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57th ISOCARP World Planning Congress**

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Contents

4	Paper Index
10	About the Congress
12	About the Tracks
14	Track 1: Inclusiveness and empowerment Al-Majlis: planning with and for communities
580	Track 2: Well-being and health Al-Fereej: caring for living conditions
1068	Track 3: Smartness and development Al-Souq: innovating for performance and management
1532	Track 4: Resilience and adaptability Al-Waha: promoting local solutions
2068	Track 5: Uniqueness and connectivity Al-Baraha: unlocking urban futures
2662	Special Sessions

Paper Index

Track 1: Inclusiveness and empowerment
Inclusiveness and empowerment
Al-Majlis: planning with and for communities

ALIM Ishika

Vulnerability and coping mechanism: A casestudy of informal (tea) stalls in public places of Dhaka city.

BROWN Rachel, PUJARA Maitri, LILAOONWALA Ayesha, MORRIS Caroline, SKLAR William

Better Buses Equity Assessment Project for New York City Department of Transportation (NYC DOT)

CHEN Junhao

Superblocks Practice in the Southern, Brasilia and Sha Tin, Hong Kong

CIMADOMO Guido, JIMENEZ-MORALES

Eduardo, MINGUET-MEDINA Jorge

Shifting from short term to long term action in post-COVID touristic cities. Drift to exclusion in Seville and Malaga, Spain

FADHILA, NISRINA Amalia, VICTORYKA Nadya

Participatory Planning during Covid-19 Pandemic: The Challenge of Bridging Inclusivity to Spatial Planning of Cities in Emerging Economies

FU Leiyu

Urban Old Community Renewal and Governance Path from the Perspective of Micro-renewal — A Case Study of Chongqing Jijiang Peninsula

GUPTA Vallary, PUNTAMBEKAR Kshama

Planning for Inclusion of Refugees-Understanding initiatives taken for Sindhi Community of Bairagarh, Bhopal

HARIKRISHNAN C.U

Future of Urban Villages : Research and Development Strategy

HU Miao

Action Analysis of Multi-Actor Governance in the Regeneration of Communities: A Case Study of Shanghai

KAMACI Karahan Ebru

From the eyes of the children: how an urban regeneration project could be?

KARADAGI Prakruthi S

Reconciling the public, the private and the people - An inquiry into the publicness of retail urban spaces in Bengaluru

KARAPPAMVEETIL Asif Abdulrahiman

Influence of spatial planning on socio-cultural inclusion in urban parks of Abu Dhabi

KELKAR Ashish

Relationship Between People and Urban Places

KYRIAZIS Apostolos, IBRAHIM Magdy, BENYAS

Ayeshah, ALMAZROUEI Shaikha

Transformations of the Emirati housing typologies. A survey on the trending urban condition and cultural clashes.

LI Yafei, LI Yuting, QIAN Yun

The characters of public space use by various residents in the neighborhoods at urban fringe: a case study of Hegezhuang Village in Beijing

LI Yuting

Residential space differentiation and social integration of typical settlements in the typical area of Beijing second Green Belt - a case study of three communities in Cuigezhuang Township

LIANG Xiaoqi, WANG Shifu

Innovative Chief Urban Designer System in Design Governance

LOU Jiankun, DONG Wei, LIN Alin

The Application of Sense of Place in Public Participation in Planning Decision of the Renewal in Old Industrial Areas

LUO Geqi, LIANG Chao, HUANG Junlin

Intelligent Assessment, Diagnosis and Planning of All-age Friendly Communities Based on Random Forest

MOURATIDIS Kostas, BUSBORG Sagen Stine,

HOFSTAD Hege

Assessing local social sustainability: Lessons learned from testing the Place Standard Tool in Kristiansand, Norway

NAING Yin Mon, TSAI Sung Lun, KOBAYASHI

Hirohide

Exploration of potential public housing strategies for low-income households in Yangon, Myanmar

