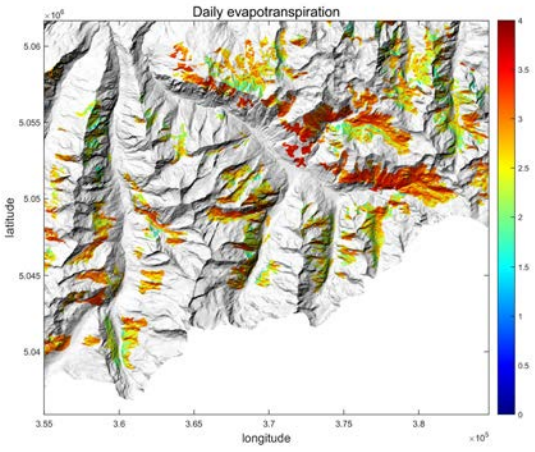
EXTERNAL COLLABORATIONS

- Arpa Valle d'Aosta
- CNR
- Department of Bioclimatology, University of Göttingen, Germany

HIGHLIGHTS OF THE RESEARCH ACTIVITY

The main goal of the research is to evaluate the mass and energy exchanges between the soil and the atmosphere, and to obtain water, carbon and energy balances in an Alpine region. This is done by means of data analysis and modelling tools considering important phenomena occurring in the soil and the surface boundary layer.

Mountain ecosystems are important because they provide services supporting downstream human life and activities, thus their preservation is fundamental. They play a key role in the sequestration of carbon (in forests and grasslands) and in water availability and distribution. However, long-lasting experimental campaigns are still rare. Monitoring is one of the more challenging research fields in the Earth sciences, because of terrain complexity and sensitivity to anthropogenic phenomena: climate change including dramatic carbon dioxide and temperature increases, and land-use alterations e.g. vegetation expansion towards higher altitudes (Gehrig-Fasel, 2007). In Italy, hilly and mountainous regions are a significant part of the territory. Improved knowledge about those regions is important scientifically, because of several open challenges: the correct computation of mass and energy fluxes using the eddy-covariance technique (Lee et al., 2005; Aubinet et al., 2012), the imbalance between incoming and outgoing energy from the system comprising the first meters of atmosphere and the upper soil layers, data quality assessment (Aubinet et al. 2012) and understanding of local scale phenomena, such as wind flow and temperature oscillations (Mortarini and Anfossi, 2015) which affect also water vapour and carbon dioxide exchanges. Soil properties are investigated due to the coupling (i.e. exchange of heat, liquid and gases) between land and atmosphere.



Additional activities include the evaluation of different land covers on evapotranspiration simulating future scenarios due to climate change for a case study, the evaluation of evapotranspiration mapped over a wider area using data from meteorological stations. Effects of snow cover on energy and water balances are also explored.

To perform the analyses, data are collected from ARPA Valle d'Aosta and stations built by the LABFLUX Team in the Gran Paradiso National Park (Cogne and Colle del Nivolet sites).

These activities will be useful for policymakers and land planning. The research framework is also carried out by the CNR Project NEXTDATA and by Ecopotential, an H-2020 funded European Project.

NAME **Chiara IACOVONE**
E-MAIL chiara.iacovone@polito.it

COURSE	XXXIII cycle - 3rd year
RESEARCH TITLE	Airbnb in the Real Estate Financial Chain - Housing and Policies in Southern Europe Post-Crisis Territories
TUTOR(S)	Francesca GOVERNA

ACADEMIC CONTEXT

Aalbers M., 2016. *The financialization of housing: A political economy approach*. London: Routledge.
Frenken K., Schor J., 2017. Putting the sharing economy into perspective. *Environmental Innovation and Societal Transitions*, 23, pp. 3-10.
Hadjimichalis C., 2017. *Crisis spaces: Structures, struggles and solidarity in Southern Europe*. London: Routledge.
Fields D., 2019. Automated landlord: Digital technologies and post-crisis financial accumulation. *Environment and Planning A: Economy and Space*, 0(0), pp. 1-22.

EXTERNAL COLLABORATIONS

- Rete SET
- Università degli Studi di Napoli Federico II

HIGHLIGHTS OF THE RESEARCH ACTIVITY

Platform economies are a capillary presence in today's economic system, through digital transmission and physical expansion they represent a sprawling regeneration of neoliberal structure.

Airbnb, as one of the main peer-to-peer rental platform, captures also the most profitable assets that drive the global economy, the real estate market. The research proposes a reflection on the interpretation of Airbnb as an infrastructural component of today's cities and on the analysis of its urbanization force.

The phenomenon is analyzed in 8 cities (Lisbon, Porto, Madrid, Seville, Naples, Palermo, Athens and Thessaloniki) of the so-called European PIGS (Portugal, Italy, Greece and Spain).

Starting from the 2008 financial crisis, the research retraces the sets of policies at the urban, national and European levels that were made to stress the housing market, such as the liberalization of rents in Portugal, the mortgage law in Spain, the new tax regime in Italy and the wave of evictions in Greece. Those policies led to an exposition of the yet unsaturated housing market, together with programs of capital attraction such as the subsidized tax regime for non- permanent resident or the 'golden visa'. Thanks to these actions finance had the possibility to enter in the former static housing market of Southern Europe. The growth and the evolution of the tourist industry is the other side of the coin. The new model supported by Airbnb is one of the most profitable and most adopted worldwide. A relevant consequence of the unregulated development of the platform is a spreading mechanism of buy-to-let in the range of Airbnb properties

carried out by professional actors. In this sense, Airbnb can be seen as a link in the financial chain of the housing market; property managers, real estate firms and broadly, transnational landlords took advantages from the extensiveness and the flexibility of the platform to enlarge their markets.

What will emerge is a complex system of different kind of infrastructures that merge and works together at different scales. The research aimed to propose a zoomed-out and transcalar approach in the studies of platform economies rather than a place-based analysis and thus, focus on the role of Airbnb as an economic, political and digital infrastructure and inscribing it in a political economic perspective to better understand its structure and its performances as a global trend.

NAME **Eloy LLEVAT SOY**
E-MAIL eloy.llevat@polito.it

COURSE XXXIII cycle - 3rd year

RESEARCH TITLE Spaces for Production in a Service Society

TUTOR(S) Angelo SAMPIERI, Cristina BIANCHETTI (Politecnico di Torino), Elena COGATO LANZA (EPFL Losanna)

ACADEMIC CONTEXT

Garofoli G., 2017. Territorio, economia e società all'epoca della crisi: alcune questioni interpretative e di metodo. *Territorio*, 81, pp. 71-75.
Bianchetti C., Kërçuku A., Llevat Soy E., 2019. Produzione e città. Per una politica dell'immaginazione. *Archivio di studi urbani e regionali*, 125, pp. 5-25.
Llevat Soy E., 2019. Un collasso in sospeso. Il dibattito scientifico sulla produzione. In Bianchetti C., ed., *Territorio e Produzione*. Macerata: Quodlibet, pp. 150-155.
Sonnette S., 2019. Au PAV, l'industrie est-elle soluble dans le projet urbain? *Tracés*, 10, pp. 14-20.

EXTERNAL COLLABORATIONS

- HABITAT Research Center, EPFL, Switzerland
- Lab U, EPFL, Switzerland

HIGHLIGHTS OF THE RESEARCH ACTIVITY

This research addresses the recent transformation of the existing infrastructures for production in the Canton of Geneva. In the last ten years the industrial areas of Geneva have been invested by, on one hand, a massive ongoing and anticipated movement of manufacturing enterprises and, on the other hand, an increased attention from the Canton's urban planning responsibles. The "abandon" of the Praille Acacias Vernets industrial area as a production settlement by the State of Geneva is an ongoing process which has posed major problems for the city and its manufacturing base. How to prevent a massive exodus of enterprises from the Canton? How to adapt the work spaces to the imminent technological changes and to the new demands of companies and workers? How to slow down production processes that negatively impact the natural environment? These new challenges have been welcomed as an opportunity to rethink the future of the industrial areas of Geneva and their role in the transformation of the city as a whole.

The aim of this work is to conduct an investigation into those spaces that supported Geneva's manufacturing production in the late twentieth century with careful, fine and precise observation of the changes produced today by the various design bodies. An exploration that can offer a more articulated and free description of the new relationships between space and production than those, still recurrent, attributable to the idéologie du post- (Lopreno, 1989), polarized between the extreme breakdown of transformations and their absolute continuity. What problems do these places pose to the urban project? How is the discussion on these spaces being reconfigured: which terms, which recurrences, which associations? How these changes affect the soil: which forms, which urban materials, which architectural choices? How these transformations become technically possible: what conditions, what regulatory tools, which actors? These questions build the backbone of the thesis and together they can bring us closer (this is the bet) to the understanding of what is the new place that these spaces hold in the contemporary city.

NAME **Viola MARI**
E-MAIL viola.mari@polito.it

COURSE XXXIII cycle - 3rd year

RESEARCH TITLE Working a Way Out? Geographies of Women at the Margins

TUTOR(S) Francesca GOVERNA

ACADEMIC CONTEXT

Hanson S., Pratt G., 2003. *Gender, Work and Space*. Routledge.
Lancione M., 2016. *Rethinking life at the margins: the assemblage of context, subjects, and politics*. London: Routledge.
McDowell L., 2016. *Migrant Women's Voices: Talking About Life and Work in the UK Since 1945*. Bloomsbury Publishing.
von Benzon N. and van Blerk L., 2018. *Geographical Research with 'Vulnerable Groups': Re-examining Methodological and Ethical Process*. London: Routledge.

EXTERNAL COLLABORATIONS

--

HIGHLIGHTS OF THE RESEARCH ACTIVITY

This study builds on the conceptualisation of the nexus between urban marginality and women's subjectivities, 'reflecting everyday struggle in the face of extreme urban social environments and prolonged precarious conditions' (Thieme, 2016), which till now has received little attention from critical urban scholars, more focus on broader and structural analysis of urban marginality. The thesis examines the life experiences of a group of women living and enduring in one of the historical working-class neighbourhood in Turin (Italy), Barriera di Milano, a very stigmatised and marginalised urban space. This work aims to investigate if and how these women challenge their subaltern and marginal condition through the mediation of work and how this process reshape, in an iterative way, their subjectivities and their relationship with space (Dutta, 2016, 2019; Hanson & Pratt, 2003).

Drawing on their life stories and microscale geographies (Katz, 2004; McDowell, 2015; Tamboukou, 2008), the aim is to answer to the following research questions: i) how marginal contexts impact and shape women's subjectivities and their daily practices, and ii) how and if women constantly negotiate their marginal condition and subjectivity through the mediation of work and labour. Moreover, it will be investigated iii) what form of agency these women display, and iv) how they develop and maintain measure of self-worth (Snow & Anderson, 1987).

This research is based upon an extensive ethnographic enquiry developed as a volunteer in two different spaces of care located in Barriera di Milano (*Fa bene* and *Drophouse*), and structured through observations, informal interactions, and more in-depth interviews. Having the chance to be directly involved in these two projects and with the women (beneficiaries, social workers, volunteers) gravitating around them, I will investigate the daily challenging experience of these women, how their strategies and coping mechanisms are linked to the marginal context and their personal stories. Through the narration of their life stories, the aim is to bring forth different stories and counter-narratives of survival, while critically engaging with the mainstream concept of empowerment for 'vulnerable' female subjects.

Is it possible to unveil new relational assemblages that go beyond canonical and binary representations of life at the margins and thus, to talk about urban margins as a space of possibility and rupture? Overcoming the common narrations around this neighbourhood, generally depicted as a dangerous, infamous, and masculine space, it will be shown a different perspective on Barriera di Milano, a 'universe of capacities' (Lancione, 2016), a city of difference and encounter (Fincher & Jacobs, 1998), and above all solidarity and care.

NAME **Francesca MATRONE**
E-MAIL francesca.matrone@polito.it

COURSE	XXXIII cycle - 3rd year
RESEARCH TITLE	Deep Neural Networks for Cultural Heritage Point Cloud Semantic Segmentation
TUTOR(S)	Andrea M. LINGUA, Marco ZERBINATTI (Politecnico di Torino), Eva Savina MALINVERNI (UNIVPM)

ACADEMIC CONTEXT

Wang Y., Sun Y., Liu Z., Sarma S.E., Bronstein M.M., Solomon J.M., 2018. Dynamic Graph CNN for learning on point clouds. *arXiv*:1801.07829.
Matrone F., Lingua A., Pierdicca R., Malinverni E.S., Paolanti M., Grilli E., Remondino F., Murtiyso A., Landes T., 2020. A Benchmark for Large-Scale Heritage Point Cloud Semantic Segmentation, *Int. Arch. Photogramm. Remote Sens. Spatial Inf. Sci.*, XLIII-B2-2020, 1419–1426.
Pierdicca R., Paolanti M., Matrone F.; Martini M., Morbidoni C., Malinverni E.S., Frontoni E., Lingua A., 2020. Point Cloud Semantic Segmentation Using a Deep Learning Framework for Cultural Heritage. *Remote Sensing*, 12, 1005.

EXTERNAL COLLABORATIONS

- Università Politecnica delle Marche, Ancona
- ICube Laboratory, Institut National des Sciences Appliquées, Strasbourg, France
- MIT Computer Science and Artificial Intelligence Laboratory, Boston, USA

HIGHLIGHTS OF THE RESEARCH ACTIVITY

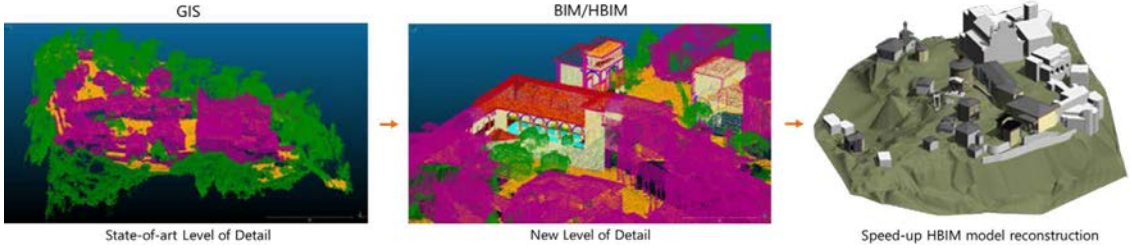
Architectural cultural heritage (CH) is a driving force for the development of a territory and, in this framework, its preservation and its memory for posterity can be supported by the most recent surveying techniques able to acquire data always faster and with higher accuracy. These kind of data, mainly point clouds, lead to the reconstruction of 3D digital models, useful also for multiscale analysis, involving both the GIS and HBIM (Historical Building Information Modeling) domains.

Starting from the aforementioned point clouds, the aim of my research is therefore to speed up the digital reconstruction of the 3D models, stepping from the urban scale to the architectural one, with a particular focus on the immovable cultural assets.

In order to do this, a semantic interpretation of the point clouds is essential and a supervised Deep Learning (DL) approach, coming from the Artificial Intelligence discipline, has been chosen to label and cluster automatically the point clouds.

After having deepened the state of the art in the use of DL techniques in the field of CH and their application to point clouds, it was necessary to structure a dataset, not available in literature, which would allow testing neural networks (NN) and their learning on case studies of my interest. Thus was created the ArCH dataset (Architectural Cultural Heritage) containing point clouds for semantic segmentation in the field of CH. This dataset has been published and made available to the scientific community (http://archdataset.polito.it/).

At this point, the NN with the best state-of-art results on the ArCH dataset was identified (DGCNN from Wang et al., 2018) and, with the collaboration of the researchers who developed this network, I've tried to adapt it to our case studies in order to increase the performances. To this aim, the following part of the research has been divided into 3 parts: (i) investigation of NN hyperparameters' best configuration, (ii) integration of 3D features and Machine Learning classifiers as Random Forest into the DGCNN, (iii) proposal of how to integrate prior knowledge (ontologies or taxonomies) into the learning system. The main outputs of the research are: new dataset available for the scientific community; first application of DL framework to CH point clouds; effective improvement of the DGCNN performances; increase of the Level of Detail for semantic segmentation of point clouds, stepping from territorial to architectural scale; proposal of prior knowledge integration into the NN.



State-of-art Level of Detail — New Level of Detail — Speed-up HBIM model reconstruction

NAME **Maria Angela MUSCI**
E-MAIL mariaangela.musci@polito.it

COURSE XXXIII cycle - 3rd year

RESEARCH TITLE Automatic Data Extraction Using Remote Sensing for Service Robotics

TUTOR(S) Andrea M. LINGUA, Paolo DABOVE and Irene AICARDI (Politecnico di Torino)

ACADEMIC CONTEXT

Musci M.A., Mazzara L., Lingua A.M., 2020. Ice Detection on Aircraft Surface Using Machine Learning Approaches Based on Hyperspectral and Multispectral Images. *Drones*, 4, 45.

Musci M. A., Persello C., Lingua A.M., 2020. UAV images and deep-learning algorithms for detecting flavescence dorée disease in grapevine orchards. In *ISPRS - International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, pp. 1483-1489.

