

MECHANICAL ENGINEERING | PHYSICS |
PRESERVATION OF THE ARCHITECTURAL
HERITAGE | STRUCTURAL, SEISMIC
AND GEOTECHNICAL ENGINEERING |
**URBAN PLANNING, DESIGN AND
POLICY** | AEROSPACE ENGINEERING
| ARCHITECTURAL COMPOSITION |
ARCHITECTURE, BUILT ENVIRONMENT
AND CONSTRUCTION ENGINEERING |
ARCHITECTURAL, URBAN AND INTERIOR
DESIGN | BIOENGINEERING | DESIGN |
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TECHNOLOGY | MANAGEMENT ENGINEERING
| MATERIALS ENGINEERING | MATHEMATICAL
MODELS AND METHODS IN ENGINEERING



Chair:
Prof. Luca Gaeta

DOCTORAL PROGRAM IN URBAN PLANNING, DESIGN AND POLICY

The PhD Programme in Urban Planning, Design and Policy (UPDP) aims at exploring the significance and impact of contemporary urban changes and understanding the way these processes can be governed through planning, design and policy making activities. The programme pays specific attention to the transition towards new, more sustainable and equitable modes of urban development as well as to pro-active advancements in planning practices and to potential innovations in traditional urban studies, urban design and policy approaches. The integration between different fields and disciplines of urban research on the one hand, and between theory and practice on the other, distinguishes the approach promoted by the PhD programme.

Objectives

The objective of the UPDP Programme is to provide PhD Students with the analytical and interpretative tools and skills together with research/ planning/design methodologies to advance research in the field of urban studies, spatial planning, urban design, urban policy and governance. PhD Students are encouraged to reflect upon traditional and innovative practices in these fields by participating in research activities concerning cities and regions in both Italy and abroad, paying particular attention to international comparison.

By establishing a dialogue with the best European and International schools, this PHD programme is the place for research and innovative approaches to urban studies, spatial planning and urban design dealing, in particular, with the following themes:

- Multi-scalar regional urbanization processes: rethinking and reshaping the city on a regional scale and addressing the challenges for the analytical approaches and descriptions, as well as for institutional and governance processes;
- Advances and challenges in contemporary planning theory and practice: the reshaping of citizenship, boundaries and collective action in urban arenas and their effects in the urban environment;
- Urban transitions towards sustainability: strategies and tools for land and biodiversity preservation, energy conservation, and natural and technological risk prevention and mitigation;
- Social and economic changes and their effects on spatial processes:

social inequalities and urban segregation; economic specialization and diversification in a global context;

- Tools for the evaluation and management of urban projects: feasibility and equity of urban projects, as well as the sustainability and design quality of the physical outcomes;
- European cities, urban policies in Europe, the EU urban policy agenda: exploring distinctiveness, convergences and divergences.

Contents and research training

Based on a multidisciplinary approach, the main objective of both the educational programme and the individual research activities is to offer PhD students a challenging environment with space for international debate, research, experimentation and innovation.

Starting from this perspective, the main teaching activities are fed by the members of the PHD Board organized into three research areas:

• **Urban studies**

Contemporary cities worldwide are confronted with increasing challenges regarding local democracy, sustainable development, management of environmental resources and landscape, social cohesion and cultural diversity. Looking at recent cross-scalar urban changes, the main issues addressed are the following: social, economic, environmental and territorial transformations; governance problems and technological innovations. The main research topics are: forms and processes of the spatialization of social and economic inequalities; urban segregation; processes and institutions of urban governance; spatial impact of social innovation; forms and processes of regionalization and processes of social, economic and territorial development in local contexts.

• **Planning theories and practices**

Urban planning is not a unitary or self-contained discipline and planning knowledge and activities can be improved by delving into (and jointly considering) both theoretical and practical issues. First, the cultures, ethics, traditions and paradigms of planning are varied and have been evolving differently according to their geographical, institutional and political context. Similarly, planning practice is multiform and can be understood from several perspectives. Studying the characteristics, the peculiar interpretations and the effects of planning practices constitutes a second relevant research field. Thirdly, the selection and discussion of the crossroads between planning and other disciplines (e.g. architecture, environmental sciences, policy studies, philosophy and others) can dramatically innovate planning theories and practices, going beyond traditional approaches and perspectives.