NCHITO Wilma S, FUNGA Bwalya E

Does Participatory Slum upgrading really work? Piloting local area planning in Lusaka, Zambia

NIES Martina, PAHLEN Bettina, ALTMANN

Julian, FREUDE Ira, KRUMME Klaus

Integrating competences for a co-creative planning culture

SATU Shammi Akter, JUTHI Rowshon Ara

Akter, SADEQUE Chowdhury Md. Zaber

An investigation of the nature of residential mobility in the informal settlements: The case of slums of Dhaka, Bangladesh

SCHUETT Rolf, FAN Li

Culture as a driver for revitalization and identity definition in Chemnitz, Germany

SETHI Ananya, THIRUVENGADAM

Ramadass Bama

Tapping Urban Voids: Transforming Abandoned Urbanscapes to Community Hubs

SHARMA Milan

Exploring the Connections between Urban Refugees, Places, and Social Capital

STEIN Perry

The decolonization of city planning through the activation of Indigenous voices

SU Wanqing, ZHANG Ziran, CHEN Rui, Yi Xiaoxiang

A grounded theory study on COVID-19 prevention and planning support in typical communities of China

TEKCE Özge, GUNAY Zeynepp

Unlocking Planning Through Everyday Life Narratives: The Case of Istanbul, Esenler Havaalani Neighbourhood

TIWARI Rahul, SINGH Jayant, KUMAR Navneet

Impact of Urban Transit System on Housing Rents: Evidences from India

UJMA-WASOWICZ Katarzyna

Wise City as an accessible city. Directions of positive changes in Poland on the example of academic town at the Silesian University of Technology in Gliwice

WANG Jinbai

Inclusiveness and Empowerment in Old Community Renovation Design

WANG Jiuyue, KIM Soobong

Research of urban park planning countermeasures in the perspective of inclusive cities

WANG Mingming

Exploring Urban Renewal Strategies in China from a Humanistic Perspective

YANG Zihan

A Comparative Study on the Fitness to the Aged between Traditional Residential Communities and Modern High-rise Communities Based on the Analysis of Environment-Behavior Coupling Degree — Take Suzhou as an example

Yi Zhikang, ZHOU Ling

From regulation to empowerment: Inclusive renovation of existing buildings in Guangzhou City, China

YUE Cui

Eco-Neighbourhood report---exploring a sustainable community on Cogan

ZENG Yue, YUAN Qifeng

Lessons for community governance from the polycentric governance model in urban villages: based on the effectiveness of COVID-19 prevention and control in different types of communities in Beijing, Shanghai, Guangzhou and Shenzhen in 2020

ZHANG Qinglai, SHEN Yuanyi, YU Yifan

Exploration of the built environment of age-friendly communities: A Photovoice Study

ZHANG Yixin, LIU Jian, Su Dong

Community-driven renewal of industrial heritage and revitalization of old industrial area: A case study of Shimizusawa, Japan

ZHANG Wenzhuo

Renovation, Gentrification, and Revitalisation of the Chinese Baroque Area in Harbin

Track 2: Well-being and health
Al-Fereej: caring for living conditions

ABDEL FATTA Lamia, BONI Giulia, CARNEVALINI Giulia, CHOU BASSI Rawad, GORRINI Andrea, MESSA Federico, PRESICCE Dante

A user-centric approach to the 15-minute city: examining children's walkability in Bologna

AHMED Azhari F. M, AI-KUWARI Lolwa, KHAZNDAR Aoubai, AI-MARRI Abdulhadi
Assessment of Road Transport Atmospheric Emission of GHGs & Criteria Pollutants in Qatar: BAU Versus Paris Agreement NDC Policy Scenarios

AO Xiang, LI Qianwen
Examining gap between planned service levels and realistic demands of hospitals based on accessibility driven service area demarcation: an empirical study of Dalian, P.R. China and Berlin, Germany

BEDI Prabh, MAHAVIR
Lessons COVID19 taught Urban Planners: Case of Chandigarh, India