EXTERNAL COLLABORATIONS

- Interdepartmental center for Service Robotics (PIC4Ser), Politecnico di Torino
- Department of Earth Observation Science (EOS), University of Twente, Enschede, The Netherlands

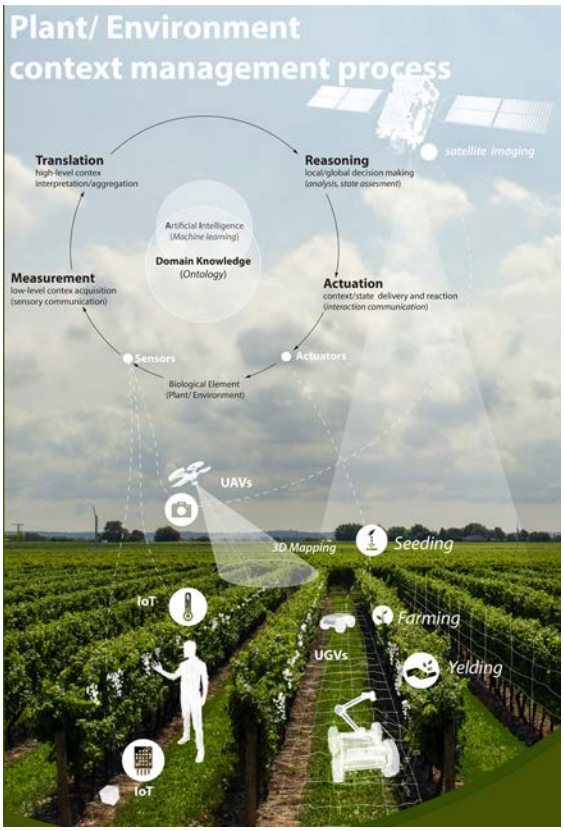
HIGHLIGHTS OF THE RESEARCH ACTIVITY

In the urban environment and rural area, monitoring and inspection at multiple scales (global, regional and local) are crucial issues in term of productivity, resilience and sustainability.

As proposed by the "Rural Development Program 2014-2020", it is necessary to provide innovative tools and sustainable solutions for monitoring, conservation, improvement of the production to sustainable development in large scale area. This implies the use of more precise and integrated sensors, analysis of big data, the use of new information and communication technologies for short scale management as well as for wide ecosystems observation.

In this scenario, the interdepartmental center of Politecnico di Torino for Service Robotics (PIC4Ser), in collaboration with different research groups, aims to integrate innovative solutions enabling service robotics in the areas of control, perception and artificial intelligence. Through four applications such as precision agriculture, cultural heritage and smart city searce& rescue, and service robotics for wellbeing, the idea of the Centre is the development of a multi-agent and multi-sensors platform, i.e. Unmanned Aerial Systems (UAS) and an Unmanned Ground Systems (UGS), that collaborate to have a different perspective and to overcome the limits of the single platform (Figure 1). Among these limits, for example, there are the reductive perspective of ground vehicles and the necessity to test new sensors. My research work, funded by the Centre, focuses on geomatics applications for classification and object detection, such as sensors acquisition, real-time photogrammetry, multisensory data fusion and deep learning.

The state of the art of sensors, types of data, automatic classification techniques highlights that the main gaps are related to technologies for a radiometric survey and standardized methodologies for multi/hyper-spectral data management. Therefore, the purpose of the research is to define an automatic multi-sensor and multi-temporal methodology for information extraction from hyper and multispectral data. The use of multi/hyper-spectral data is mandatory in order to characterize objects both from the geometric and radiometric point of view and to improve the automatic data extraction and classification.



NAME **Giuditta SOCCALI**
E-MAIL giuditta.soccali@polito.it

COURSE	XXXIII cycle - 3rd year
RESEARCH TITLE	The Neoliberal Heritage City between Abuse and Reclaim. Insights from Varanasi (Benares), India
TUTOR(S)	Ugo ROSSI, Alberto VANOLO (Università di Torino)

ACADEMIC CONTEXT

Comaroff J.L., Comaroff J., 2009. *Ethnicity.* Inc. University of Chicago Press.
Herzfeld M., 2015. Heritage and the Right to the City: When Securing the Past Creates Insecurity in the Present. *Heritage & Society,* 8(1), pp. 3-23.
Dodson M.S., 2016. *Banaras: Urban Forms and Cultural Histories*. Taylor & Francis Group.
Simone A.M., 2018. *Improvised Lives: Rhythms of Endurance in an Urban South*. Cambridge, UK, Polity Pr.

EXTERNAL COLLABORATIONS

- CSDS, Centre for the Study of Developing Countries, New Delhi, India

HIGHLIGHTS OF THE RESEARCH ACTIVITY

The study of cultural heritage has traditionally been confined to historical and technical disciplines such as conservation and restoration of traditional artefacts, the administration and management of cultural institutions, and the promotion and planning of heritage sites for visitors and tourism management.

In the last decades, sociologists and anthropologists have started to unpack the taken-for-granted notion of cultural heritage, defining it as a socio-economic process of value- and place-making which is object of contestation and negotiation among groups and communities. This new paradigm has fertilized new research trajectories. However, unlike anthropologists and sociologists, urban scholars still hesitate in engaging fully in the domain of urban heritage and in discovering the implications that the notion has for urban research.

Using qualitative research methodology and single case study analysis this thesis argues that reading urban transformations through the lens of cultural heritage access, use and contestation has the potential to unveil socio-economic dynamics that reproduce urban capitalism. At the same time, my research shows that the neoliberal heritage city has become object of fierce contestation and resistance. Groups around the world have realized that if they are to renegotiate their role and place in urban societies, they may benefit from mobilising historical narratives and places that are misrepresented or silenced. In particular, this thesis argues that urban heritage dispossession, both material and immaterial, is closely linked to the dimension of collective and public space.

NAME **Roberta TARAMINO**
E-MAIL roberta.taramino@polito.it

COURSE XXXIII cycle - 2nd year

RESEARCH TITLE Consumers, City Networks and Commercial Patterns. An Investigation of Retail locations in the City of Turin, Italy

TUTOR(S) Luigi BUZZACCHI, Giulio ZOTTERI (Politecnico di Torino)

ACADEMIC CONTEXT

Eaton B.C., Lipsey R.G., 1979. Comparison shopping and the clustering of homogeneous firms. *Journal of Regional Science*, 19, pp. 421-435.
Stahl K., 1987. Therories of urban business location. In: *Handbook of Regional and Urban Economics.* Elsevier, pp. 759-820.
Duranton G., Puga D., 2004. Micro-foundations of urban agglomeration economies. In: *Handbook of Regional and Urban Economics.* Elsevier, pp. 2063-2117.
Aguirregabiria V., Suzuki J., 2015. Empirical games of market entry and spatial competition in retail industries. In *Handbook on the Economics of Retailing and Distribution.* Edward Elgar Publishing.

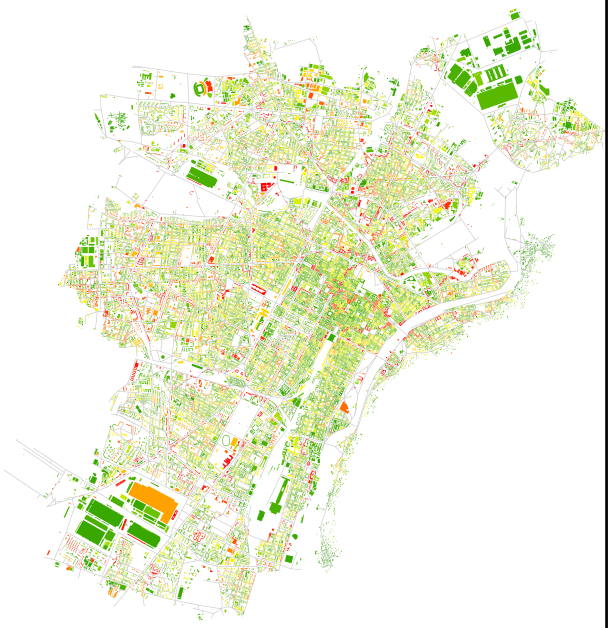
EXTERNAL COLLABORATIONS

--

HIGHLIGHTS OF THE RESEARCH ACTIVITY

Retail firms provide consumers with goods and services for consumption. They are an economic institution delivering explicit product or services at an observable market price (Betancourt and Gautschi, 1988), playing in an oligopolistic market.

Retailers follow a two-stages process. First, they decide how similar their product may be with respect to competitors. If their products or services are too similar to those of established firms, in theory, incumbents are not able to woo consumers but if their products are too different, firms may train the potential consumer launching educational campaigns. Second, they decide their best location. In the retail market, location is not meant to be only a spot on a map. The city can't be viewed as if it were located on a featureless plan, on which all land is of equal quality (Alonso, 1960). It is the relative position that a retailer can occupy given the proximity to other stores, on one hand, and to potential consumers, on the other hand (Aguirregabiria and Suzuki, 2015). It is a juxtaposition of social, economic and even morphological aspects of urban life, such as centrality and accessibility, layout and design, visibility and popularity, cluster attraction and spill-over. Hence, commercial city patterns are the result of a long process in which retailers deal with urban morphology, given that space is a scarce resource to be allocated with competitors. One possible outcome of a such important choice, that has never been a consequence of chance, is that activities agglomerate in areas that are considered as accessible and attractive by the consumers (Duranton and Puga, 2004).



On the one hand, accessibility deals with urban network. On the other hand, attractiveness deals with typical consumers behaviour. Indeed, store owners are expected to locate on the point of maximal demand that is "as closely as possible to the consumers demanding their commodity bundle and to retailers who, by supplying complementary commodity bundles, attract the desired clientele" (Stahl, 1987:33). Indeed, customers who visit several shops benefit from increasing return to scale. This externality is enhanced when multiple shops are located in close proximity (Eaton and Lipsey, 1979). Hence, the most important reason for shop to cluster is the presence of shopping externalities, which are generated by consumers' trip-chaining behaviour (Koster and Pasidis, 2017) and which are increasing stores' attractiveness in the eyes on consumers.

Our research has the objective to investigate the existent relationship between retail location choices, urban network and consumers behaviour in order to provide a critical interpretation of the commercial city patterns.

NAME **Alberto VALZ GRIS**
E-MAIL alberto.valzgris@polito.it

COURSE	XXXIII cycle - 3rd year
RESEARCH TITLE	Urban Metabolisms of the Green Transition. The Commodity Chain of Lithium-Ion Batteries from the Atacama Plateau to Zero-Emission Cities
TUTOR(S)	Francesca GOVERNA

ACADEMIC CONTEXT

Angelo H., Wachsmuth D., 2015. Urbanizing urban political ecology: A critique of methodological cityism. *International Journal of Urban and Regional Research*, 39(1), pp. 16-27.
Arboleda M., 2015. Financialization, totality and planetary urbanization in the Chilean Andes. *Geoforum*, 67, pp. 4-13.
Mezzadra S., Neilson B., 2015. Operations of Capital. *South Atlantic Quarterly*, 114(1), pp. 1-9.
Valz Gris A., 2019. Tangling a bi-oceanic corridor. *Lo Squaderno*, 51.

EXTERNAL COLLABORATIONS

- CIDMEJu, San Salvador de Jujuy, Argentina

HIGHLIGHTS OF THE RESEARCH ACTIVITY

This research project is funded by and developed at the Future Urban Legacy Lab as part of an interdisciplinary focus on the relationship between cities and production. Its seeks to investigate contemporary geographies of production while critically considering the geographic category of the city: which urban spaces are both intersected with and fabricated by contemporary geographies of production? As argued by critical and heterodox studies of urbanization, more attention needs to be paid in the field of urban studies to the dynamics by which urban agglomerations are produced well beyond their administrative and physical borders, considering the wider metabolic interactions that structurally bind them to extended forms of urbanization.

The present research project proposes to explore this metabolic interaction through the study of commodity chains. This framework not only is a productive heuristics for retracing the unfolding of economic dynamics, towards which studies in economic geography have traditionally employed it, but also an innovative one, I argue, for studying associated dynamics of urbanization. The subsequent operations which ultimately produce a consumable item illuminate in fact a wide array of urbanizing spaces across the chain. Economic geographic literature on the commodity chain concept is therefore reviewed here and critically combined with studies in urban political ecology and critical urban theory so as to formulate novel methodological and theoretical questions.

The project investigates the geographies of lithium-ion batteries-themselves a globally expanding commodity because of their prominent role in sustaining the global agenda towards the reduction of carbon emissions. Batteries are remaking cities worldwide through their rapidly growing adoption in ICT, electric mobility and grid applications based on renewable energy. Their commodity chain, however, reveals a much wider relational geography by which hinterlands of extraction, circulation and manufacturing are fundamentally reshaped with direct correspondence to the transformations occurring in cities. The project explores the dynamic of extended urbanization in the Atacama region in South America (the world's largest agglomeration of lithium reserves) through extractive, logistical and financial geographies associated with the lithium-ion supply chain. As such, an urbanizing Atacama is reconstructed with respect to an array of scales and relations.

XXXIV CYCLE - 2nd YEAR STUDENTS

NAME **Fabrizio AIMAR**
E-MAIL fabrizio.aimar@polito.it

COURSE XXXIV cycle - 2nd year

RESEARCH TITLE Social resilience and UNESCO Cultural Landscapes

TUTOR(S) Angioletta VOGHERA, Rohit JIGYASU (ICCROM)

ACADEMIC CONTEXT

Brunetta G., Ceravolo R., Barbieri C.A., Borghini A., de Carlo F., Mela A., Beltramo S., Longhi A., De Lucia G., Ferraris S., Pezzoli A., Quagliolo C., Salata S., Voghera A., 2019. Territorial Resilience: Toward a Proactive Meaning for Spatial Planning. *Sustainability*, 11, p. 2286.
Butler A., Knez I., Åkerskog A., Sarlöv Herlin I., Sang Å. O., Ångman E., 2019. Foraging for identity: the relationships between landscape activities and landscape identity after catastrophic landscape change. *Landscape Research*.
Coaffee J., 2019. *Future-proof. How to build resilience in an uncertain world*. Yale University Press, Yale, UK.

EXTERNAL COLLABORATIONS

- R3C, Responsible Risk Resilience Centre, Politecnico di Torino
- LINKS Foundation (Cultural Heritage & Regional-Urban Development area), Turin
- ICCROM, International Centre for the Study of the Preservation and Restoration of Cultural Property

HIGHLIGHTS OF THE RESEARCH ACTIVITY

The landscape is alive and constantly mutates over time (Antrop, 2005). In literature, permanence, identity, and preservation of cultural values ask for the integration of co-evolution in landscape planning. So, the debate around the relationship between cultural heritage and resilience has opened (Brunetta et al., 2019), falling into UN Target 11.4 (2015).

"UNESCO Cultural Landscapes . . . represent the 'combined works of nature and of man' (Convention, art. 1). They are illustrative of the evolution of human society . . . over time" (UNESCO Guidelines, art. 47). Based on SOC reports, in 10/28 WH Agricultural Landscapes there are Primary Factors affecting, i.e. socio-cultural uses of heritage, and Secondary Factors impacting, i.e. identity, social cohesion, and changes in local community.

So, what is the relationship between resilience and identity? What is the limit between persistence and change, to achieve both the systemic robustness required by UNESCO and to cope with dynamic shifts? What is the main objective of Cultural Landscapes?

To grasp the socio-economic transformation processes, the resulting impacts on OUV and other heritage values, their management, and what factors will determine the continuation of Cultural Landscapes in the future, 2 case studies have been established: the Vineyard Landscape of Piedmont: Langhe-Roero and Monferrato, Italy and the Cultural Landscape of Honghe Hani Rice Terraces, China.

Analyses on the diverse meanings of the landscape and the driving forces of change affecting them have been performed, also interviewing local-international experts and scholars. Findings have revealed common issues, as depopulation, abandonment of cultivated lots, inward migration, new crops/practices that can affect integrity and authenticity in the long run.

So, to maximize resilience and minimize vulnerability, retaining memory and community identity seem essential. Social resilience needs to establish a local capacity building to promote an active conservation, defining an acceptable limit between dynamic pressures and communitarian memory.

Landscape cannot be a self-goal, but it requires an adaptive capacity in integrated management systems to create social robustness and permit multiple ways to look at and perceive it. It emerges how communities are landscape attributes, which necessitate to be strengthen launching new interrelationship with their values into the UNESCO OUV and Guidelines. Proactive landscape-resilient tools shall necessarily be inserted in potential revisions of current Management Plans.

NAME **Velia BIGI**
E-MAIL velia.bigi@polito.it

COURSE XXXIV cycle - 2nd year

RESEARCH TITLE Analysing Flood-Related Risks in the Context of Climate Change Through Quantitative Approaches Selected on Geographical Base

TUTOR(S) Alessandro PEZZOLI, Magda FONTANA (Università di Torino), Maurizio ROSSO (Politecnico di Torino)

ACADEMIC CONTEXT

C. B. Field, *et al*., eds., 2014. *IPCC, 2014a: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects*. United Kingdom and New York, NY, USA: Cambridge University Press Cambridge.
Jenkins K., Surminski S., Hall J., Crick F., 2017. Assessing surface water flood risk and management strategies under future climate change: Insights from an Agent-Based Model. *Science of the Total Environment*, 595, pp. 159-168.
Belcore E., Pezzoli A., Calvo A., 2019. Analysis of gender vulnerability to climate-related hazards in a rural area of Ethiopia. *Geographical Journal*, July, pp. 1-15.
Bigi V. *et al*., 2020. *A Vulnerability Assessment in Scant Data Context: The Case of North Horr Sub-County*, 3.

EXTERNAL COLLABORATIONS

- Regione Piemonte
- ETH, Zurich, Switzerland
- CCM Italia, Medical Collaboration Committee

HIGHLIGHTS OF THE RESEARCH ACTIVITY

In the context of climate change, the increase of flood risk and flood related risks will pose a serious challenge. This risk will result as a consequence of higher daily discharges as well as of changes in the economic, social and environmental conditions.