• **Design topics, forms and tools**

In a scenario of changing socio-economic, environmental and territorial conditions, theoretical and technical issues for the construction of urban projects and the implementation of governance policies are

being experimented with as a way to improve the quality of life. Specific research themes are: the role and form of urban projects in leading territorial transformations; innovation in the description and representation of urban environments and landscapes; tools for the evaluation and management of urban projects and policies aimed at mastering the feasibility and equity of land development, as well as the sustainability and the design quality of the physical outcomes and strategies for land and biodiversity preservation and energy conservation.

The three research areas reflect the contents and themes of the ongoing research at DASTU and represent the framework of future proposals. They

will be the backbone for PhD Students' educational and research activities.

Professional and research profiles

According to its international orientation, the UPDP PhD Programme intends to train highly qualified researchers and professionals and expects them to work in academic institutions, research centers, public administrations and the private sector in the following fields: spatial planning, design and management of urban projects and policy, urban studies and urban governance.

PhD Doctors with such a profile are qualified to be employed by Italian and International academic institutions, public bodies and research centers, as well as public and private development agencies.

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PLANNING LIMITATIONS, CONTRADICTIONS AND NEW PERSPECTIVES FOR RURAL AND TERRITORIAL DEVELOPMENT IN COLOMBIA

Liliana Giraldo Arias - Tutor: Prof. Davide Ponzini

Colombia's development model based on economic growth has favoured nature exploitation and inequitable power relations over rural land. This has led to violent conflicts, land disposition, migratory dynamics and poverty, which have delayed rural development. Colombian rural regions are characterized by limited access to political, social, and economic resources, poor basic services, detriment on cultural and environmental values, as well as undervalued traditional productivity activities and life style; in sum, they have limited development opportunities and capabilities. In turn, the country's decentralized planning system undermines territorial comprehensiveness, urban/rural articulation and rural sustainable development. Limitations and contradictions caused by overlaps and gaps amongst governmental levels, laws and decrees, which goes hand in hand with urban-oriented planning policies that have undermined rural development, environmental sustainability and social well-being. Within this context, the signing of the Peace Treaty of 2016 gave origin to new trends and revalued rural Colombia as the privileged space for peace making. Therefore, the country is in the process of

reconsidering rurality not only as land for agriculture or nature exploitation, but also as a space for community opportunities and the protection of nature. In order to comprehend rural development models and planning limitations and contradictions for rural and territorial development in Colombia, this work proposes a conceptual approach on the basis of theories on development, rural development, rurality and political ecology. A state of the art of current history of political and economic conflicts over rural land and the evaluation of the planning systems are presented in this thesis in order to orient planning perspectives for policy transformation and to search for urban and rural development alternatives. The review of various international examples of nature exploitation unveils links between the exploitation of nature and the potentials of spatial development. The analysis of Colombia's region Casanare shows how critical aspects caused by fast-growing demographic and economic dynamics due to *extractivist* industries, which have generated unjust resource distribution and planning decisions, have impaired rural development and social improvement. Based on evidence on these variables,

recommendations to reorient planning policies for rural and regional development alternatives in Colombia will be provided. This dissertation proposes alternatives, redefining objectives and spatial planning principles centred on nature-mankind relationships that can also be internationally applicable.

Key words: rural and regional planning, spatial planning, political ecology, *extractivism*, rural development, *new rurality*, urban/rural continuum.



Fig. 1 - Oil extraction site in Yopal, Casanare



Fig. 2 - Agroindustrial monocrop in Orocué, Casanare

CRISIS MAPPING FOR POST-DISASTER RECONSTRUCTION PLAN: MAKING SENSE OF URBAN CRISIS

Ouejdane Mejri - Supervisor: Prof. Scira Menoni

Based on the assumption that the crisis caused by a natural disaster may be an opportunity of knowledge as presented by Morin's theory of crisis, this PhD research aimed to explore how crisis data may be an opening to enrich local risk related knowledge to support planning the urban post-disaster reconstruction. Particularly, the approach in this research is learning through experience, where learning derives from the capitalization of what we will understand from the disaster that has affected the studied territory and the crisis that ensues: making sense of the crisis in order to link risk theory with post-disaster reconstruction practice. What is proposed in particular here is to explore the possibility of generating and integrating new knowledge about risk factors that a territory and community with pre-existing knowledge to better support reconstruction planning. Today, participative and reliable territorial crisis data is largely collected through crowdsourcing processes and made available on public platforms. In the last decade, the communication about the crisis integrated these volunteered crisis data with official information spread by emergency managers and governments. Indeed, a huge amount of geographic data, maps, pictures,