CHAI Ning, FAN Xin, LIU Jing
Research on the resilience regeneration and planning of the aging community in the post COVID-19 era

CHEN Yile
Discussion on Urban Epidemic Prevention and Control in Chang'an City in Tang Dynasty

CUNHA Jeanna De Campos, MORGADO Sofia, MARQUES Da Costa Eduarda
Towards Healthier Cities: Urban Green Spaces (UGS) in the Neighbourhood Benfica, Lisbon

DING Yanzhu, YANG Li, CHEN Qianting, NA Li
Study on the quality evaluation of old block renewal from the perspective of healthy city

DONG Fei, LI Qing, WU Kun
Creating Localized Resilient Places in Community-Thoughts on Renovation Practice of Wuhan Farmer's Market after the Covid-19 Pandemic

DONG Yu, LI Fengjing, DONG Wei, ZENG Erli
Do parents' and children's perceptions of community environment affect children's physical activity levels?

FU Bang, HE Hao
Localized Spatial Planning Practices of Child-Friendly Cities under the New Urban Agenda: A Case Study of the City of Wuhan

GAD Mohamed Abdelmoneim
Towards Preventative Urban Health Resilience: A Case Study of Cairo's Heliopolis

GENG Hong, YANG Long
Study on the supply of urban public service facilities and the path of cracking based on public health emergencies

LI Jing, LIU Xinning
Research on the Renewal Design of the Neighborhood-scale Built Environment from the Perspective of Post Epidemic

LI He
Evolution of Provincial Economic and Social Development Plan for Pandemic Prevention since SARS to COVID-19

LI Fengyan, LU Qi
Enlightenment on Modern Urban Planning of the Traditional Construction Wisdom in Lingnan Region

LIANG Shuai, LENG Hong
Research on feature recognition and optimization of public space in winter city based on the promotion of physical activity - A case study of Harbin

LYU Xiaohe, XIA Qing
Evaluation on well-being and urban development: a case study on 33 cities of mainland China

MA Yanhong, CHEN Xi
A Theoretical Framework for Constructing Biophilic Urban Nature

MAREGGI Marco, LAZZARINI Luca
Health, an enduring theme for urban planning

MATTOO Saisha
Envisioning Eco-scapes for Healthy Urban Environments: a future to indemnify the past through passive measures

TILLNER Silja, PEVERINI Marco
The Circular Economy in Affordable Housing to Reach Carbon Neutrality - Refurbishment and Greening

TSEKERI Elisavet, KOLOKOTSA Dionysia, LILLI Aikaterini, CALLEJA Kurt, QUACINELLA Daniela, MICALLEF Daniel, DUCA Edward, BISELLO Adriano
The "human community" in the eye of the future cities' vision. The VARCITIES Project approach

VERVOORT Peter, PISMAN Ann
Health promoting urban green spaces: exploring pathways for mapping and analysis in Flanders (Belgium)

WU Yucheng, XU Chenran
Spatio-temporal performance of urban planning in the face of Covid-19: A systematic review of Chinese methods

XIA Huiyi, XIA Nankai
Study on the Planning of Medical Facilities in small towns under the policy of "medical community"

XU Haotian, WU Chenling
Shaping Air Negative Ion Life Circles in the Coastal Space for Healthy Cities

YAN Tianjiao, LENG Hong
Evidence-based design of perceived pathways in cold regional parks for elderly health behaviour

YI Huimin, ZHANG Jie, LI Chi
Research on the age-friendly renewal of public space in historic blocks under the background of community life circle

YIN Ruochen, FANG Jia, HSIEH Chun-ming
Infectious risk prevention and control methods of small open space in post-epidemic era: Risk analysis of airborne transmission of respiratory infectious diseases based on CFD wind environment simulation

YU Weikai, YU Kejian
Value Unlocked: Strategies on Connection between Green Open Space and Healthy Activity in Conghua, Guangzhou

ZENG Erli, DONG Yu, LI Fengjing, CHE Lu
The impact of built environment characteristics on perceived general safety of city dwellers: A case study in Mianyang (China)