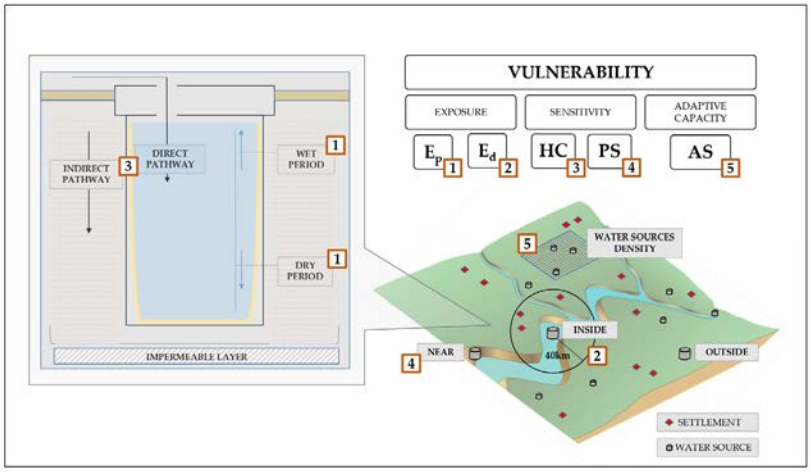
Two different quantitative approaches are selected in order to analyse flood risk and flood related risks according to geographical characteristics which play a role in the distribution and the integrity of data availability.

Rural areas, indeed, suffer from a deficiency in the quantification of natural-related risks, both for lack of interest - primarily economic interest – and, as a consequence, the lack of data collection. Whereas in urban areas the accessibility, quality and organisation of data is considerable.

Using the reference definition of risk provided by the Intergovernmental Panel on Climate Change (IPCC), a spatial assessment is conducted in North Horr sub-county (Kenya) in order to determine the vulnerability of open shallow water sources to nitrate contamination due to fecal intrusion as a consequence of flooding events and nitrate percolation in groundwater. The outcomes compared with the adaptive measures contained in the local development plan highlight the inability of the policy makers to rectify the asymmetries and enhance the easiest access to quality water.

In the Piedmont region, through a broader use of the IPCC's definition of risk coupled with an alternative use of Agent Based Models will enable the identification of intervention areas and the creation of a more refined instrument that identifies the component of risk on which is necessary to act in advance. The expectations of the research based on this case study rely on the creation of a planning instrument able to support policy makers' decisions on flood prevention measures with the characteristics of functionality, usability and innovation.

The flood risk management is a complex issue that varies greatly according to the geographical characteristics of the study area and, therefore, need to be addressed with specific tools.



NAME **Francesca BLANC**
E-MAIL francesca.blanc@polito.it

COURSE	XXXIV cycle - 2nd year
RESEARCH TITLE	Testing Comparative Spatial Planning Studies in Latin America. Case Studies from Ecuador and Bolivia
TUTOR(S)	Giancarlo COTELLA, Marcin DĄBROWSKI (TU Delft)

ACADEMIC CONTEXT

Janin Rivolin U., 2012. Planning Systems as Institutional Technologies: a Proposed Conceptualization and the Implications for Comparison. *Planning Practice and Research*, March, pp. 37-41.
Schwarz A., Streule M., 2016. A Transposition of Territory: Decolonized Perspectives in Current Urban Research. *International Journal of Urban and Regional Research*, 40(5), pp. 1000-1016.
Watson V., 2016. Shifting Approaches to Planning Theory: Global North and South. *Urban Planning*, 1(4), pp. 32-41.
Galland D., Elinbaum P., 2018. A "Field" Under Construction: The State of Planning in Latin America and the Southern Turn in Planning. *Disp*, 54(1), pp. 18-24.

EXTERNAL COLLABORATIONS

- TU-Delft, Delft University of Technology, The Netherlands
- UdC, Universidad de Cuenca, Ecuador
- Universidad Privada Boliviana, Cochabamba, Bolivia

HIGHLIGHTS OF THE RESEARCH ACTIVITY

Until recently, comparative spatial planning studies had mostly focused on the European continent. Since the end of the 1980s, a growing number of studies contributed to the proliferation of theoretical and methodological approaches, as well as to a further definition of the object of study. At the same time, comparisons focusing on other parts of the World are much less frequent, if one excludes the rather 'dry' reports produced by international organizations. Aiming at investigating the reasons behind this empirical gap, the PhD thesis inquires how to test comparative spatial planning analysis in the Latin American context, in particular in the Andean region, with focus on Ecuador and Bolivia. By doing so, the PhD research firstly inquires the theoretical implications and challenges that emerge when applying to the global South conceptual and analytical frameworks developed in the Northern hemisphere. As spatial governance and planning systems are highly context-dependent, and the European and Latin American contexts are highly different, these methodologies are contextualized and critically tailored in the context of the 'southern turn in planning' and in the light of decolonized perspectives in urban research.

Secondly, the PhD research analyzes how the spatial governance and planning systems work at national and local level in Ecuador and Bolivia, in terms of structure, tools, discourse and practices. It focuses both on the mechanisms adopted by each country's spatial governance and planning systems to allocate land use and spatial development rights, as well as on the actual relations and balance between public and private interests in guiding the development. All this in the framework of the recent and ongoing spatial governance and planning legal reforms.

Thirdly, the PhD research investigates how international influences have shaped the Ecuadorian and Bolivian spatial governance and planning systems, at both national and local level. It focuses on the role played by the mainstream urban agencies, the cooperation aids and the international city networks, discussing the rising impact of the 'urban solutionism' and the 'global philanthropy' in Latin America.

NAME **Francesca Caterina BRAGAGLIA**
E-MAIL francesca.bragaglia@polito.it

COURSE XXXIV cycle - 2nd year

RESEARCH TITLE Ruling theUunruled?
The Institutionalisation of Social Innovation in Spatial Planning

TUTOR(S) Umberto JANIN RIVOLIN

ACADEMIC CONTEXT

Swyngedouw E., 2005. Governance innovation and the citizen: the Janus face of governance-beyond-the-state. *Urban studies*, 42(11), pp. 1991-2006.
Moulaert F., Swyngedouw E., Martinelli F., Gonzalez S., eds., 2010. *Can Neighbourhoods Save the City?: Community development and social innovation*. London: Routledge.
Eraydin A., Frey K., 2018. *Politics and Conflict in Governance and Planning: Theory and Practice*. London: Routledge.
Bragaglia F., 2020. Social innovation as a 'magic concept' for policy-makers and its implications for urban governance. *Planning Theory*, pp. 1-19.

EXTERNAL COLLABORATIONS

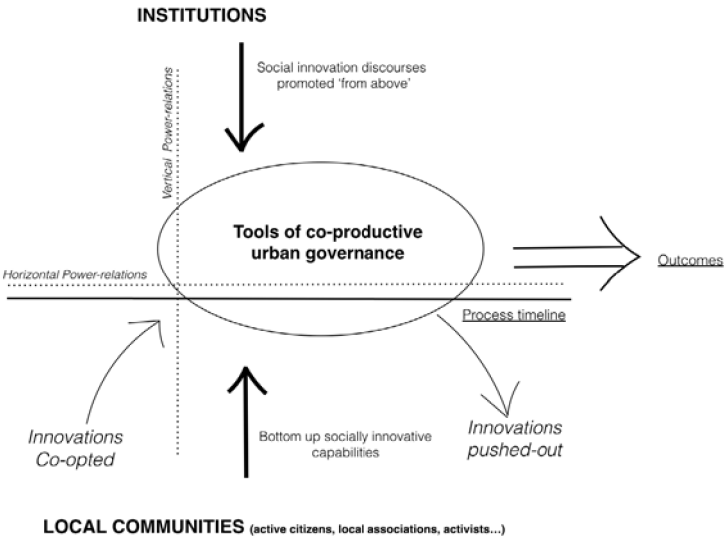
- Science Po Paris, France
- University of Reading, United Kingdom

HIGHLIGHTS OF THE RESEARCH ACTIVITY

Over the past years, social innovation has been considered as a possible partial solution to the economic crisis and to the current welfare system failures (Moulaert *et al.*, 2007), leading to the conclusion that civil society can co-operate - and sometimes even substitute government - in urban welfare provision and spatial planning interventions. In this sense, many European countries, have recently been trying to organize and stress this great socially innovative ferment - originating outside the governmental apparatus - within institutional frameworks. Among the others, the Neighbourhood Plans, instituted in 2011 in England with the 'Localism Act', and the Conseils Citoyens, that since 2014 have profoundly redefined 'La Politique de la Ville' in France, are emblematic examples of this new faith in co-creating and co-managing the city with citizens and associations. These new tools are the clear expression that in the current scenario, spatial governance can no longer be interpreted from a uni-directional perspective.

Starting from a broad theoretical reflection on the concept of social innovation in the academic and policy discourse, the thesis argues that social innovation is actually a 'magic concept' for policy-makers and this has profound implications for urban governance (Bragaglia, 2020).

The research is thus aimed at investigating the application of the Neighbourhood Plans London and the Conseils Citoyens in Paris. In more practical terms, the research aims to understand (a) at what conditions and in what institutional settlements it is possible to develop mutually engaging relationships between municipalities and civil society capabilities; (b) if the new instruments can transform the established vertical and horizontal power relationships (Arnstein, 1969; Foucault, 1982) between public authorities and civil society, or they are simply 'flanking mechanisms' (Brenner and Theodore 2002, p. 374) of traditional asymmetrical relationship of power to 'govern through citizenship' (Rose, 2008); (c) Under which conditions, it is possible to develop mutually engaging relationships between governments and civil society capabilities that can improve the operation of urban governance.



NAME **Alessandra BUFFA**
E-MAIL alessandra.buffa@polito.it

COURSE XXXIV cycle - 2nd year

RESEARCH TITLE Integrating Resilience Concept and Urban Form: the Pandemic Crisis Experience of Covid 19

TUTOR(S) Grazia BRUNETTA

ACADEMIC CONTEXT

Davoudi S., Shaw K., Haider L.J., Quinlan A.E., Peterson G.D., Wilkinson C., Fünfgeld H., McEvoy D., Porter L., Davoudi S., 2012. Resilience: A Bridging Concept or a Dead End? [. . .]. *Planning Theory & Practice.* 13(2), pp. 299-333.
Marcus L., Colding J., 2014. Toward an integrated theory of spatial morphology and resilient urban systems. *Ecology and Society*, 19(4), p. 55.
Feliciotti A., Romice O., Porta S., 2018. From system ecology to urban morphology: towards a theory of urban form resilience. Conference Proceedings – IFoU December 2018: Reframing Urban Resilience Implementation: Aligning Sustainability and Resilience. *Sustainability*.
Samuelsson, K., Barthel, S., Colding, J., Macassa, G., Giusti, M., 2020. Urban nature as a source of resilience during social distancing amidst the coronavirus pandemic. *Landscape and Urban Planning*.

EXTERNAL COLLABORATIONS

- White Arkitekter Office, Stockholm, Sweden
- SMoG , Spatial Morphology Group, Chalmers University of Technology, Gothenburg, Sweden
- Stockholm Resilience Centre Stockholm, Sweden

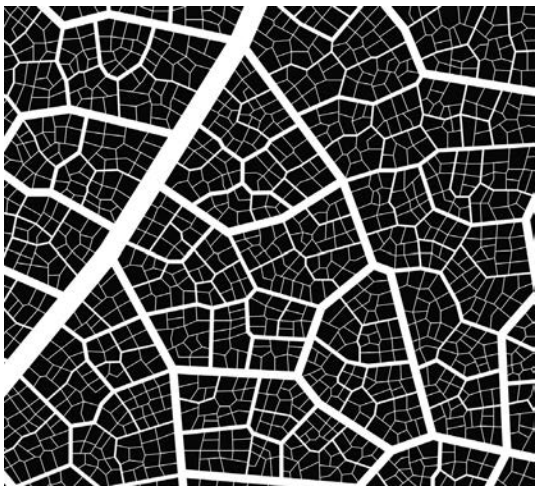
HIGHLIGHTS OF THE RESEARCH ACTIVITY

Today cities are home to more than 54% of world population and since about the 67% of world population is projected to live in urban contests by 2050. This high concentration of population and socio-economic activities makes it fundamental to safeguard cities from the threatening effects of anthropic behaviors, natural disturbs, pandemic crisis, shocks and climate change impacts to urban sustainability. In the contest of increasing uncertainties and uncontrollable disturbs, some cities are working on resilience as the capacity to persist, to adapt or even transform into new development pathways in the face of dynamic change. Focusing on resilient properties emphasizes the need to integrate explicitly the element of change to understand and manage city-form.

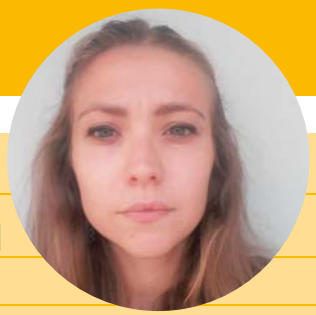
The thesis joins this debate by looking at urban form through the lens of co-evolutionary resilience within a critical contest of crisis that stresses the urban system. The physical form of cities is one of the most evident manifestation of its internal flows and dynamics and hence of the continuous tensions between visible and invisible, be it conflicting or potentially synergic. This becomes particularly relevant when referring to the perpetual disequilibrium projected for cities in terms of unexpected crisis and inevitable rapid variables as the COVID-19 pandemic has caused to cities across the world. However, despite the growing dialogues on resilience and decades of studies in urban morphology, an explicit morphological perspective on resilience is still lacking in research. But not only: the novel situation of COVID-19 highlights the urgent need of a knowledge integrating resilience concept, city science and public health discipline.

Dealing firstly with some key morphological aspects in relation to the co-evolutionary interpretation of resilience, the research then will pass to the empirical observation of a crisis phenomenon, corresponding with COVID-19 pandemic crisis in a city with the purpose to verify the validity of some resilient morphological properties previously found, that may support or hinder the affected area. Indeed, several resilient morphological properties will be "tested" in terms of efficacy along the crisis-steps and then will be probably re-discussed and re-organized.

Insights of this research will certainly propose a ground-breaking contribution to the research, offer new perspectives for understanding the element of change in cities, and advance resilience science and urban form principles also in the contest of public health.



NAME **Caterina CAPRIOLI**
E-MAIL caterina.caprioli@polito.it



COURSE XXXIV cycle - 2nd year

RESEARCH TITLE Agent-Based Model and Geographic Information System (GIS): an Integrated Approach to Test Sustainable Policies and Urban Transformation Scenarios

TUTOR(S) Marta Carla BOTTERO

ACADEMIC CONTEXT

Caprioli C., Bottero M., 2018. Agent-based modelling and Geographic Information System for the evaluation of eco-district's scenarios. In: Leone A., Gargiulo C., eds., *Environmental and territorial modelling for planning and design*. Naples: FedOAPress., pp. 35-45.
Caprioli C., Bottero M. Pellegrini M., 2019. An Agent-Based Model (ABM) for the Evaluation of Energy Redevelopment Interventions at District Scale: An Application for the San Salvario Neighborhood in Turin (Italy). In: S. Misra *et al*., eds., *Computational Science and Its Applications – ICCSA 2019. ICCSA 2019. Lecture Notes in Computer Science*, 11621, Cham: Springer.
Gilbert N., Terna P., 2000. How to build and use agent-based models in social science. *Mind & Society*, 1, pp. 57-72 .

EXTERNAL COLLABORATIONS

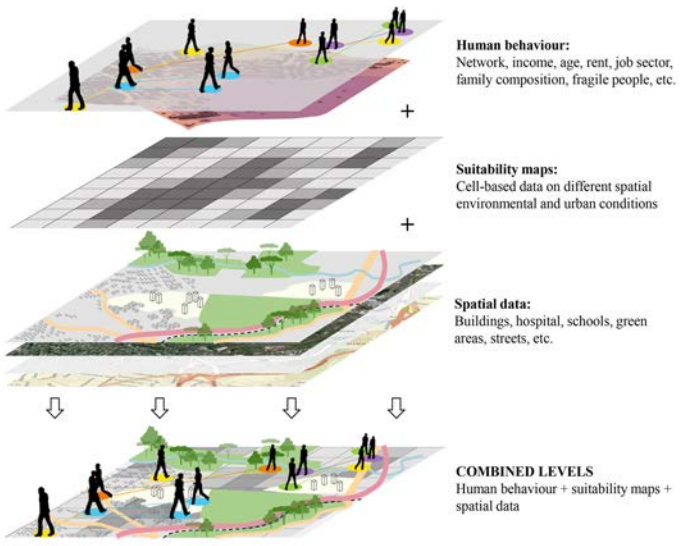
- QUT, Queensland University of Technology, Brisbane, Australia

HIGHLIGHTS OF THE RESEARCH ACTIVITY

When dealing with the city and the processes that characterize it, we face an extremely complex system, in which multi-dimensional aspects, multi-scalar and multi-temporal perspectives are strongly relevant. At the same time, the increasing awareness of the fundamental role of sustainability issues and the necessity of long-term perspectives in urban transformation and planning require more urgently to identify and evaluate the environmental, economic and social impacts of alternative policies.

This PhD research aims at developing a tool able to support the decision-making process for supporting the definition of sustainable policies and long-term strategies in urban contexts. Through the development of an innovative approach in urban contexts, based on agent-based systems, the objective is twofold. From one side, to test different sustainable policies at the district scale and to verify the effectiveness and efficiency based on the analysis of the behaviors and decision rules of the inhabitants. To the other side, to predict, before the implementation, the multiple effects and outcomes generating by an urban transformation in a consolidated area. In both cases, the development of an agent-based model, strongly based on a bottom-up approach in the evaluation of different strategies and scenarios, could be an opportunity to create an alternative perspective of these complex problems, thus supporting decision-makers and planers in the definition of policies and strategies for urban development. The final objective is to identify the key drivers and key effects which guide these processes and connect them to the specificities of a place and its population, more than developing an instrument able to give definitive answers on these themes.