videos and texts are produced during crisis. This information include all that information that people and institutions need to communicate and share with the 'world' and they increasingly use websites and social media to fasten the communication and broadcast it to a larger public. This 'big crisis data' comprise relief information, assistance requests, official alerts as well as descriptions of what is going on in the 'disaster place'. Essentially, it is within this new configuration of technology and people, in the encounter of media convergence, participatory culture and collective intelligence, that we assisted to the emergence of live crisis narration activities transforming crisis information exchange, sharing and management practices. With regard to the empirical analysis, we implemented the case-studies method in order to understand in-depth the multifaceted opportunities that crisis data and narratives can offer to our research purposes. Both qualitative and quantitative data collection methods have been employed in support of each other. The case-studies are: November 2017, Puerto Rico, Hurricane Maria; May 2016, Canada, Fort McMurray Forest Fire and November 2012, USA, New Jersey and New York Superstorm

Sandy. The empirical exploratory research performed in this work permitted to realize that recurrent descriptions of the evolution of the experience of the crisis are present in the examined crisis narratives. Indeed, our usage of the pattern-based inquiry permitted to understand from observation and interpretation of the crisis narratives and the underlying processes that occur during the crisis phase the event evolution, impact and community reaction. Hence, the resulting expression of risk factors namely hazard, exposure, vulnerability and capacity patterns are empirical results that do not attempt to model the crisis but to characterize it. The resulting taxonomy provides an intermediary stage for the conceptualization of the risk factors the crisis narratives. While looking for meanings for crisis data we found out in its polysemy the expression of the evolution of the impact of the disaster on the territory, i.e., a description of the hazard in action, the emergency response in action, the community response and the territory/community affection. We demonstrated through 1) an in-depth analysis of the gaps in the knowledge supporting reconstruction planning and 2) the assessment of the crisis data availability, validity and polysemy

that there is a huge opportunity in using crisis data in order to improve our knowledge of local territories and communities. Crisis data are to be considered valuable sources of information and of knowledge on local vulnerabilities and capacities. Moreover, a set of technical and organisational recommendations are proposed to support the post-disaster reconstruction planners and policy-makers in using the developed taxonomy of risk factors to support the reconstruction planning with knowledge on the physical and systemic vulnerabilities of the territory and the community as well as their resilience to natural disasters.

FORENSIC INVESTIGATION OF POST-FLOOD DAMAGE DATA TO SUPPORT SPATIAL PLANNING

Marina Tamara Mendoza - Supervisor: Prof. Scira Menoni

This Thesis explores the use of Disaster Forensic Investigation to support the development of spatial plans in flood-prone areas, to prevent and reduce flood risk. Recent Disaster Risk Reduction (DRR) and Urban Planning policies have acknowledged the key function that spatial planning has in shaping disaster risk. These policies call for the integration of DRR knowledge, strategies and measures in spatial planning practices at all levels in order to prevent and reduce disaster risk. Yet, the knowledge currently used in Italy and other EU countries is insufficient for supporting spatial planning for flood risk prevention and reduction at both regional and local levels. The review on the DRR knowledge, particularly on floods, currently used in the regional plans of the twenty Italian regions shows that only flood hazard information is used to inform planning decisions. A similar situation regards the local planning level in Italy, France and Germany. There is then an opportunity to improve the current knowledge base used at different planning levels by adding the knowledge from the forensic investigation of disasters. Forensic investigation is one of the many usages of disaster damage data, alongside loss accounting,