ZHA Yilun
Measuring disparities in food access and its implications for nutrient-related diseases

ZHAN Meixu, WANG Hao
A new approach towards modernized urban governance from the perspective of government - citizen collegiality

ZHAN Ye, ZHU Ying, YU Yifan, LIU Yining
Is Neighborhood Green Space Associated With a Lower Risk of Type 2 Diabetes in elderly? Evidence From Shanghai, China

ZHANG Qi, ZHENG Zhenghua, HUANG Jianzhong, ZHOU Ying
Toward liveable neighbourhoods: Prioritizing the improvement of neighbourhood amenities through people-oriented planning in Wuhan

ZHANG Hao, LI Jing
Research on the Construction of "15-Minute" Cities under the Health Impact Assessment

ZHUANG Haobin, YANG Xiaochun
The accessibility assessment of medical facilities based on the hierarchical medical system

Track 3: Smartness and development
Al-Souq: innovating for performance and management

AKSU Murat, SHALAN Muna

Rethinking Smart technologies and Inclusiveness in Cities: the case study of Eskişehir Tepebaşı Municipality in Turkey

AKS MER Gizem

Gap Between Planning Practice and Research in Turkey Case: Old Methods for New Issues¹

AN Na, YANG Binman

Research on the Optimum Population Scales of Countries Based in the Context of Sustainable Development

CHEN Qianting, DING Yanzhu, YANG Li, LI Chao, TANG Jian

Research on the Efficiency Evaluation of Rural Space Governance Methods from the Perspective of Flow Theory

GHIRA Zsofia Anna, MONNO Valeria

Co-production towards just urban transformation – two different ways in Budapest, Hungary and in Sassari, Italy

GREEN David

Incremental Planning: The Value of Incremental Development in City Growth and Clarification of the Organic

GUILHERME Maia

Pritzker is not enough: Braga Stadium and the city-branding that was not

GUO Juanjuan, WANG Haiming, LU Weimai

The construction of the dynamic index system of livable cities based on big data—taking the construction of livable cities in Zhuhai as an example

JABBAR Rateb, ZAIDAN Esmat, SAID Ahmed ben, GHOFrani Ali

Transition to Sustainable Smart Energy: An analysis of human-building interactions in Qatar Using Machine Learning Techniques

JANN Mats, FREDRIKSSON Anna, BILLGER Monica, BRUSSELAERS Nicolas, FUFA Selamawit Mamo, AI FAHEL Rodrigue, MOMMENS Koen

Smart construction logistics governance – A systems view of construction logistics in urban development

KUMAR Vipul

Speculative Planning: Agrarian-Urban Transformation in Peri-Urban areas

LI Jiaxin

Evaluation and improvement strategy of street space quality in Lujiazui core area of Shanghai based on multi-source data fusion

LI Yuze, YUAN Jingyuan, LIU Xiaoguang

Ecological risk prediction based on land use simulation under multiple scenarios: A case study of urban agglomeration in central Zhejiang, China

LIN Shijia

How urban renewal in megacity influences jobs-housing spatial relationship in industrial park: a case study of Caohejing Development Zone

LIU Jiadi

Research on Urban Network Characteristics of Shanghai Metropolitan Area. Based on Population Migration Data of AutoNavi Map

MANAL Sayani, KURIAKOSE Paulose N

Behavioral policy design for a car-dependent transport regime: shifting to sustainable alternatives

MUSIC Barbara, NIKSIC Matej, LUPULESCU

Andrada-Ioana, BUDAU Oana Emilia, GEAMBAZU Serin

Innovative policy instruments for urban governance: the case of urban regeneration in the Danube Region

PERI Ana, TUFEEK-Memisevic Tijana, NEDOVIC-BUDIC Zorica

Collaborative planning mechanisms in urban megaproject development: the case of Chicago

PILLAY Nischolan, PRETORIUS Ockert Rudolf,

LETSOKO Vuyiswa, HUSTON Zinea Fostering sectoral competitiveness and adaptation: 4IR in architecture curricula of South African tertiary institutions