To reach the goal, the research will integrate an agent-based model with the potentiality of GIS, to combine the stakeholders' attitudes and behaviors in a temporal and dynamic perspective with the consideration of the spatial dimension of the urban complex problems. Also, integration of Multicriteria Analysis (MCA), Choice Experiment method, Hedonic Price Model and specific surveys could be implemented to include in the model more intangible variables, such as social attitudes of the population, their decision rules and the level of importance of each relevant criterion considered.



NAME **Elisabetta COLUCCI**
E-MAIL elisabetta.colucci@polito.it

COURSE XXXIV cycle - 2nd year

RESEARCH TITLE Development of a Geo-Spatial Ontology to Support the Documentation of Minor and Abandoned Historical Centres

TUTOR(S) Andrea M. LINGUA, Antonia SPANÒ (Politecnico di Torino), Margarita KOKLA (NTUA Athens)

ACADEMIC CONTEXT

Studer R., Benjamins V. R., Fensel D., 1998. Knowledge Engineering: Principles and methods. *Data and Knowledge Engineering,* 25(1–2), pp.161-197.
Acierno M., Cursi S., Simeone D., Fiorani D., 2017. Architectural heritage knowledge modelling: An ontology-based framework for conservation process. *Journal of Cultural Heritage*, 24, pp. 124-133.
Kokla M., Mostafavi M. A., Noardo F., Spanò A., 2019. Towards Building a Semantic Formalization Of (Small) Historical Centres. *Int. Arch. Photogramm. Remote Sens. Spatial Inf. Sci.*, XLII-2/W11, pp. 675-683.

EXTERNAL COLLABORATIONS

- OntoGeo, Geographic Information Science and Geoinformatics Research, Group National Technical University of Athens, School of Rural and Surveying Engineering, Greece
- Delft University of Technology, Department of Urbanism, Faculty of the Built Environment and Architecture, 3D geoinformation research group, The NetherInds

HIGHLIGHTS OF THE RESEARCH ACTIVITY

This theme of research deals with the Geomatics area and specifically, it is about geographical and spatial information. The main topic is the study of ontologies for spatial and geographical data. In Computer Science, an ontology is an information object or a computational artefact.

Ontologies are very useful to create a common language and to ensure semantic interoperability with the purpose to create a unique and standard thesaurus that will let different discipline and stakeholders talk together.

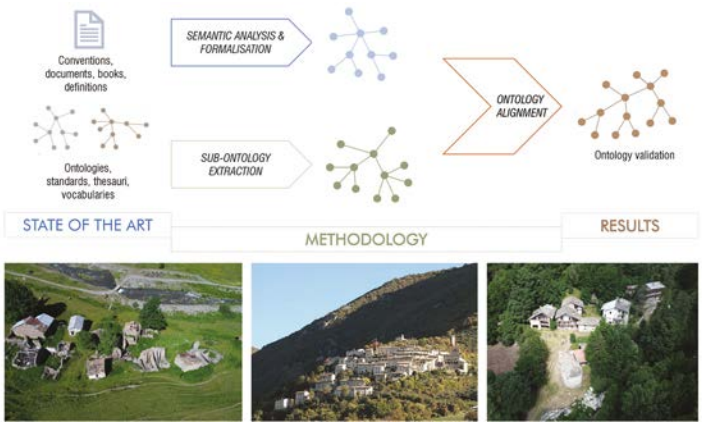
The ontology domain of this study is identified in historical centres and villages (urban, rural, minor or abandoned) in order to spatial document them and to help the decision-making process of small urban and rural areas in different scenarios.

In view of the fact that documentation involves many experts and disciplines (as well as historians of architecture, cataloguing entities, heritage management, …), a more specific use case of "urban HC and minor and abandoned HC spatial and geographical features documentation" has been identified.

Despite these consolidated methodologies and standards, there are still some gaps and shortcomings. At first, there is a lack of ontology, in computer science, containing useful information to manage, share and collect data on historical centres. Moreover, there are many interoperability problems and geometries incompatibilities (for example between GIS and BIM or HBIM data).

Then, proposal of a new methodology can be summarised in some steps:

- study existing standards and related conceptualisation for historical centres,
- identify the semantic formalization of historical centres, villages, hamlets, parts of cities …;
- design an ontology for historical centres and villages;
- fill the gap of interoperability issues for 2D and 3D data with some tests considering international standards and languages (CityGML, CityJSON, linked data, …);
- design a multiscale database populated with case studies textual, 2D and 3D data in order to validate the ontology.



NAME **Giulia DATOLA**
E-MAIL giulia.datola@polito.it

COURSE XXXIV cycle - 2nd year

RESEARCH TITLE Toward Resilient Cities: Measuring Urban Resilience Performance Using a System Dynamics Approach

TUTOR(S) Marta BOTTERO, Elena DE ANGELIS (Politecnico di Torino)

ACADEMIC CONTEXT

Sharifi A., Yamagata Y., 2016. Urban Resilience Assessment: Multiple Dimensions, Criteria, and Indicators. In: Yamagata Y., Maruyama H. ed., *Urban Resilience. Advanced Sciences and Technologies for Security Applications*. Cham: Springer, pp. 259-274.
Tan Y., Jiao L., Shuai C., Shen L., 2018. A system dynamics model for simulating urban sustainability performance: A China case study. *Journal of Cleaner Production*, 199, pp. 1107-1115.
Datola G., Bottero M., De Angelis E., 2019. How urban resilience can change cities: a system dynamics approach. In: Misra S. et al., ed. Computational Science and Its Applications – ICCSA 2019. ICCSA 2019. *Lecture Notes in Computer Science*, 11622. Cham: Springer. pp. 108-122.
Bottero M., Datola G., De Angelis E., 2020. A System Dynamics Model and Analytic Network Process: An Integrated Approach to Investigate Urban Resilience. *Land*, 9(8), pp. 242-268.

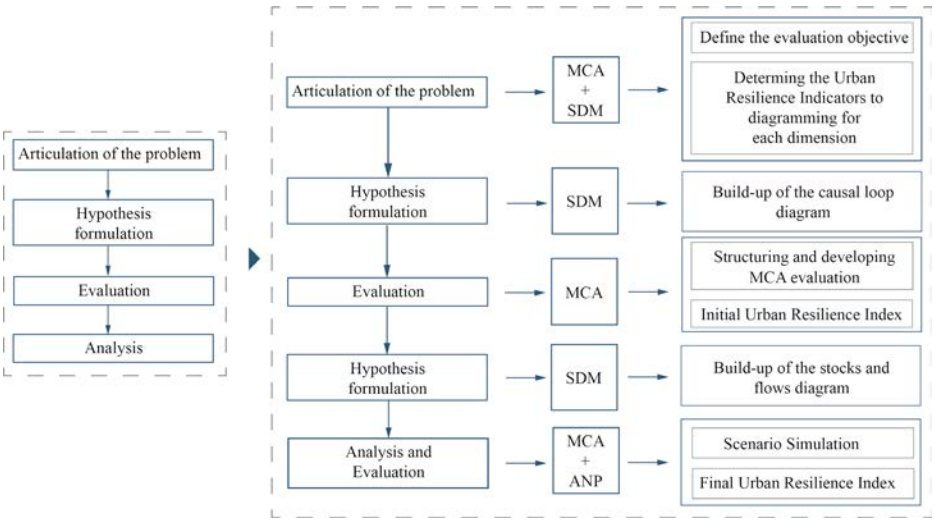
EXTERNAL COLLABORATIONS

- Riga Technical University, Institute of Energy Systems and Environment, Latvia

HIGHLIGHTS OF THE RESEARCH ACTIVITY

The concept of urban resilience has become relevant in the context of cities and it is increasingly applied as a fundamental principle to define urban development strategies (Sharifi, 2016; Yamagata and Maruyama, 2016). Cities are exposed to a wide range of shocks and stresses both natural and man-made and the global community is increasingly realizing that built urban resilience in our cities is needed to mitigate the negative impacts of hazards. For these reasons, planning for resilient cities is now recognized in the political agenda for urban development. Considering this challenge, it is of fundamental importance to provide to the decision makers specific evaluation tools able to measure the urban resilience performance of a city in the future, given the current state and the hypothesis of intervention. Starting from these issues and through an in-depth literature review, this research proposes an integrated evaluation approach to measure both the current urban resilience performance and the possible future performance related to urban development strategies.

The first phase of the research is focused on the creation of a system of indicators to measure the performance of urban resilience at the initial state through the support of Multi-Criteria Analysis (MCA). The second phase consists in using System Dynamics Model (SDM) (Forrester, 1968) to describe and model the mutual relationships between the different criteria included in the evaluation model, in order to consider both the relationships between several elements of the urban systems and their dynamics. SDM will be also used to simulate the evolution of different strategies over time, considering their impacts in the different dimensions. Based on these simulations, the third phase is dedicated to the evaluation of the urban resilience performance in the future. The final phase will provide the translation of this index in a map through the GIS (Tan et al., 2o10) able to visualize and communicate the results of the evaluation.



NAME **Arianna FONSATI**
E-MAIL arianna.fonsati@polito.it

COURSE XXXIV cycle - 2nd year

RESEARCH TITLE InfraBIM Tools and Methods Applied to Organizations' Implementation Process

TUTOR(S) Anna OSELLO, Alessandro DAMIANI (Lombardi Ingegneria S.r.l.)

ACADEMIC CONTEXT

Eastman C., Teicholz P., Sacks R., Liston K., 2011. *BIM Handbook. A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers and Constractors*. Inc. Hoboken, New Jersey: John Wiley & Sons.
Succar B., Sher W., Williams A., 2012. Measuring BIM performance: Five metrics. *Architectural Engineering and Design Management*, 120-142.
Dodge Data & Analytics, 2017. *The Business Value of BIM for Infrastructure 2017*.
BS EN ISO 19650-1:2018, *Organization and digitization of information about buildings and civil engineering works, including building information modelling - Information management using building information modelling: Concepts and principles.*

EXTERNAL COLLABORATIONS

- Lombardi Ingegneria S.r.l.
- Carnegie Mellon University, Pittsburgh, USA

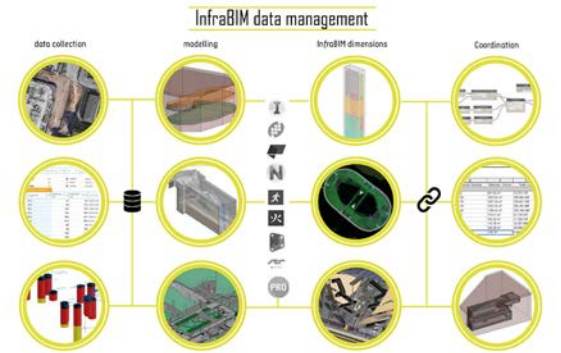
HIGHLIGHTS OF THE RESEARCH ACTIVITY

The benefits of a BIM-oriented approach are attractive not only at building level, but as far as infrastructural projects are concerned too. The transition of BIM methodology to the infrastructural domain has emphasized its prospects, providing new challenges and pushing the process beyond any previous limit. Currently, the BIM maturity level within the infrastructure field still needs implementation, because interoperability needs further improvements.

The main objectives of this research topic are focused on BIM methodology implementation process within the Company management, in order to analyse and develop documents necessary to a BIM-oriented procedure and management of the entrusted works. This leads to a development process in which the actual design approach needs to be reorganized in order to satisfy the needs of a highly competitive market. During the development of the research, three main case studies have been developed from different perspectives, to test the interoperability among platforms and tools and to verify the efficiency of specific approaches and practices. The interoperability tests performed on the case studies enabled the organization of a database containing values of performance towards the InfraBIM use selected.

The methodological approach has been organized under the following main sections:

- Literature review on several aspects related to the InfraBIM environment;
- Development of BIM implementation processes, defining the "BIM strategy" of the company "Lombardi Ingegneria S.r.l." through standard documents containing template and encoding rules, BIM uses applications, training etc.;
- Analysis of methods and tools, performing interoperability tests through the application on case studies, defining the values of specific indicators to be used for the evaluation of the most suitable workflow for a specific goal;
- Benchmark and comparison of alternative methods and tools through multicriteria method AHP;
- Development of a BIM decision support tool for companies approaching BIM implementation, including the results on the comparison among workflows.



NAME **Chiara GENTA**
E-MAIL chiara.genta@polito.it

COURSE XXXIV cycle - 2nd year

RESEARCH TITLE Exploring Assessment Frameworks and SDGs Interlinkages for Implementing Circular Economy Strategies in European Urban Contexts

TUTOR(S) Patrizia LOMBARDI, Serenella SALA (Joint Research Centre)

ACADEMIC CONTEXT

Brandon P.S., Lombardi P., Shen G.Q., 2017. *Future challenges in evaluating and managing sustainable development in the built environment*. London: Wiley-Blackwell.
Farné Fratini C., Georg S., Søgaard Jørgensen M., 2019. Exploring circular economy imaginaries in European cities: a research agenda for the governance of urban sustainability transitions. *Journal of cleaner production*, 228, pp. 974-989.
Miola A., Borchardt S., Neher F., Buscaglia D., 2019. *Interlinkages and policy coherence for the sustainable development goals implementation: an operational method to identify trade-offs and co-benefits in a systemic way*. Luxemburg: Publications office of the European Union.
Sala S., Castellani V., 2019. The consumer footprint: Monitoring sustainable development goal 12 with process-based life cycle assessment. *Journal of Cleaner Production*, 240, p. 118050.

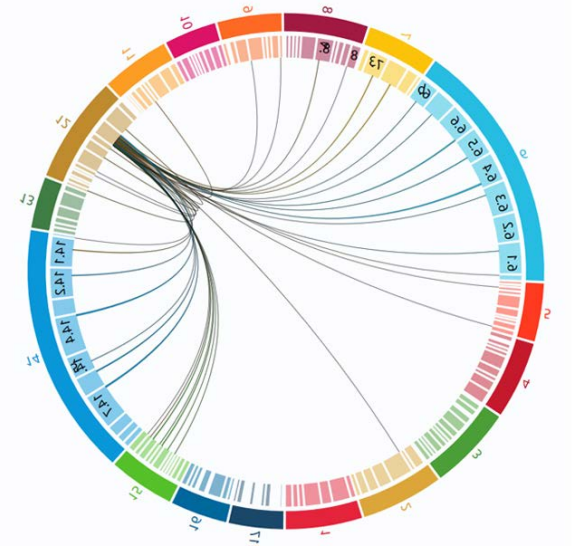
EXTERNAL COLLABORATIONS

- Ispra, Joint Research Centre
- Interreg project MOLOC, Comune di Torino

HIGHLIGHTS OF THE RESEARCH ACTIVITY

In a growing world, cities have an increasing role in facing contemporary challenges. On one hand they can be considered main responsible of consumption of energy and resources, but at the same time they are key actors in facilitating and experimenting transformation toward a more sustainable development. In September 2015 the UN adopted the Agenda 2030 for Sustainable Development which is articulated in 17 goals and 169 targets. Among the SDGs (sustainable development goals), which represent a new integrated vision for the global future, goal 11 is completely dedicated to cities with the aim of making them more inclusive, safe, resilient and sustainable. On the other hand, Circular economy (SDG12) is increasingly adopted in urban governance in order to implement a socially inclusive and environmentally desirable urban transition. Different interconnections exist between goals related to circular economy and urban sustainable development both in terms of co-benefits and trade-offs. In this context, the role of cities in the sustainable transition has a long-standing interest. Moreover, little attention has been paid on the how circular economy is implemented in urban context and which positive and negative impacts and feedbacks are generated.

The research will try to fill this gap by investigating European consumption patterns at the urban scale from a consumer point of view. Successively, interlinkages with other SDG are assessed in order to identify possible area of action that maximize positive interconnections. The thesis is articulated in two parts. In the first part a detailed literature review about transition cities, circular economy urban practice,s and methodologies for interlinkages analysis is developed as a basis for the definition of a preliminary framework of synergies and trade-offs between SDG12 (about circular economy) and other goals in urban contexts. In the second part, through the use of a case-study a quantitative evaluation of consumption patterns of European cities is carried out. This evaluation tried to go beyond checklists and protocols usually adopted to evaluate sustainability performance of urban areas, in favour of a more metabolic approach. In conclusion both qualitative and quantitative methodologies from the literature review will be used to identify interlinkages and results will be discussed considering possible implication in decision-making process and contribution of local urban policies to the achievement of global targets set by the Agenda 2030.



NAME **Elena GIGLIO**
E-MAIL elena.giglio@polito.it

COURSE XXXIV cycle - 2nd year

RESEARCH TITLE Energy Transaction and the Downstream Space Technologies: Policies and Opportunities

TUTOR(S) Piero Boccardo, Stefano Lo Russo (Politecnico di Torino)

ACADEMIC CONTEXT

European Commission, 2018. *The Strategic Energy Technology Plan – at the heart of energy research and innovation in Europe.*
Balaram V., 2019, Rare earth elements: A review of applications, occurrence, exploration, analysis, recycling, and environmental impact. *Geoscience Frontiers*, 10, pp. 1285-1303.
European Commission, 2019. *PwC Advisory France, February 2019, Copernicus Market Report*.

EXTERNAL COLLABORATIONS

- CONICET - Consejo Nacional de Investigaciones Científicas y Técnicas, Argentina
- Lombardi Ingegneria S.r.l.

HIGHLIGHTS OF THE RESEARCH ACTIVITY

2015 the adoption by 193 countries of an objective aimed at ensuring universal access to affordable, reliable, sustainable and modern energy services, within the framework of the new UN Sustainable Development Goals to be achieved by 2030, gave the subject a new level of political recognition. Before then, energy was considered only a means for development and not an objective for its own sake. Experience has shown that no growth goal can be reached without access to modern forms of energy. Development and energy are contextual; the lack of access to energy becomes a cause, and sometimes a consequence of the lack of development.