risk modelling and compensation. In this work, the disaster damage data related to a flood event and collected afterwards is referred as “post-flood damage” data. Disaster Forensic Investigation is a very recent tool to extract lessons learned after a disaster, originally designed to inform DRR policy-making and practice. Existing forensic investigation methods fail at considering the key role of spatial planning in the generation of exposure and vulnerability of cities and territories. A new Disaster Forensic Investigation method was developed in this research that is a comprehensive analysis of the disaster that makes use of post-flood damage data. It aims at (i) understanding the causes of the disaster and its damages, and (ii) identifying the role of spatial planning in shaping disaster risk (i.e. whether spatial planning is a relevant risk driver or whether it contributed to risk prevention or reduction). This method was applied in the analysis of two case studies: The 2002 and 2013 floods in the town of Grimma, in Saxony, Germany and the 2012 flood in the Umbria Region, Italy, in Ponticelli, in Città della Pieve and Orvieto Scalo and Ciconia, in Orvieto. Findings of this research reveal that the new Disaster Forensic

Investigation method is an effective tool for mainstreaming flood risk prevention and reduction in spatial planning at different levels. The Umbria and Grimma case studies showed that the lessons learned from Disaster Forensic Investigation can support the definition of actions for flood risk prevention and reduction at both regional and local planning levels. Flood risk management can be mainstreamed in spatial planning through (i) the introduction of DRR measures to reduce and prevent risk in planning instruments, and (ii) spatial plans that act as instruments for risk prevention and reduction. In the first case, risk management measures, as currently used in DRR, are integrated into spatial plans. In the second case, spatial planning acts as a DRR measure by itself, for example through locational decisions, land-use planning and building regulations that are sensitive to flood risk. The case studies also revealed that the lessons learned from Disaster Forensic Investigation can be integrated into the knowledge base of existing planning instruments at different levels (in Italy, France and Germany) and support the definition of actions towards flood risk

prevention and reduction for both the existent and the future built environment (new and redevelopment) (Fig. 1). Besides, some lessons learned can be also used for mainstreaming flood risk management in spatial planning in areas similar to the one analysed in the forensic investigation. In addition, results of this research include the link between Disaster Forensic Investigation and a new taxonomy of flood risk management measures that supports the selection of actions to effectively mainstream flood risk prevention and reduction in spatial planning at different levels,

applicable to different contexts. This taxonomy, in association with the lessons learned from Disaster Forensic Investigation, will support the definition of actions to integrate into spatial plans in flood-prone areas. Flood risk prevention and reduction measures are classified according to different criteria, including the following: the factor on which the measure acts (e.g. hazard, exposure, vulnerability), whether the action is on the existent or the future built environment and the planning level of introduction. The first criterion links the results of the Disaster Forensic Investigation

to the selection of possible risk prevention and reduction actions. This taxonomy can be adapted considering the scope of existing planning instruments.

Keywords: Disaster Forensic Investigation, Disaster Risk Reduction and Spatial Planning, Post-flood damage data, Flood risk prevention.

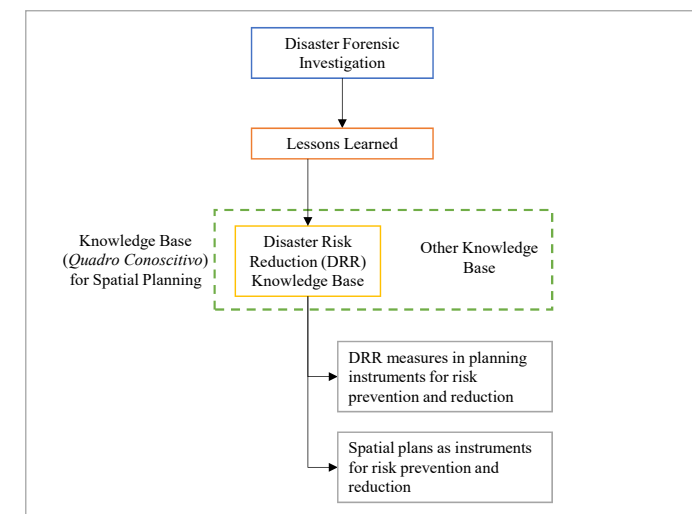


Fig. 1 - Lessons learned from Disaster Forensic Investigation for the knowledge base for spatial planning (source: author).