RIBEIRO Gustavo, NOWAK Aleksander

Mapping Density and Distribution of Urban Spaces in the City of Copenhagen

SEDLITSKAYA Maria

Industrial quarters. Redevelopment as a tool for the integrated development of the Moscow industrial zones that have lost their purpose

Shi Haochen, CEN Xiaoxuan, LAI Yanjun

A Multi-dimensional Analysis of Booming E-commerce (Online Shops) in Urban Villages: A Case study in Tongcun

SPASIANO Andrea, BARTOCCINI Umberto, NARDI Fernando

Geospatial data homogenization and processing for integrated assessment of urban and natural resources and risks: A pilot case for Lazio Region (Italy)

SUN Tianyao, HAN Miao, AI Rong, YANG Sen, LIU Ziqian

Evaluating A City's Regional Competitiveness Through An Airport's Angle. The Yangtze River Delta Cities Case

TAO Shijie, WEN Xiaoyi, LI Shimin

Research on Prediction of Land Use Change in Central Cities of Southern Yunnan Based on Markov Model

TEJUCO Felicísimo Jr

Revitalizing the Sidewalks of España Boulevard through a Street Management Plan vis-à-vis Community Empowerment from Welcome Rotunda, Quezon City to Lerma/Morayta, City of Manila

TIWARI Rahul, KAUSHIK Utkarsh, DEVADARU Lakshmana Rao

Effect of Public Transportation on Urban Sprawl in the City of Bhopal, India

WANG Hewang, ZHANG Chunyang

Discussion on the management and control of urban waterfront space planning returning to the public

WANG Yankai, ZHAO Miaoxi, CHEN Shunqing, CHEN Qizhi

Application Scales, Dimensions and Scenarios of City Information Modeling (CIM)- Based on the Practice in Guangzhou, China

LI Wenjing, XIAO Dawei

The Sustainable-based Impacts of Built Environmental Influencing Factors on Price-Rent Ratio: A Case Study in Guangzhou

XU Suning, DAI Chao, WU Xiaochen

Research on Sustainable Development Evaluation and Spatial Distribution Characteristics of Resource-based Cities in Heilongjiang Province

XU Ninghan

Spacio-Temporal Development of the Rural Natural Landscape in the Beijing-Tianjin Region

YAO Chengxin, QIN Xueran, ZUO Guangzhi

Spatial Plan Research based on a new generation of suburban logistics industry in China

YE Qiming, FENG Yuxiang, HAN Jing, STETTLER Marc, ANGELOUDIS Panagiotis

A Reinforcement Learning-based Adaptive Control Model for the Future Street Infrastructure Planning. An Algorithm and A Case Study

YE Yang, CHAOZHI Jia, MENG Xue

Survey of Urban Spatial Quality Research under New Data and New Technology Environment

YE Zhongnan, WEI Hanxue, LIN Chuanren Community Renewal with Urban Diagnosis: Bajiao Community, Shijingshan District, Beijing

ZHU Haixuan, HOU Xiaoyu, KUDRYAVTSEV

Fedor, ZHE Xiuqi, QUE Pengluo, JIA Xiaoyu Research on Cognitive Coupling between Digital Media Space and Real Urban Space in the Era of Big Data: A Case Study of Chongqing, China

Track 4: Resilience and adaptability
Al-Waha: promoting local solutions

ALVES, F.B.M., SOUSA Junior, W.C.