Energy storage will play a key role in enabling the EU to develop a low-carbon electricity Syste and the commitment of governments is essential to achieve the objectives related to climate change.

Higher levels of energy storage are required for grid flexibility and grid stability and to cope with the increasing use of intermittent wind and solar electricity. Smart cities, a key energy policy goal, require smart grids and smart storage.

The EU package of measures for energy storage is mainly made up of:

- the strategic framework for the development of energy storage technologies, starting with the revision of the SET Plan in 2015;
- EU funding instruments for research and innovation in favor of energy storage technologies in the current programming period (2014-2020) 18;
- the EU regulatory framework to support the spread of energy storage technologies starting from 2014.

The Commission helps to implement the SDGs also in non-energy extractive industries through its policies such us:

- European Innovation Partnership on Raw Materials (COM/2012/082 final) SDG 8 and SDG 15
- Commission Guidance on non-energy extractive industry and Natura2000 SDG 15
- Copernicus for Raw Materials SDG 8
- The Geoscientific Knowledge and Skills in African Geological Surveys (PanAfGeo) SDG 8

NAME **Martina GIZZI**
E-MAIL martina.gizzi@polito.it

COURSE XXXIV cycle - 2nd year

RESEARCH TITLE Reuse of Disused Oil and Gas Wells for Geothermal Energy Production: a Multidisciplinary Investigation Tool

TUTOR(S) Stefano LO RUSSO, Glenda TADDIA

ACADEMIC CONTEXT

Alimonti C., Soldo E., 2016. Study of geothermal power generation from a very deep oil well with a wellbore heat exchanger. *Renewable Energy*, 86, pp. 292-301.
Liu X., Falcone G., Claudio Alimonti C., 2018. A systematic study of harnessing low-temperature geothermal energy from oil and gas reservoirs. *Energy*, 142, pp. 346-355.
Nian Y.L., Cheng W.L, 2018. Insights into geothermal utilization of abandoned oil and gas wells. *Renewable and Sustainable Energy Reviews*, 87, pp. 44-60.

EXTERNAL COLLABORATIONS

- DENERG, Department of Energy, Politecnico di Torino

HIGHLIGHTS OF THE RESEARCH ACTIVITY

Both the 2030 UN Agenda for Sustainable Development and the Paris Agreement on Climate Change represent two fundamental contributions to guide the transition towards an economic model that primarily aims social progress and environmental protection.

In order to achieve increased energy efficiency, all nations are required to urgently change the way they produce and consume goods as well as how they manage natural resources. Notably, progresses must be made regarding the integration of renewable energy in end-use applications in buildings, transportation and industries.

The main aims for energy companies are therefore to provide energy solutions that are distant from those based on fossil fuel and to guarantee access to low-cost energy, through technological development and environmental value.

Among the available energy resources, geothermal energy is a weather-independent, environmentally friendly resource that represents one of the future energy solutions that will have to be increasingly exploited for both power generation and direct use applications.

Energy production based on the exploitation of geothermal energy resources derived from disused wells in oilfields could represent a considerable future economic and environmental potential: It could solve problems associated with suspended oil and gas wells near municipalities, thereby allowing us to hypothesise long-term scenarios for exploitation for the benefit of end users in the industrial, civil and agriculture districts.

The main aim of the research activity is to develop a multidisciplinary investigation tool that allows to define the most advantageous hypotheses of geothermal potential exploitation linked to existing wells, already subject to the concession of hydrocarbons cultivation but currently no longer exploited.

The research involves different phases of work:

1) review of the advanced methods and technologies developed for retrofitting dismissed oil and gas wells in oilfields (open and closed-loop geothermal systems);

2) analysis of different selected study-sites for the evaluation of site-specific energy potential, by providing an accurate representation of abandoned wells' temperature distribution;

3) analysis of plants development scenarios to understand if it will be possible to content energy requests in the territory surrounding the production plants (civil and agricultural districts).

NAME **Pinky KUMAWAT**
E-MAIL pinky.kumawat@polito.it

COURSE XXXIV cycle - 2nd year

RESEARCH TITLE Data and Information Extraction from Multiple Data Sources for Transport Innovation and Sustainability

TUTOR(S) Cristina PRONELLO, Silvia CHIUSANO (Politecnico di Torino)

ACADEMIC CONTEXT

Kumawat P., Kalani G., Kumawat K. N., 2016. Prediction of ERP Outcome Measurement and User Satisfaction by using Adaptive Neuro Fuzzy Inference System and SVM Classifiers approach. International Congress on Information and Communication Technology. In: *Springer AISC*, 1, pp. 237-238.
Kumawat P., 2018. User Satisfaction Prediction in ERP using KNN Classifier for high Prediction Accuracy. *International Journal on Emerging Trends in Technology (IJETT)*, 5, pp. 2455-0124.
Kumawat P., 2018. High Prediction Accuracy and Low Error for ERP User Satisfaction by Hybrid of ANFIS and KNN classification. *International Journal on Emerging Trends in Technology (IJETT)*, 5, pp. 11005-11009.
Pronello C., Kumawat P., 2020. Smartphone applications developed to collect mobility data: a review and SWOT analysis. In: Arai K., Kapoor S., Bhatia R., eds., *Intelligent Systems and Applications*. Proceedings of the 2020 Intelligent Systems Conference (IntelliSys), Springer.

EXTERNAL COLLABORATIONS

- Sorbonne Universités – Université de Technologie de Compiègne, France

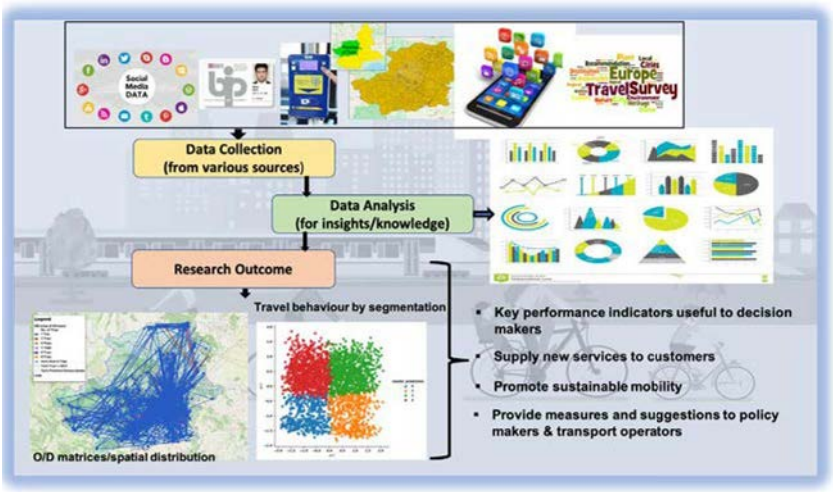
HIGHLIGHTS OF THE RESEARCH ACTIVITY

Nowadays, massive data available in the worldwide web allows tracking words, as well as locations, that are analysed and matched through several databases, allowing the prediction of people's activities and making obsolete the expensive and time-consuming statistical surveys (Hilbert, 2013). Today there are several data sources useful for the project: open data as well as the directed, automated or volunteered sources (Kitchin, 2014), including smartphone apps. The impressive growth of data volume generated annually (Manyika *et al.*, 2011) should have largely improved the knowledge of the urban mobility. The understanding of the factors influencing mobility patterns and travel behaviour (Pronello et al., 2011) is the key to ensure the acceptance of innovations and services that could readdress the mobility patterns to more sustainable behaviours and optimize investments in transport systems. The research aims at exploiting the full potential of big data to describe mobility patterns, extract information from existing massive data sources, crossing it with context-specific understanding of human behaviour, in order to analyse the different ways people interact with one another (Onnela, 2011). The project will provide – through an innovative approach, less invasive than current travel surveys – a cloud-based framework for collecting, analysing, and extracting urban mobility information from several massive data sources. Such information is useful to several purposes: the planning and programming of public transport as well as the control of the quality of its services; the management of mobility; the supply of new services for the customers; and the study of the complexity of the interaction between information and travel behaviour.

The objectives are:

1) analysis, integration, and extraction of information from travel surveys, mobile devices and network operators aimed to build mobility datasets/patterns and behavioural and interactions patterns;

2) evaluation of the collected data in terms of a) quality and reliability; b) mobility patterns and clusters of users; c) definition of Key Performance Indicators (KPIs) useful to the decision makers for improving services in transport systems; d) individuation of new mobility services.



NAME **Erica MANGIONE**
E-MAIL erica.mangione@polito.it

COURSE XXXIV cycle - 2nd year

RESEARCH TITLE Housing the Student Population: Policy Implications of a Three-Dimensional Perspective on University Students

TUTOR(S) Marco SANTANGELO, Loris SERVILLO

ACADEMIC CONTEXT

Smith D., 2005. Studentification: the gentrification factory. In: R. Atkinson, G. Bridge, eds., *Gentrification In A Global Context: The New Urban Colonialism*. London: Routledge, pp. 72-89.
Chatterton P., 2010. The student city: an ongoing story of neoliberalism, gentrification, and commodification. *Environment and Planning*, 42, pp. 509-514.
Moos M. *et al.*, 2019. The knowledge economy city: Gentrification, studentification and youthification, and their connections to universities. *Urban Studies*, 56(6), pp. 1075-1092.
Revington N. *et al.*, 2020. The urban dormitory: planning, studentification, and the construction of an off-campus student housing market. *International Planning Studies*, 25(2), pp.189-205.

EXTERNAL COLLABORATIONS

- -

HIGHLIGHTS OF THE RESEARCH ACTIVITY

Since university became a mass and global phenomenon, new socio-economic impacts on urban environments are object to scholar's attention. Major western country's universities attract increasing number of young, who contribute to change cities, fostering new consumes and behaviors. On the other hand, municipalities can't do without universities anymore: this are now key players in the urban development policy definition. Such reciprocal university-city relation can be described as a successful one, as well as from an alternative point of view, who concentrates on student population, identifying them as promoter of gentrification processes – the so called "studentification" (Chatterton 2010, Smith 2005). In such academic context, more than one gap need to be filled; not just the one who see at students as aggressive "gentrifiers", but also the rarely appearance of southern Europe university cities in the international debate, despite their involvement in the same global dynamics and urban transformations. Among Italian university cities with higher off campus students' rates, one of the main and most critical issue is about housing. As a matter of fact, international real estate investors are increasingly attracted to Italian university cities; the positive trend of student housing sector and its ongoing commodification, suggest the reality of a potential risk of speculation. This is even more true when the public institution's intervention is observed: specific policies are weak, if not absent. University student housing policies are the topic of the research, with Turin as a case study. A policy is intended as a coordinated action, as the result of a collective and willful process of definition of a clear and common objective. According with such definition, the research starts claiming that no student housing policy is actually carried out in Turin. On the other hand, a complex and complicated network of public and private actors are studied, to frame their independent answer to the housing demand, that is causing relevant but still not studied socio economic impacts. Students can be seen as objects, subjects or even actors in the student housing policy subsector. The research wants to investigate how each of the three point of views on students can lead to different coalitions, decision processes and policies in the student housing sector, but also the development of different spaces and impacts on local communities.

NAME	**Danial MOHABAT DOOST**
E-MAIL	danial.mohabat@polito.it

COURSE	XXXIV cycle - 2nd year
RESEARCH TITLE	Social Equity and Resilience: Investigating the Compatibility of Resilience Theory and Practice to Address Social Equity in the Urban Context
TUTOR(S)	Angioletta VOGHERA, Grazia BRUNETTA

ACADEMIC CONTEXT

Meerow S., Pajouhesh P., Miller T.R., 2019. Social equity in urban resilience planning. *Local Environment*, 24(9), pp. 793-808.
Mohabat Doost D., Buffa A., Brunetta G., Salata S., Mutani G., 2020. Mainstreaming Energetic Resilience by Morphological Assessment in Ordinary Land Use Planning. The Case Study of Moncalieri, Turin (Italy). *Sustainability*, 12(11), p. 4443.

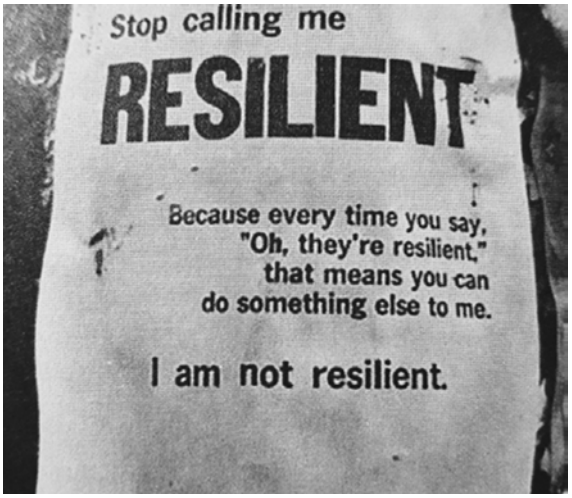
EXTERNAL COLLABORATIONS

- R3C, Responsible Risk Resilience Centre: An Interdisciplinary Research Centre, Politecnico di Torino
- Nordic hub for sustainable urbanization, Denmark

HIGHLIGHTS OF THE RESEARCH ACTIVITY

In light of the increasing number of urban shocks -including Natural hazards, climate risks, economic uncertainties, and more recently the outbreak of Covid-19 pandemic- it is becoming extremely difficult to ignore the importance of resilience thinking. Undeniably, the concept of resilience is becoming more popular, both for the academic and public sphere. However, there are two areas of intense debate on the issue. First, the multiple meanings of the term and second, the lack of resilience theory and practice to address social equity. While the main focus of this research is on the latter, it will reveal that these two controversial areas are strongly tied to each other. To be more specific, many researchers suggest that, currently, "communities' resilience is highly unequal" (Meerow, Pajouhesh, & Miller, 2019). Based on undeniable facts -which verifies this lack- a considerable literature has argued that urban resilience is an inherently conservative concept. They claim that this inherent conservatism stops the radical and systematic transformations, normalizes the crisis, depoliticizes the issue, neglects the structural inequalities and justifies the increased securitization promoted by formal institutions. Therefore, it is crucial to determine if the current lack of addressing equity within the framework of resilience roots in the concept itself, or this deficiency results from other theoretical misapprehensions. Thus, the primitive aim of this study is to clarify the nexus between the concept of resilience and social equity, by following the recent debates. It explores the reasons behind the lack of a general consensus on the issue as its first crucial research question.

Subsequently, by analyzing a novel case-study, this research tries to answer the subsequent questions raised in pursuit of the first stage. Changes in the daily life of the couriers and the difficulties they are faced with in the time of COVID-19 pandemics is selected as the case-study to investigate why some groups are less resilient and suffer more when a crisis occurs; why they are more likely to become forgotten; what the structural roots of this discrimination are; and how contests or conflicts between different groups become shaped or changed when such a crisis happens.



NAME **Stefano QUAGLIA**
E-MAIL stefano.quaglia@polito.it

COURSE XXXIV cycle - 2nd year

RESEARCH TITLE Urban Forests and Governance.
A framework for Assessing Urban Forest Governance Arrangements

TUTOR(S) Claudia CASSATELLA, Federica LARCHER, Carmen AALBERS (Wageningen University & Research)

ACADEMIC CONTEXT

Lawrence A., De Vreese R., Johnston M., van den Bosch C. C. K., Sanesi G., 2013. Urban forest governance: Towards a framework for comparing approaches. *Urban Forestry & Urban Greening*, 12(4), pp. 464-473.
Lawrence A., Ambrose-Oji B., 2015. Beauty, friends, power, money: navigating the impacts of community woodlands. *The Geographical Journal*, 181(3), pp. 268-279.
Dang T. K. P., Visseren-Hamakers I. J., Arts B., 2016. A framework for assessing governance capacity: An illustration from Vietnam's forestry reforms. *Environment and Planning C: Government and Policy*, 34(6), pp. 1154-1174.
Borelli S., Conigliaro M., Quaglia S., Salbitano F., 2017. Urban and Peri-urban Agroforestry as Multifunctional Land Use. In: *Agroforestry*. Singapore: Springer, pp. 705-724.

EXTERNAL COLLABORATIONS

- WUR, Wageningen Environmental Research, Wageningen, The Netherlands

HIGHLIGHTS OF THE RESEARCH ACTIVITY

In this era characterized by global trends, such as rapid population growth and urbanization, changing climate, depletion of natural resources, and growing socio-economic inequalities, cities play a key role in understanding socio-ecological dynamics and in responding to changes (Grimm et al., 2008), particularly referring to the need of attaining urban sustainability and resilience through the formulation and implementation of plans and policies aimed at protecting natural capital and enhancing human wellbeing and health.

In this context urban forest, defined by FAO (2016:2) as: "all trees and woods in an urban area: in parks, private gardens, streets, around factories, offices, hospitals and schools, on wasteland and in existing woodlands", is globally receiving increasingly attention as a sustainable and resilient multifunctional land-use option due to the numerous services and goods it is able to provide to urban and peri-urban communities.

Being the delivery of forest ecosystem services determined by decision-makers and influenced by stakeholders involved in urban forest governance (Fischer & Mincey, 2013), it appears as crucial deepening the research agenda on this aspect of urban forestry to address the knowledge gap in the literature and to foster the planning, design, and management of sustainable, resilient and cost-effective urban forests (Ostoić *et al*., 2018; 2015; Ambrose-Oji *et al*., 2017; Lawrence *et al.*, 2013; Bentsen *et al.*, 2010).

In fact, the great majority of research on urban forest refers to technical challenges, and the benefits, of planting and managing trees in the urban areas, but relatively little has been written about governance arrangements and their capacity of implementing and managing successful urban forestry initiative in the long-term.

In this vein, the objective of this doctoral investigation is to develop a framework to assesses processes and impacts of different forest governance arrangements at local scale in order to understand successful, or not, factors characterizing the quality of governance (i.e. good governance) and their environmental, ecological, and social impacts.

NAME **Carlotta SCIOLDO**
E-MAIL carlotta.scioldo@polito.it

COURSE XXXIV cycle - 2nd year

RESEARCH TITLE European Transnational Networks in the Cultural and Creative Sector as Micro Political Systems

TUTOR(S) Carlo SALONE, Fabrizio DI MASCIO

ACADEMIC CONTEXT

Borras S., Radaelli C., 2011. The politics of governance architectures: creation, change and effects of the EU Lisbon Strategy. *Journal of European Public Policy*, 18, pp. 463-484.
Dente B., 2014. Towards a typology of local development policies and programmes. *Local Economy: The Journal of the Local Economy Policy Unit*, 29, pp. 675-686.
Tatcher M., 2019. Direct and market governance paths for the creation of an EU political identity: cultural heritage policy. *Comparative European Politics*, 17, pp. 585-602.

EXTERNAL COLLABORATIONS

- Department of Political Science, School of Public Policy, UCL London, United Kingdom

HIGHLIGHTS OF THE RESEARCH ACTIVITY

The reasons to undertake this research emerged from an empirical, as well as theoretical inquiry leading to two interconnected issues: on the one hand how the EU intervenes in the cultural sector, on the other, how the internationalization of the Cultural and Creative Sector has been shaped by this intervention. These motivations will be unfolded along the research, though, we underline that to analyze these issues requires to address cultural policy as well as EU governance studies. Before coming to this distinction, we acknowledge that to take under scrutiny the European Cultural Policy implies to unfold working methods of a coordinative policy. In this framework emerging new modes of governance, their process and outcome are at stake. These include transnational networks, which are our field of enquire.

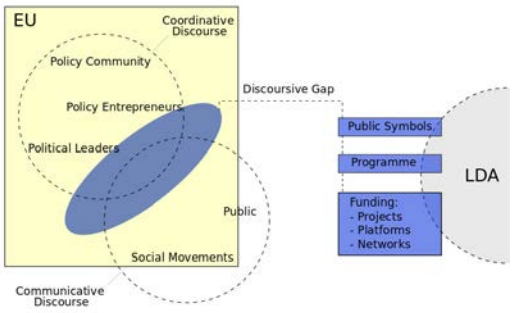
The European Cultural Policy (ECP) has evolved as a set of implicit, mostly symbolic, policies that acknowledge the multiple nature of cultural assets in the European Institutions since the 1980s. Recognized under European Union responsibility' in the Maastricht Treaty, culture has been endorsed as explicit policy sector, only after the EU increased its role in domains without formal competences and the new forms of non-constraining co-ordination emerged in the late 1990s.

Two main events contributed further to the formalization of cultural policy under the competence of the European Institutions: the Lisbon Treaty and the Enlargement Strategy in 2004.

The Lisbon Treaty legitimated new modes of operation (such as Open Method of Coordination – OMC), which allowed the European Commission to intervene in sector without a clear mandate. The Enlargement strategy towards East, instead, required to reinforce 'the European' collective cultural identity under the motto 'United in diversity'; thus cultural policy seemed to cover a strategic potential role in building a 'sense of European cultural belonging'. As these events contributed to legitimize the complementary role of the EU in the cultural sector, coordinative mechanisms such as OMC, Structured Dialogue, and Transnational networks developed in the European framework.

But, policy coordination tools are not a simple matter of administrative decision-making, rather are political choices (Lascoumes and Le Gales 2007) which involves the participation of different EU administrative agencies, national, and subnational actors, as well as civil society platforms, external experts, and non-government organisations (NGOs).

In this framework, networks are considered tools covering a complementary function in diffusing EU policies and paradigms. In turn, though, transnational networks developed as informal bottom up initiatives in the 1980', and only later have been sustained with EU grants. In the cultural sector an ad hoc network grant was included in the first strategic Plan for Culture in 2007. From that moment on, these structures have undergone a process of readjustment, as a way of responding to EU policy coordination framework. Their different modalities to tackle global and local challenges are the field of enquiry of this work.



NAME **Francesca TAORMINA**
E-MAIL francesca.taormina@polito.it

COURSE XXXIV cycle - 2nd year

RESEARCH TITLE World Heritage Serial Sites of Religious Interest: Participatory Governance and Tourism Development

TUTOR(S) Sara BONINI BARALDI

ACADEMIC CONTEXT

Kooiman J., 1999. Social-political governance: overview, reflections and design. *Public Management*, 1, pp. 67-92.
Cornwall A., 2008. Unpacking "Participation": models, meanings and practices. *Community Development Journal*, 43(3), pp. 269-283.
Labadi S., 2013. *UNESCO, cultural heritage and outstanding universal value*. Walnut Creek, CA: AltaMira Press.
Pignatti A., Baraldi L., 2018. *Il patrimonio culturale di interesse religioso*. Milano: FrancoAngeli Edizioni.

EXTERNAL COLLABORATIONS

--

HIGHLIGHTS OF THE RESEARCH ACTIVITY

In the framework of the extensive debate on the UNESCO World Heritage (WH) program, and with a focus on WH serial sites of religious interest, this doctoral thesis aims to critically investigate how the paradigm of the participatory governance is materialized in the practices of local construction and development of a WH site, considering the dimension of sustainable tourism.

Arguing about a clear meaning of participatory governance it is still challenging, both in theory and practice, despite the bulk of literature emerging in political and social science debates. Whether the term governance, in its generic connotation, turns a shift from centralized steering of society by the State to a decentralization of power among a plurality of actors including the private and civil society, the adjective participatory emphasizes the need for enforcing citizen engagement and supporting new forms of power-sharing as a response to a democratic crisis.

In the field of heritage studies, some scholars highlighted the risk of "cosmetic" use of participation, its failure to ensure the promise of democracy, and its elitist nature which might lead to new centralized power structures instead than promoting new forms of collective responsibilities.

This rhetoric use of participatory governance appears dominant in many WH policy documents that advocate balanced participation of a wide variety of stakeholders and rights-holders, as a precondition for a sustainable management and tourism development, tending to idealize the effects of participation and overlooking the risk to obtain opposite outcomes, such as the de-responsibilization of the political class instead than a shared responsibilization of civil society or new impetus for exclusion rather than inclusion.

Based on these premises, within this thesis I intend to contribute to the advancement of the discourse on participatory governance of cultural heritage, trying to overcome the perspective that opposes good practices to bad ones. I propose a micro-level and qualitative analytical approach to the World Heritage serial site Arab-Norman Palermo and the Cathedral Churches of Cefalù and Monreale in order to clarify how, and whether, the establishment of a UNESCO WH site can trigger new participatory governance approaches within the local contexts, inside and outside the boundaries of the site's buffer zones.

XXXV CYCLE - 1st YEAR STUDENTS

NAME **Martina BOCCI**
E-MAIL martina.bocci@polito.it

COURSE	XXXV cycle - 1st year
RESEARCH TITLE	The Role of the Conservation and Transmission of Traditional Construction Techniques in the Local Development
TUTOR(S)	Andrea BOCCO, Carlo SALONE

ACADEMIC CONTEXT

Jenkins T. N., 2000. Putting postmodernity into practice: endogenous development and the role of traditional cultures in rural development in marginal regions. *Ecological Economics*, 34(3), pp. 301-313
Magnaghi A., 2010. *Il progetto locale. Verso la coscienza di luogo*. Torino: Bollati Boringhieri
Bocci M., 2019. Cile, così rivivono i pueblos. *Il Giornale dell'Architettura*, 24 January.
Bocci M., Mazelli R., Bocco A., eds., 2020. *Rehabilitation of traditional heritage and local development*. Torino: Politecnico di Torino (in print).

EXTERNAL COLLABORATIONS

- Fundación Altiplano, Arica, Chile
- Terrachidia, Madrid, Spain
- Medesus, Arequipa, Peru
- Dry Stone Walling School, Tokushima; School of Environment and Society (Tokyo Institute of Technology), Tokyo; Team Maruyama, Wajima, Japan
- Fondacioni Gjirokastra, Gjirokastra, Albania
- Patrimonio, Museos y Casco Histórico (Ministry of Culture of Buenos Aires), Buenos Aires, Argentina
- Associazione Canova, Montecrestese, Italy

HIGHLIGHTS OF THE RESEARCH ACTIVITY

The research aims to investigate the relationship between heritage and local development.

The core issue is the recovery of minor local heritage, often located in marginal and rural areas, increasingly marked by depopulation, deficiencies in infrastructure and basic services and an implicit imaginary of disadvantage. On the other hand, these territories are often dense of culture; they are places where alternative economies, in symbiosis with nature and which preserve biodiversity, may still be able to activate processes of subsistence and self-organization, with an emphasis on agriculture and crafts based on local resources – both tangible and intangible.

The research is based on the selection and study of international initiatives that implement this rehabilitation through competent conservation and transmission of traditional construction techniques. Alongside the vertical competence linked to restoration practices and knowledge of materials and techniques, however, a horizontal competence (a broad view) and a commitment for the cultural rehabilitation of the area are also needed. In my view, the aim of these initiatives must be also the social and economic development of the communities that inhabit this heritage, supporting them and allowing their survival.

The first phase of this research has been aimed at establishing a network of contacts and collaborations with associations and organisations working in this field. Seminars and debates have allowed us to collect information about these initiatives and to focus on some fundamental issues, such as tourism, the relationship between these initiatives and local communities, the continuity over time of the processes generated.

In a second phase, field research and the qualitative and quantitative analysis of local development indicators will allow me to investigate the success of these initiatives.

The core of the research is based on direct contact with the communities involved in these processes, the organisations that implement them and the people engaged in the revitalisation of traditional techniques. With a heuristic approach, I will use first-hand experience, derived from my interest in traditional techniques, as a means of establishing a deep connection with locals.

NAME **Daniela DE LUCA**
E-MAIL daniela.deluca@polito.it

COURSE XXXV cycle - 1st year

RESEARCH TITLE BIM and VAR for the Use of Art and Culture in Healthcare System

TUTOR(S) Anna OSELLO

ACADEMIC CONTEXT

Lepouras G., Vassilakis C., 2004. Virtual museums for all: employing game technology for edutainment. *Virtual Reality*, 8, pp. 96-106.
Shams L., Seitz A.R., 2008. Benefits of multisensory learning. *Trens in cognitive sciences*, 12(11), pp. 411-417.
Younes G., Kahil R., Jallad M., Asmar D., Elhajj I., Turkiyyah G., Al-Harithy H., 2017. Virtual and augmented reality for rich interaction with cultural heritage sites: A case study from the Roman Theater at Byblos. *Digital Applications in Archaeology and Cultural Heritage,* 5, pp. 1-9.

EXTERNAL COLLABORATIONS

- -

HIGHLIGHTS OF THE RESEARCH ACTIVITY

The idea of involving the five senses to immerse the user in the action, which takes place in a simulated environment through innovative tools such as Virtual Reality, is the direction to be developed both in the medical field and for cultural entertainment. Through the re-elaboration of physical space, time and interaction between man and enabling technologies it is possible to create digital environments with a high degree of innovation to support people with fragility and disability. Sensory experiences, music and art can increase the accessibility of places and experiences. To improve this perception, environments can be promoted in which new sensory experiences can bring the user closer to a new world. Moreover, to improve the psychophysical well-being of patients and their families, opera and virtual tours can generate moments of entertainment, playful and modular using VR and AR technologists. The main aims of the research topic focuses on the definition of the useful requirements to connect the Virtual Reality system with a BIM models for implement a Care System and to increase the accessibility of art and entertainment facilities also to people with disabilities. Specifically, they are:

- Standard definition of a digital model to create immersive virtual tours of theaters and art spaces that cannot be physically visited;
- Interactions with Virtual Reality tools to amplify emotions through sensory stimulation.

From the study of users' reactions using these technologies to increase the cultural background it is possible to define a protocol that can help multiple users to mitigate their psychophysical state. By comparing traditional methods with innovative tools, new standards can be defined to monitor the emotional state of the user. In summary, the research work aims to combine more competences in heterogeneous disciplines in the field of digital modeling and in the cultural sector to define new medical strategies to improve care services and accessibility to entertainment services. The main result is the creation of dashboards and tools that exploit the potential of virtual reality in hospitals where art and music become fundamental elements for social inclusion and the diffusion of our artistic heritage. The applications developed within specific case studies, will highlight different methods of digital model development and points of view to investigate specific musical, sound and visual aspects that approach a wide and heterogeneous user target.

NAME **Mirko GRECO**
E-MAIL mirko.greco@polito.it

COURSE XXXV cycle - 1st year

RESEARCH TITLE Competitiveness and Well-Being of Smallholders in Agricultural Policies. Real Dichotomy or False Dilemma?

TUTOR(S) Angioletta VOGHERA

ACADEMIC CONTEXT

Smith M., Richard S. Krannich R., Hunter L., 2001. *Growth, Decline, Stability, and Disruption: A Longitudinal Analysis of Social Well-Being in Four Western Rural Communities*. Oregon: Rural Sociological Society.
Hazell P., Poulton C., Wiggins S., Dorward A., 2010. *The Future of Small Farms: Trajectories and Policy Priorities*. London: World Development, (38).
European Union, 2016. *Cork 2.0 declaration "A Better Life in Rural Areas"*. Luxembourg: Publications Office of the European Union.
Sterly S., Jongeneel R., Pabst H. *et al.,* 2018. *A comparative analysis of global agricultural policies: lessons for the future CAP*. Brussels: European Parliament, Policy Department for Structural and Cohesion Policies.

EXTERNAL COLLABORATIONS

- -

HIGHLIGHTS OF THE RESEARCH ACTIVITY

Agricultural policies are going to play an increasingly important role in the pursue of food and resources security, and will steer the future development of sustainable agriculture.

Existing research on the well-being of smallholders shows that they are affected by uncertainty, and their ability to adapt and develop innovative and sustainable practices depends on their quality of life. High levels of discomfort are associated with negative prospects for farmers, "regardless of their real and objective situation" (Gorgievski, 2010). The reduction in motivation has been positively correlated with a decline in the ability of the farm to resist and respond to pressures over time (Peel, 2015).

Globally, very small holdings (<2ha) account for 84% of total farms, while 24% of the global agricultural area is made up of farms below 10 ha (FAO, 2014). There are 548 million farms, 90% of which are family led. It is estimated that almost 2.5 billion people worldwide are involved in, or dependent on, small agricultural activities. In light of this, agricultural policies should take into account the life expectations of farmers. The well-being of local and small farmers strongly affects the future and long-term capacity of the rural system to adapt and respond to environmental, ecological and economic alterations, and to preserve their cultural diversity, which is also essential for the resilience of the rural systems.

This study will investigate the compatibility of competitiveness with the well-being of small farmers in agricultural policies. The research will be based on a comparative of three agricultural policy systems (differentiated between global market oriented and internal market oriented), their structure and the effects they produce on the rural territory and the small farms. The research will make use of a literature review, to expose and assess the discrepancy in support between large and small farmers; of questionnaires aimed at larger groups and farming communities and of interviews with officials and local farmers.

The study will use the current OECD classification of rural areas to distinguish the territories according to their proximity and links with cities and local markets. To better understand the way in which the two types of rural policy structures affect small farmers in relation with the distance from the main markets.

With this research, the hope is to contribute to the understanding of how agricultural policies can acknowledge and protect the well-being of smallholders, farming communities and families as invaluable assets that can enable diverse and sustainable site-specific adaptation practices and strategies.

NAME **Karl Benjamin KRÄHMER**
E-MAIL karl.kraehmer@polito.it

COURSE XXXV cycle - 1st year

RESEARCH TITLE A Geography of Two Apples.
Investigating (De)Growth and Space following a Commodity

TUTOR(S) Marco SANTANGELO

ACADEMIC CONTEXT

Cook I. *et al.*, 2004. Follow the Thing: Papaya. *Antipode,* 36, pp. 642-664.
D'Alisa G., Demaria F. and Kallis G., eds., 2014. *Degrowth: A Vocabulary for a New Era*. Abingdon: Routledge.
Angelo H., Wachsmuth D., 2015. Urbanizing Urban Political Ecology: A Critique of Methodological Cityism. *International Journal of Urban and Regional Research,* 39(1), pp.16-27.
Brand U., 2020. Sozial-ökologische Transformation konkret: Die solidarische Postwachstumsstadt als Projekt gegen die imperiale Lebensweise. In: A. Brokow-Loga, F. Eckardt, eds. *Postwachstumsstadt. München: oekom verlag*, pp. 30-42.

EXTERNAL COLLABORATIONS

- -

HIGHLIGHTS OF THE RESEARCH ACTIVITY

Cities, or, maybe better, urban life, depends on hinterlands, on places where to get resources from, extending the effects of urbanisation far beyond conventional city limits. How can these relationships be shaped? I use the approach of commodity geographies and "follow-the-thing" research to investigate the diversity of city-hinterland relationships in the case of one commodity: the apple. Starting from a Turin supermarket and Porta Palazzo's farmers' market I will follow two apples back to their places of origin, investigating the social, economic and ecological relationships in the spaces where their production, logistics, consumption occurs. An important line of research on commodities and their geographies has developed starting with Hopkins and Wallerstein who in relation to world-systems theory have first proposed to connect research on centre and periphery studying commodities. Later on, multiple approaches have been developed, from commodity chain analysis, to global production networks in studies on management and business to Cook's ethnographic "follow-the-thing" approach . In parallel, scholars such as Moore and Hornborg have looked at commodities finding that capitalist growth has been possible due to unequal geographical development and the externalisation of costs and impacts. Also Neil Brenner in conceptualising planetary urbanisation, has been interested in city-hinterland relationships, which materialise in commodity flows.