Goals Structuring based on Value-Focused Thinking methodology: Creating alternatives for sustainability in the urban mobility

AMENTA Libera, VACCARO Maril, GIOFFR Vincenzo, GARZILLI Francesca

EX-perience NATO: A regenerative and metabolic approach for re-establishing sustainability in cities

AN Na, YANG Binman

Evaluation and prediction of the sustainable development potential of mountain towns based on ecological footprint

ANDRADE Victor, KANITZ Marcela G. Q., De LUCENA Jessica G

Cycle logistics: The potential of cargo bicycle as a sustainable solution for urban logistics in Brazil

ANTONOV Alexander, MERTSALOVA Yana, TOLOVENKOVA Darya

Green urban frameworks in Russian cities: history, methodology and perspectives. Kazan case study

AZZIMONTI Oscar, AILI Federico

Implementing Nature-Based Solutions: the role of experts in co-creation processes and new governance models

FENG Junming, LI Yue, LV Shuo

A Framework for incorporating Supply-Demand equity into Pedestrian and Bicycle System plans: A case of Huilongguan-Tiantongyuan District in Beijing

GALL Tjark, VALLET Flore, YANNOU Bernard
Co-Creating Sustainable Urban Futures: An initial Taxonomy of Methods and Tools

GARIKAPARTHI Manasa

Urban Climatic Design: Form based parameters for Climate responsive residential development, Delhi

GARIKAPARTHI Manasa

Socio-ecological System of Urban Lakes: Case of Jakkur Lake Precinct, Bengaluru

GHADANFAR Suzanne

The Role of Urban Resilience Strategies in the Economic Recovery of Post-Conflict Aleppo: Enhancing Livelihoods of the Host, Returnee, and Displaced Communities

HERNANDEZ Castellanos Miryam, DEMERUTIS Arenas Juan Angel

Governance of Green Infrastructure. An Analysis of Urban Forests in Metropolitan Areas in Mexico

INDRASARI Fenita

Kampung dwellers' resilience and adaptive responses to climate change hazard

JIANG Yuliang

The LA River Fish Passage: Urban Ecology as the Backbone of Urban Design

KADIR Swarna Bintay, HASAN Mohammed Hamidul, HASAN Md. Mehed

Qualitative assessment of physical and human assets: after a coastal flood of Koyra upazila, Khulna, Bangladesh

KARASSOWITSCH Michael

Architectural Value and Urban Metabolism and the post-oil city as transition to what comes after

KATURIC Ivana, GREGAR Mario, MARINOVIC Paola

Post-pandemic Dubrovnik–Degrowth Scenario

KATURIC Ivana, SISAK Ivan, GREGAR Mario

Modelling the development of the Šibenik Urban Area (Croatia according to the objectives of European green policies

LAO Xiaolin

Vulnerability of the old community: Observations from Wuhan, China

LI Jiacheng

Construction of A County Level's Water System Restoration Framework Based on Ecological Wisdom: A Case of Weiyuan

LIU Chengchen, ZHANG Tao, SHA Xiangtong, HU Nan, XU Zhiyong

Energy Revolution & Territorial Spatial Planning Reform: The Path Selection and Practice of Chinese Urbans towards "Carbon Neutral"

LIU Jian, SU Dong, ZHANG Yixin

Mechanism of Cross-border Coordination through Regional Planning for Ecological Goals

MA Xinyu, XIA Qing, LI Chi

Evaluation and optimization of community resilience in Yellow River floodplain area: A case study of Lizhuang resettlement new town in Xinxiang City

MONARDO Bruno, RAVAGNAN Chiara

Sustainable Strategies in Mobility Planning towards Resilient Cities

NARDI Fernando, SPASIANO Andrea, BARTOCCINI Umberto, ANNIS Antonio

The value and the need of nature-based solutions for resilient urban ecosystems: from citizen engagement to novel Nexus perspectives for fair and safe use and development of natural and urban resources: Insights from the city of Rome (Italy water resource and risk management programs

NARITA Dan

Blue-Green Critical Infrastructure beyond Contingency Planning and Risk Management: Towards integrated Regional Design Strategies for In-between Territories of the Greater Bay Area

PELLAS Themistoklis

Planning for the Wild–Urban Interface

QIN Xiaoling, MENG Meng, WANG Shifu

Mapping the Flood Inundation Area for Climate Adaptation Planning: A Chinese Case in Xinxiang City, Henan Province China