Setting out from the investigation of apple geographies, my research connects to emerging research on degrowth, space and spatial politics. Degrowth is a political project, social movement and academic debate that starts from the idea that living with less can make us happier, while less production and consumption is necessary in order to live inside planetary boundaries. Sustainable development instead aims at decoupling economic growth from social and ecological impact: a strategy that has failed, among other issues due to the externalisation of impacts. In response, in degrowth there is a strong tendency to favour the local dimension – but so far often without a thorough investigation of space and research on space. In my research I plan to look critically at "local vs. global" relationships and to go beyond simple dualisms, aiming at a contribution to a more complex and complete spatial perspective in the degrowth debate.

NAME **Marco MASSANO**
E-MAIL marco.massano@polito.it

COURSE	XXXV cycle - 1st year
RESEARCH TITLE	GIS-Based Co-Simulation Platform for Smart Energy and Renewable Technologies Integration in Energy Communities
TUTOR(S)	Enrico MACII, Edoardo PATTI and Andrea LANZINI (Politecnico di Torino)

ACADEMIC CONTEXT

Bottaccioli L., Patti E., Macii E., Acquaviva A., 2018. Distributed Infrastructure for Multi-Energy-Systems Modelling and Co-simulation in Urban Districts. In: *7th International Conference on Smart Cities and Green ICT Systems*.
Massano M., Patti E., Macii E., Acquaviva A., Bottaccioli L., 2020. An Online Grey-Box Model Based on Unscented Kalman Filter to Predict Temperature Profiles in Smart Buildings. *ENERGIES*, 13(8), p. 2097

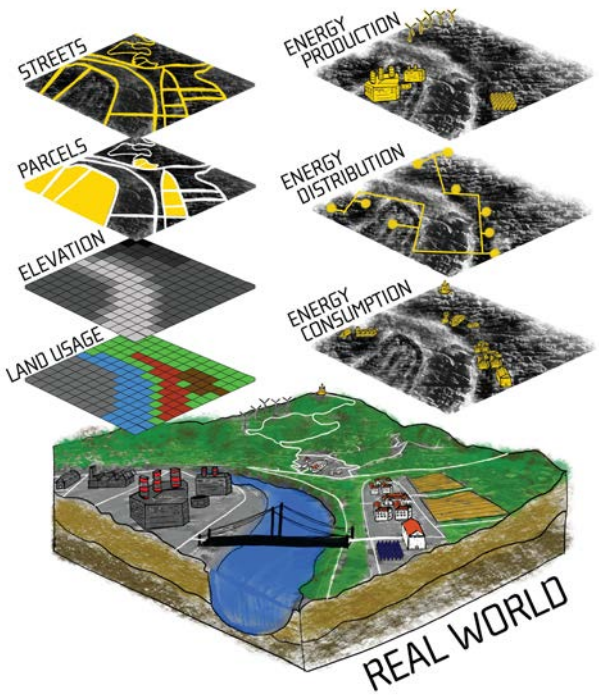
EXTERNAL COLLABORATIONS

- Energy Center Lab – Politecnico di Torino

HIGHLIGHTS OF THE RESEARCH ACTIVITY

This research aims at developing a distributed infrastructure able to model and co-simulate Multi-Energy-Systems (MES) in a Renewable Energy Community (REC). The designed platform wants to combine different technologies and heterogeneous information to model the energy flows and to simulate the impacts of novel control strategies in RECs and distribution networks. It must be able to exploit information coming in (near-) real-time from Internet-connected devices installed through the context that wants to be modeled (the selected community). Furthermore, the platform will provide features to simulate how such novel policies affect the energy marketplace and to analyze the effects and/or limitations of regulatory frameworks. On these premises, the platform wants to be an infrastructure for both planning and simulation, as a service that can be used by different stakeholders to build and analyze new energy scenarios for short- and long-term planning activities and for testing and managing the operational status of MES.

A starting point for the operation of such a platform is a detailed GIS-based spatial quantification of both the RES potential and energy demand. The geospatial analysis tool intends to identify suitable areas for RES exploitation (e.g. industrial settlements, buildings roofs) in relation to the surrounding area, the real RES availability, and the existing environmental and landscape constraints. Major elements to be considered are the temporal and spatial distribution of RES availability and final energy demand, the localization of main energy consumption areas, and the extensiveness of the power grid. The accurate representation of the energy infrastructure on the selected area represents a crucial aspect to be considered in the energy planning platform design: a detailed map that considers the energy demand, the electric network, the main existing power plants, and the storage systems must be developed. The distribution network must be described and analyzed, paying attention to the most critical parts in terms of possible bottlenecks for the evolving energy system. The platform has also to be designed with the capability to suggest hypotheses for strengthening and spatial relaxing both the distribution grid and other environmental constraints.



NAME **Cecilia MEREGHETTI**
E-MAIL cecilia.mereghetti@polito.it

COURSE	XXXV cycle - 1st year
RESEARCH TITLE	Social Impact of Cultural Programs in Urban Areas. An analysis of European Capitals of Culture with Data Science tools
TUTOR(S)	Sara BONINI BARALDI, Carlo SALONE

ACADEMIC CONTEXT

Ballas D., 2013. What makes a 'happy city'?. *Cities*, 32, pp. S39-S50.
DiMaggio P., Nag M., Blei D., 2013. Exploiting affinities between topic modeling and the sociological perspective on culture: Application to newspaper coverage of US government arts funding. *Poetics*, 41(6), pp. 570-606.
Steiner L., Frey B.S., Hotz S., 2015. European Capitals of Culture and Life Satisfaction. *Urban studies*, 52(2), pp. 374-394

EXTERNAL COLLABORATIONS

- University of Bologna

HIGHLIGHTS OF THE RESEARCH ACTIVITY

Cultural programs have seen an increase in both numbers and importance in recent years, particularly to boost local economies and promote development. The idea behind this research is to take a different perspective on the assessment process of such initiatives. Looking in particular at the social sphere, the aim is to appraise how cultural programs affect subjective wellbeing in the territories involved.

The study will focus on the "European Capitals of Culture" (ECoC) Program, an initiative that allows cities to implement for one year a set of cultural initiatives and activities to promote development in the hosting city. The ECoC is a well-researched, relevant initiative, however reports on its effects on hosting cities are often focusing on the same topics – mainly tourism attractiveness, participation, economic returns or the inclusion/elitism debate. This view is also supported by the guidelines given so far by the EU for the results' evaluation of the initiative.

Understanding both the need to find new tools and new "narratives", I propose a mixed methodology that aims at being objective and at the same time considers also very subjective data. The main feature in the methodology shall be the use of textual data analytics and topic modeling. The idea is to collect and analyze solicited and unsolicited written content produced by different actors both online and offline, which will be analyzed with topic modelling and sentiment analysis. Additionally, more traditional techniques – such as surveys and focus groups – will be integrated in the study, to complete the picture and improve interpretability.

In the end, the study will contribute to the ongoing debate on the ECoC program and to the literature on the topic of culture and development, but it will also respond to the need for new guidelines for the evaluation of the program highlighted by the EU itself.

NAME **Francesco NURRA**
E-MAIL francesco.nurra@polito.it

COURSE XXXV cycle - 1st year

RESEARCH TITLE Economic and Labour Survival Strategies of Islamic Communities During and in the Aftermath of the Pandemic Crisis

TUTOR(S) Ugo ROSSI, Francesco CHIODELLI

ACADEMIC CONTEXT

Maréchal B., Allievi S. *et al.*, 2003. *Muslims in the enlarged Europe: religion and society*. Leiden, Brill.
Buckley M., McPhee S., Rogaly B., 2017. Labour geographies on the move: Migration, migrant status and work in the 21st century. *Geoforum,* 78, pp. 153-158.
Strauss K., 2018. Labour geography 1: Towards a geography of precarity? *Progress in Human Geography*, 42(4), pp. 622-630.
Samaddar R., 2020. *Borders of an Epidemic. Covid-19 and migrant workers*. Kolkata, Calcutta Research Group.

EXTERNAL COLLABORATIONS

- -

HIGHLIGHTS OF THE RESEARCH ACTIVITY

The temporal context of this research is the pandemic crisis and ongoing post-pandemic transition phase. An exhaustive study about the ongoing global pandemic crisis must analyse it while comparing it with previous global capitalist crises (especially the 2007-8 one), in order to individuate which peculiar features characterise the actual crisis. Furthermore, the ongoing crisis has created a different conceptualisation and usage inside the distinction between public and private spaces in the urban context.

The global pandemic crisis has several consequences on the urban context, especially in terms of political and economic policies that limit mobility and labour. Thus, the global pandemic crisis caused a powerful imbalance inside the functioning of the urban economy. The neoliberal urban economy is based on inequalities, and the pandemic crisis accentuated some of these inequalities.

Considering inequalities as a constituent feature of the urban context, this research investigates the economic and labour survival strategies of Islamic communities during and in the aftermath of the pandemic crisis. Despite the presence of muslim converts, this research investigates Islamic communities as urban marginalities and subaltern groups from an intersectional perspective about muslim migrants and immigrants, thus by considering gender, ethnic, and age differences.

This study also concerns the existence of informal and formal networks of solidarity that allows the economic and labour survival of the Islamic communities.

Turin is one of the Italian cities most affected by the pandemic crisis in terms of casualties and spread of contagion. Besides, some of its boroughs have a majority of migrant and immigrant inhabitants.

Islam a Torino

NAME **Carlotta QUAGLIOLO**
E-MAIL carlotta.quagliolo@polito.it

COURSE XXXV cycle - 1st year

RESEARCH TITLE Spatial Dynamic Assessment in Urban Coastal Areas through Integrated Ecosystem Services Modelling under Climate Change Scenarios

TUTOR(S) Alessandro PEZZOLI, Elena COMINO (Politecnico di Torino), Marco Maria BAGLIANI (Università di Torino)

ACADEMIC CONTEXT

Voskamp I. M., Van de Ven F. H. M., 2015. Planning support system for climate adaptation: Composing effective sets of blue-green measures to reduce urban vulnerability to extreme weather events. *Building and Environment*. Pergamon, 83, pp. 159-167.
Grêt-Regamey A., Altwegg J., Sirén E.A., van Strien M.J., Weibel B., 2017. Integrating ecosystem services into spatial planning - A spatial decision support tool. *Landscape and Urban Planning*. Elsevier, 165, pp. 206-219.
IPCC, 2019. Summary for policymakers. In: Pörtner, H.-O. *et al.*, eds., *IPCC Special Report on the Ocean and Cryosphere in a Changing Climate*. In press.

EXTERNAL COLLABORATIONS

- CESAM, Centre for Environmental and Marine Studies, University of Aveiro, Portugal
- Griffith University, SeaCities, Cities Research Institute, Gold Coast, Australia

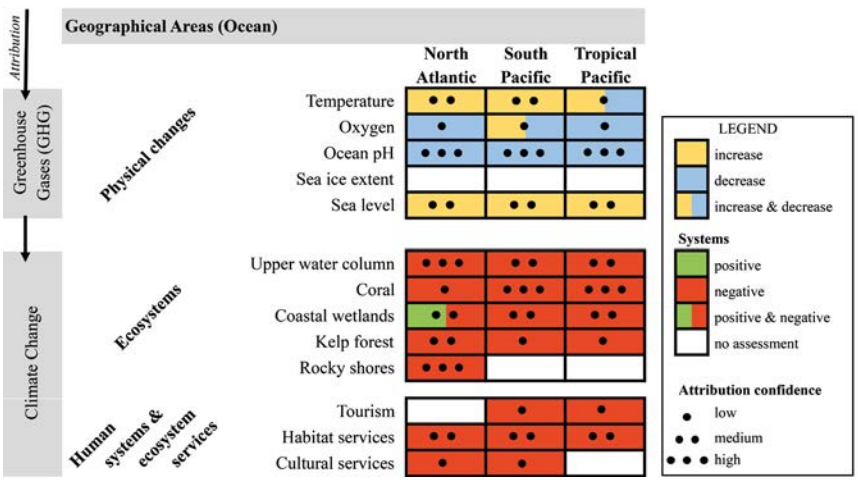
HIGHLIGHTS OF THE RESEARCH ACTIVITY

Climate Change is considered the major threat to the stability of the cities, especially through the amplification of related impacts. Since major cities are concentrated in coastal areas, the projections of a warmer climate further increase the frequency and intensity of coastal-, urban- and flashy-floods, and thus also speeding up the coastal erosion.

One of the key objectives of the EU Adaptation Strategy (2013) is the need for addressing knowledge gaps about adaptation focusing on the city-level strategies through the Global Covenant of Mayors for Climate & Energy initiative. Moreover, as recommended by the EU Directive (2007), the risk and vulnerability along the coast must be assessed through spatial analysis depicted in maps (EU, 2007).

In the context of climate change as the driver and the urban resilience as the response for achieving rapid long-term adaptation, the contemporary urban design principles must include Ecosystem-based approaches overcoming the traditional mitigation method. How to transform the knowledge systems that support decision-making while translating the integrated spatial climate-ecosystem models used for vulnerability assessment into local adaptation planning measures?

This PhD research aims at developing a spatial system dynamic assessment for coastal cities through integrated ecosystem services modelling in a context of climate change scenarios, thus contributing to identify climate-related coastal vulnerabilities. In doing so, this work will employ the most recent modelling release of the software InVEST including the Coastal Vulnerability model and Urban Flood Risk Mitigation model integrated into a GIS environment. The output enables site-specific spatial knowledge of the vulnerable areas. A second step includes the adoption of future climate scenarios through the development of a methodology based on short-, medium-, long-term coastal vulnerability assessment highlighting the identification of most sensitive regions in the face to climate change. The expected results of this work concern the provisioning of policy implication scenarios expressed in biophysical and monetary term supporting urban adaptation strategies while defining the major transformations mainstreaming the resilience of coastal cities.



NAME **Claudia REMIAO AZZOLIN**
E-MAIL claudia.azzolin@polito.it

COURSE XXXV cycle - 1st year

RESEARCH TITLE Resettlement of Internally Displaced Persons in post disaster context in Mozambique

TUTOR(S) Fabio ARMAO, Giancarlo COTELLA

ACADEMIC CONTEXT

Arnall A., Thomas DSG., Twyman C., Liverman D., 2013. Flooding, resettlement, and change in livelihoods: evidence from rural Mozambique. *Disasters*, 37 (3), pp. 468-488.
Artur L., Hilhorst D., 2012. Everyday realities of climate change adaptation in mozambique. *Global Environmental Change*, 22(2), pp. 529-536.
Artur L., Hilhorst D., 2014. Floods, resettlement and land access and use in the lower Zambezi, Mozambique. *Land Use Policy*, 36, pp. 361-368.
Oliver-Smith A., 2018. Disasters and large-scale population dislocations: International and national responses. In: *Oxford Research Encyclopedia of Natural Hazard Science*. Oxford, UK: Oxford University Press.

EXTERNAL COLLABORATIONS

- -

HIGHLIGHTS OF THE RESEARCH ACTIVITY

This research frames in development, urban, and disaster studies in the post-disaster context in the light of post-development discourses that strongly influence the resettlement processes in the African countries.

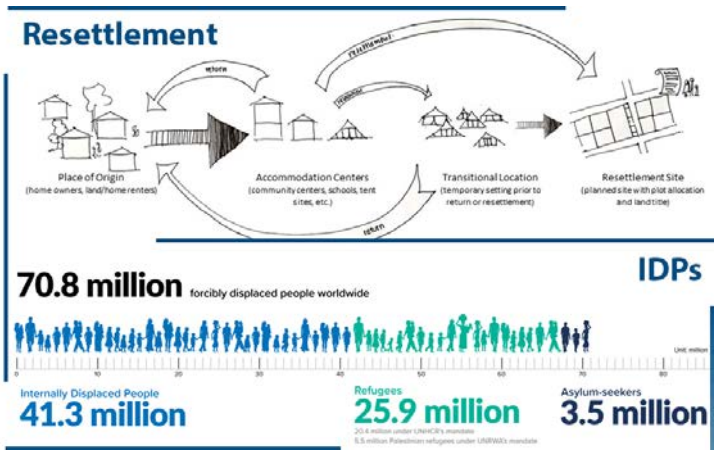
The aim of this research is to investigate stakeholder relations in the resettlement process of Internally Displaced Persons (IDPs) after the Cyclone Idai in Mozambique.

The research subject is approached from different perspectives based on a 'relational site' shaped through the engagements of different actors during the resettlement process. The analytical process aims to identify the challenges faced by the different set of actors, and the opportunities that climate-induced resettlement represent to them.

Within this context, resettlement is analyzed through relationships between the host community and resettled community (grassroots perspective); and government and NGOs (institutional perspective).

The research is based on an actor-oriented approach upon a single case study. This in-depth analysis is crucial to understand the process through a holistic view of the actors engaged in this process.

This research aims to collaborate to the academic debate on the topics of resettlement, internally displaced persons, post-disaster development in global south countries; and to collaborate to the improvement of policies and practices of resettlement driven by natural hazards and climate change.