QU Bing, MA Jie

Technical rationality or public value: Rethinking China's urban renewal and urban design under the background of post-industrialization

SAKINAH Assy Saffa, BRIANANTO Dionisius, SULAIMAN Riardy

Aquaculture: The Thread of the Emerging Resiliency of Coastal Area in Indramayu

SU Wanqing, CHEN Rui, ZHANG Ziran, ZHOU Zhichong

Feasibility study on the construction of skyway in commercial center of typical extreme cold cities in China

TAJASEKI Urara

Town Management in a Period of Urban Growth: The Altered Versions of Japanese Jichi-kai Models Found in Minato Ward, Tokyo

TAN Zhuolin, LU Ming, YUAN Chao, JIN Zao

Assessing Urban Resilience for Resource-based cities in Northeast China Based on the Adaptive Cycle Framework

WANG, M.M

An Analysis of Urban Development Potential Based on Ecological Carrying Capacity

SEN Xia

Research on Optimization Strategy of Shanghai Industrial Heritage Protection and Reuse Based on Multi-source Data – Take the creative industry park as an example

YUAN Jingyuan, LI Yuze, LIU Xiaoguang

Comprehensive evaluation and dynamic evolution analysis of urban vulnerability of old industrial bases in Heilongjiang Province, China

ZHAO KAI Xi, LI Chi

Assessment of External Spatial Vulnerability of Mountain Cities under Climate Change: Zhao Tong Case Study, China

ZHAO Yang

The Practice of Bridging the Belt and Road Initiative and the 2030 Sustainable Development Goals: The Case of SDG11 Sustainable Cities

ZHOU Dailin, LIUYunya, HU Jiape

Rethinking on Urban White Areas in High-density City under Healthy City Framework

ZHOU Jiamin, QIAN Yun, ZHANG Yunlu, WANG Keli

Study on the Joint Construction of Ecological Control and Green Infrastructure in Desertification Area: a Case Study of Ulan Buh Desert Area

ZOU Zhichong, SU Wanqing

Flash Floods Exposure Assessment Model for DRR Oriented Adaptive Planning in High-density Urban Areas

JOSHI Hiral

BAMBOO A Glocal Solution

Track 5: Uniqueness and connectivity
Al-Baraha: unlocking urban futures

AN Qinglong, ZHAO Zhiqing
Suitability assessment of industrial heritage tourism of the towns along Chinese Eastern Railway in Heilongjiang Province

ANDRADE Victor, LUCENA Jessica, KANITZ Marcela
Towards public electric buses in Latin America

BIRSENS Joe
The socio-spatial integration of knowledge districts into the city: Theoretical clarifications and evidence from Belval, Esch/Alzette

CHEN Baolu, XU Chen, SHEN Danfeng, WANG Jun
The path to improve the quality of public space in industrial parks under the concept of sharing: Take Taiyuan Starting Area of Xiaohu Industrial Park, Shanxi's Transformation Comprehensive Reform Demonstration Zone as an example

CHENG Bingqian, ZHANG Tianjie
Preserving the living world cultural heritage: studies on the building history and preservation practices based on the historic urban landscape of Pingyao, China

CHOBISA Paridh, BEDI Prabh
Revitalization of Walled City: Case of Udaipur, India

COSKUN Halid, PAKOZ Muhammed Ziya
Evaluation of Residential Areas with Different Spatial Patterns through Defensible Space Concept

DONG Fei, ZHANG Fan, WU Kun
Vitality Towards Water: Exploring the Construction of Urban Waterfront Public Space: A Case Study of Wuhan's Yangtze River Waterfront Spatial Planning Design

FAN Li, ALTROCK Uwe
Reconstruction, adaptive reuse and preservation of industrial heritage in Shanghai

FENG Yifan
Research on Evaluation and Optimization of Campus-City Boundary Space Based on Symbiosis Theory

FU Leiyu, LIU Wen
Environmental Assessment of Urban Rail Transit Station Area Based on TOD Mode: A Case Study of Ranjiaba Station in Chongqing