NAME **Manuela RONCI**
E-MAIL manuela.ronci@polito.it

COURSE XXXV cycle - 1st year

RESEARCH TITLE Urban Biodiversity: Guidelines for Aware Planning and Design

TUTOR(S) Federica LARCHER, Bianca Maria RINALDI, Andrea BOCCO

ACADEMIC CONTEXT

Nassauer J.I., 1995. Messy Ecosystems, Orderly Frame. *Landscape Journal*, 14(2), pp. 161-169.
Prominski M., 2019. Come Together. Enhancing Biodiversity in High-Density Cities by Giving Space to Humans and Non-Humans. In: B.M. Rinaldi, P.Y. Tan, eds., *Urban Landscapes in High-Density Cities. Parks, Streetscapes, Ecosystems*. Basel: Birkhäuser, pp. 190-203.
Tan P.Y., 2019. Meeting Old Friends and Making New Ones: Promoting Biodiversity in Urban Landscapes. In: B.M. Rinaldi, P.Y. Tan, eds., *Urban Landscapes in High-Density Cities. Parks, Streetscapes, Ecosystems*. Basel: Birkhäuser, pp. 204-215.
Randrup T.B., Buijs A., Konijnendijk C.C., Wild T., 2020. Moving beyond the nature-based solutions discourse: introducing nature-based thinking. *Urban Ecosystems*, 23, pp. 919-926.

EXTERNAL COLLABORATIONS

- -

HIGHLIGHTS OF THE RESEARCH ACTIVITY

Most of the human population lives in cities. Due to growing anthropic pressure, urbanisation has become the main cause of worldwide environmental damages. From climate change to biodiversity loss, it is clear that cities are the key to face the biggest challenges. Starting with the understanding of the city as an ecosystem, the research focuses on biodiversity issues in urban context. The aim is to examine how design might enhance or mitigate the mechanisms regulating the development of urban biodiversity.

Assuming that the city is unavoidably a place of colonisation for many living entities, the purpose is to analyse how the distribution of biodiversity adapts to the existing conditions. To do this, it will be discussed how the organisation of open spaces can increase their heterogeneity and quality. Although many open spaces are capable of beckoning biological diversity even if they were not purposely designed with this aim (or were not even designed at all), composition and configuration of the vegetation can become a driver to address urban biodiversity loss.

One of the major issues in designing for biodiversity is to balance human and nature needs. Getting out of an anthropocentric view, we could apply a novel "nature-based thinking", shifting the attention from the mere benefits and services provided by nature to humans, towards a vision including man inside nature. Therefore, the active involvement of citizens would rise their awareness, so that humankind could reach a virtuous feedback, returning efforts to benefit nature. After the global diffusion of different landscape design styles over time caused loss of ecological variety and local identity, it is time to establish a new place-based approach able to turn ecosystem functions and patterns in new accepted and shared urban aesthetics. Following this attitude, environmental, social, economic, functional and aesthetic issues could be successfully addressed and integrated in urban design and management.

The final goal of the research is a critical review of the collected good practices and case studies, in order to develop guidelines for biodiversity-friendly planning of urban open spaces, taking into account the ecological stability of the cities and promoting their dynamics. A good approach towards urban regeneration should in fact be able to balance formal design, defined functions, spontaneous colonisation and temporary uses of the open spaces, shared among all the living dwellers of the city.

NAME **Federica ROTONDO**
E-MAIL federica.rotondo@polito.it

COURSE XXXV cycle - 1st year

RESEARCH TITLE The Governance of Low-Carbon Energy Transition. What Role for Local Energy Intermediaries?

TUTOR(S) Giancarlo COTELLA, Isabella LAMI

ACADEMIC CONTEXT

Cassen C., Hamdi-Chérif M., Cotella G., Toniolo J., Lombardi P., Jean-Charles Hourcade J.C., 2018. Low Carbon Scenarios for Europe: An Evaluation of Upscaling Low Carbon Experiments. *Sustainability,* 10, p. 848.
Kivimaa P., Boon W., Hyysalo S., Klerkx L., 2019. Toward a typology of intermediaries in sustainable transitions: a systematic review and a research agenda. *Research Policy*, 48, pp. 1062-1075.
Nochta T., Skelcher C., 2020. Network governance in low-carbon energy transitions in European Cities: a comparative analysis. *Energy Policy*, 138, p. 111298.

EXTERNAL COLLABORATIONS

- -

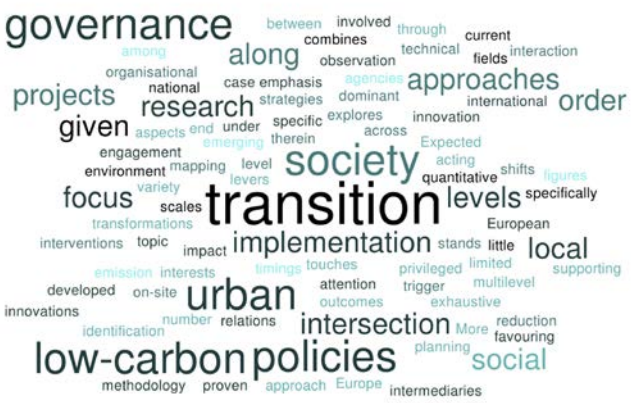
HIGHLIGHTS OF THE RESEARCH ACTIVITY

The topic under investigation stands at the intersection between urban transformations, urban governance and transition studies towards a low-carbon society. It also touches upon multilevel governance studies, as it explores the intersection and translation of strategies and policies developed at the European and national levels to local contexts by considering social relations, institutional aspects and agencies at the local level and their interaction with other levels.

To achieve international emission reduction targets for cities, the dominant techno-centric approaches to urban planning, policies and projects have not proven exhaustive. In particular, whereas these approaches focus on energy and the environment as fields to approach through continuous technical innovations, little attention is given to social practices and organisational asset that could have a role in favouring and supporting the transition towards a low-carbon society.

In order to shed light on the matter, this research shifts the focus to current governance practices and, in particular, on the involved actors and their relation across variable scales and timings. More specifically, a particular emphasis is given to "energy intermediaries", as emerging figures in facilitating the transition acting as bridges among a variety of actors and interests and enabling public engagement along the process.

To this end, a limited number of case studies in Europe will be considered, in order to analyse in depth the implementation of specific projects therein. The proposed research methodology combines interviews with privileged actors and on-site observation, as well as quantitative investigation of the impact of the analysed interventions. Expected outcomes move from mapping the actors' chain along the implementation process to the identification of levers to trigger process innovation in the shaping of policies for energy transition towards low-carbon society.



NAME **Ornella SALIMBENE**
E-MAIL ornella.salimbene@polito.it

COURSE XXXV cycle - 1st year

RESEARCH TITLE Atmospheric Particulate Matter and Interaction with Human Health

TUTOR(S) Andrea M. LINGUA, Deborah PANEPINTO (Politecnico di Torino), Francesco PILLA (UCD College of Dublin)

ACADEMIC CONTEXT

Pilla F., Broderick B., 2014. A GIS model for personal exposure to PM_{10} for Dublin commuters. *Sustainable city and society*, 15pp.1-15.
Salimbene I., Affuso F., Salimbene O., Marasco S., Schettini C., 2015. Asthma and rhinitis: clinical and physiological correlation, possible environmental factors. *European Respiratory Journal*, 46.
Salimbene O., Salimbene I., Pilla F., Ragosta M., Comino E., 2018. Sleep disordered breathing and relationship with Pm_{10}. *European Respiratory Journal*, 52.
Ragosta M., D'Emilio M., Giorgi G., Salimbene O., Riccio P., 2019. Application of MCA for studying as the lifestyle and the air quality can affect form of sleep disordered breathing. *Fresenius Environmental Bulletin*, 25, pp. 1-7.

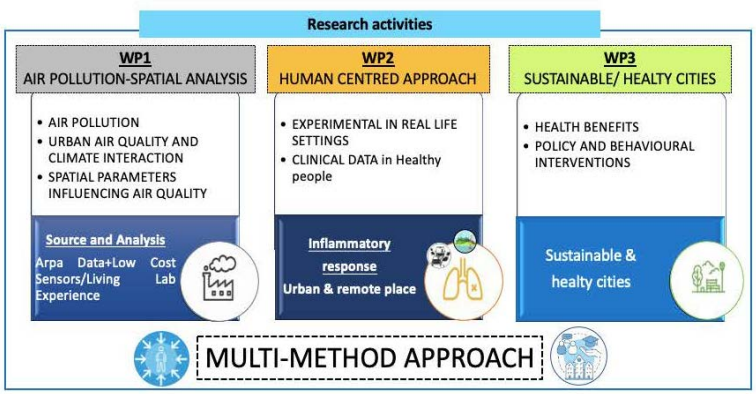
EXTERNAL COLLABORATIONS

- Earth institute-UCD College of Dublin, ASST, Ireland
- Carlo Poma Hospital, Mantova

HIGHLIGHTS OF THE RESEARCH ACTIVITY

According to the World Health Organization, Air Pollution and Climate Change are now the world's largest single environmental health risk. The premature deaths attributable to air pollution (European Environmental Agency) in Italy are more than 60 thousand/year and the health-related costs deriving from air pollution are estimated at between 47 and 142 billion euros (ISTAT, 2015). Evidence suggests the increase in respiratory diseases precisely in the areas most oppressed by PM pollution (WHO, 2019) and it has been confirmed that air pollution and tobacco smoke are the main sources of exogenous oxidants in human population. Air pollution is largely a preventable risk and reducing pollution at its source can have a rapid and real impact on human health. The current epidemic situation caused by COVID-19 has highlighted how long-term exposure to persistent air pollutants could be related both to the spread of the virus and to the increase in the mortality rate. Consequently, emerging diseases and the increase in respiratory diseases require the urgency of improving global air quality and the importance of increasing efforts to reduce pollution at local levels. Improve air pollution control on local scale based on the correlation with human inflammatory response, is the key factor of my research activities which involve as case study, cities with different PM sources.

There are many scientific questions in relation to the COVID -19 epidemic and air pollution, such as the following: Could chronic / acute exposure to air pollution have an effect on the likelihood of infection from SARS-CoV-2?, is there an interaction between outdoor pollution and spread of viral infection? What could be the positive effects of the decrease in pollution on the health of the population? All this aspects converge in my interdisciplinary research activities based on geospatial analysis and modeling of urban dynamics, which involve the use and development of GIS based models and decision support tools integrated with clinical data, in order to pre-empt the impacts resulting from the interactions between human population and the environment. Moreover i am reinforcing my research interest in the 'Living Lab' activities which focus on improving city life and use of low cost sensors for air quality monitoring and environmental conditions.



NAME **Ingrid VIGNA**
E-MAIL ingrid.vigna@polito.it

COURSE XXXV cycle - 1st year

RESEARCH TITLE Forest Socio-Ecological System Modelling for Wildfire Risk Analysis

TUTOR(S) Angelo BESANA, Alessandro PEZZOLI, Elena COMINO (Politecnico di Torino)

ACADEMIC CONTEXT

Ostrom E., 2009. A General Framework for Analyzing Sustainability of Social-Ecological Systems. *Science*, 325, pp. 419-422.
Glaser M., Krause G., Ratter B.M.W., Welp M., 2012. *Human-Nature Interactions in the Anthropocene: Potentials of Social-Ecological Systems Analysis*. Routledge.
Spies T., White E., Ager A., Kline J., Bolte J., Platt E., Olse K., Pabst R., Barros A., Bailey J., Charnley S., Morzillo A., Koch J., Steen-Adams M., Singleton P., Sulzman J., Schwartz C., Csuti B., 2017. Using an agent-based model to examine forest management outcomes in a fire-prone landscape in Oregon, USA. *Ecology and Society*, 22, p. 25.
Müller M., Vilà Vilardell L., Vacik H., Mayer C., Mayr S., Carrega P., Duche Y., Lahaye S., Böttcher F., Maier H., Schunk C., Zimmermann L., Ascoli D., Cotterchio A., Fiorucci P., Gottero F., Pirone S., Rizzolo R., Vacchiano G., Sautter M., 2020. *FOREST FIRES IN THE ALPS: State of knowledge, future challenges and options for an integrated fire management - White Paper for policy makers.* Vienna: EUSALP Action Group 8.

EXTERNAL COLLABORATIONS

- -

HIGHLIGHTS OF THE RESEARCH ACTIVITY

Forests play a fundamental role in providing several ecosystem services. Recently, their ability to regulate the carbon cycle and, therefore, to influence climate change trends has become clear to the public opinion. However, climate change, together with other direct and indirect human impacts, is threatening forests ecosystems' health worldwide. Wildfires are one of the results of these driving pressures on the fragile ecological equilibriums and wildfires risk is likely to increase in most Europe. The drivers of wildfires risk are not limited to climatic and meteorological factors: the forest management techniques, the presence of tourists, the typical rural abandonment of some areas with the consequent aging of the population and the characteristics of the Wildland-Urban Interface (i.e. the border between the urban area and the forest or open land) all have a major role in forest fires spread.

Recent studies have started to assess the correlation between the incidence of wildfires and human socio-economic activities. This research aims at deepening the interactions between the human sphere and the ecological sphere, in the framework of the wildfire risk analysis. A spatial system modelling approach will be used, through the design of a Socio-Ecological System, which is defined by Glaser et al. (2012) as "a complex, adaptive system consisting of a bio-geophysical unit and its associated social actors and institutions. The spatial or functional boundaries of the system delimit a particular ecosystem and its problem context.". The model will allow to analyse current wildfire risk and future scenarios, in a context of climate and socio-economic changes.

During the first phase of the research, the best modelling approach has been investigated through a systematic literature review. During the second phase, two European case studies will be analysed and compared. The first one will be located in the Italian alpine temperate forest, while the second one will be located in the Sweden boreal forest.

The research results will allow to progress in knowledge about the consequences of climate change and socio-economic changes on forest fire risk and to guide the integration of the obtained results in policy programs. Moreover, justice issue will be a reference during the research process, with the aim of considering equity concerns in forest management and, more specifically, in wildfire risk mitigation strategies.

Evidence of the Wildland-Urban Interface in Valchiusella, northern Italy.

PAST CYCLES

XXXII CYCLE

László CSEKE

Securing and optimising more-than-human value production in the 'mozzarella landscape' in Italy Campania Italy

Federico DELL'ANNA

Energy and Economic Evaluations to Desig Urban Tranformation and Requalification Programs

Massimiliano GRANCERI

Mainstreaming Climate Change Adaptation into Local Planning. Insights from Barcelona and Turin municipalities

Fabio IAPAOLO **(not yet discussed)**

De-Individuation of the Moderm Subject in the Age of Artificial Intelligence. The case of Self-Driving Cars and Algorithms for Decision Making

Lucia LUPI **(not yet discussed)**

Mirroring the City Toward Web-Based Technologies to Support City Stakeholders in the Orchestration of Local Development Actions

Andrea MORA **(not yet discussed)**

Collective labour in practice. Infrastructures and facilities in Lima neoliberal stage of popular urbanizations

Qi MU **(not yet discussed)**

Built Heritage Conservartion in Perspective of Development

Maurizio PIOLETTI

Spatial governance in the Latin American and Caribbean region: a survey on metropolitan areas in Brazil, Bolivia and Cuba

Federico PIOVESAN

Spaces of Participation Commoning and the Shared Management of Urban Spaces

Leonardo RAMONDETTI

The Enriched Field. Urbanising the Central Plains of China

Niccolò RAPETTI

BIM implementation for infrastrucutre projects. Methods and tools for information modeling and management.

Pablo Angel RUFFINO

Digital built heritage: use cases of existing building through BIM-based approach

Astrid Coromoto SAFINA ALMEIDA

Beyond globalized visions .Problematizing urban theory through spatial readings of the Pearl River Delta

Francesco SEMERARO

The Building Information Modelling and Management approach for Public Contracting Authorities of infrastructure projects

XXXI CYCLE

Samantha CENERE

Making in the making. Performing new forms and spatialities of production

Merve DEMIRÖZ

Conservation of Izmir Historical City from Traditional Plans to Entrepreneurial Governance

Vincenzo DI PIETRA

Seamless Positioning and Navigation in Urban Environment

Camilla GUADALUPI

Undisciplined expertise. Reflections on an emerging profession within Tactical Urbanism

Luca LAZZARINI

Urban/rural co-productions. Planning and governance approaches for improving the relationships among city and countryside in Italy and England

Davide LONGHI

Mobility as a Service (MaaS) in suburban and rural areas: concept design and challenges

Erminia MARTINI

Power dynamics and aid governance in a post disaster context: a case study of Haiti's recovery

Valerio OPERTI

Travellers' Preferences and Attitudes to understand Travel Behaviour and define Market Segmentation

Constantin SANDU

Feature Extraction from Remotely Sensed Imagery for Emergency Management and Environmental Assessment

Diego Danilo VITELLO

Planning for the New Geography of Manufacturing

XXX CYCLE

Emere ARCO

Geomatics for Mobility Management. A comprehensive spatial database model for Mobility Management

Chiara BASILE

Making arrival, making the city. Newcomers' becoming through and with Brussels

Erblin BERISHA

The evolution of spatial planning systems in the Western Balkan Region. Between international influences and domestic actors

Amandine DUBOZ

Willingness to use real-time multimodal information to change travel behaviour. The use of psycho-social variables for the market segmentation

Benedetta GIUDICE

Ecological planning strategies for a qualitative land take

Nives GRASSO

Visibility analyses using 3D urban models generated by low-cost multi-sensor approaches

Gian Gavino PAZZOLA

The socio-spatial relations of innovative artistic production in Piedmont and Liguria

Anna Paola QUAGLIA

The politics of innovation, entrepreneurship and community as a discursive practice. Researching a startup incubator in Milan

Alys SOLLY

Spatial Planning and Well-being: a Survey on the Swiss Case

Sara TORABI MOGHADAM

A new integrated multi-criteria spatial decision support system for urban energy planning in the built environment

Francesca Maria UGLIOTTI

BIM and Facility Management for smart data management and visualization

FOR MORE INFO:

dottorato.d.ist@polito.it
http://dottorato.polito.it/urb/en/overview