GAO Mengyao, LI Chi
Comparison about the Spatial Distribution and Influencing Factors of Rural Settlements and Traditional Villages around the Yellow River Beach Area

GREEN David
Incremental Development in Makkah: Individual Led Growth, Parcel by Parcel

HAN Miao
Planning Method of Airport Economic Zone Based on 'Time-Critical' Orientation

HAO Haizhao, CHEN Xiaojian
Quantitative analysis and development guidance of the spatial morphology of ancient towns in southern Shaanxi

HOU Xiaohu, LIU Fang, LIU Yibo
Research on the cultural immersion experience tourism mode of Pingyao Ancient City from the perspective of cultural renaissance

IRANMANESH Nasim
Urban morphology, a necessary knowledge to survey the city (the case study: Qazvin city in Iran)

IRANMANESH Nasim
The role of water in morphology of historic city of Naragh

KAKOTY Amitabh
Post oil and gas future urban sustainability and relevance of a compact urban form for Doha: Unlocking Doha's sustainable and resilient future

LI Peilun, ZHAO Zhiqing, CHEN Yuling
Semantic Segmentation of Street View Map on the Cityscape of Heritage in the Historical and Cultural City

LI Xin
Settlements Generating System (SGS): Research on Self-adapting Method of Rural Settlement Planning

LIU Chen
Research on the renewal strategy of ancient town based on the authenticity of subject and object from multiple perspectives: a case study of Longxing ancient town

LU Qian
Toward a complex everydayness an MOP based research on the revitalization scheme of the South Gate of the Xi'an city wall

MA Xuanli, WANG Xin, ZHANG Bojun, TANG Amy
Spatial Evolution of Rural Built Heritage Guided by the Construction of Cultural Routes - A Case Study of Dongshiguyan Village in Beijing

MOSISSA Samuel Tsegaye, SHEN Zhongwei, TEKLEMARIAM Eden Atsbeh
Initiate Planning principles for Green Transit-oriented Development Using Green Infrastructure as a Core Principle

NASR Eman H. M., KHALIL Mohamed A. M.
Toward Sustainability of Temporary Uses in Public Spaces: A Case Study Muscat, Sultanate of Oman

SALAHELDIN Hadeel T., MAJOR Mark David, TANNOUS Heba O.
Analysis of Built Environment Factors on Walkability at Three Doha Metro Stations

SARJEANT Renelle, MAHADEO Sarah
Integrated Planning Regions in Trinidad and Tobago: A Strategic Spatial Planning Experiment

SEO Youkang, KWON Youngsan
A Study on the Impact of Tactical Urbanism Applied in Seoul on Change in Perception of Placeness: Focused on the case of Seoul, South Korea

SHAH Suruchi
Unlocking the Potential of Water Architecture in Urban Realm of Delhi, India

SHARMA Rudra
The Imperceptible stakeholders: Including the natural world within the urban realm

TENG Kaixuan, WANG Jun
Strategies of rural planning and development of suburbs of Shanghai under the global city target

VIKRAM Lavanya, BHARDWAJ Monalisa
Wasteland Landuse Planning Approaches in a GIS Environment Using Space Syntax Analysis

WANG Jinbai
Light Up Urban Gray Space: Design Practice of an All-Aged Community Spatial Complex Under Overpass

WU Songtao, XU Huibo, SU Wanqing, HU Yuqi
Improving the sense of citizens' happiness in cold regions during the COVID-19 pandemic blockade through plant color planning: Taking the Harbin Institute of Technology Community as an example

YAO Qiang, SHEN Qingji, MENG Haixing, RUI HONGJUAN, LIAO Shuqi
Study on Design Methods of Urban TOD Area Based on Resilient Cities Theory: Taking Sichuan Normal University Subway Station Area in Chengdu, China as an example

ZENG Rusi, SHEN Zhongwei
Patterns, Characteristics and Enlightenment of Urban Underground Complex Practices in China

ZHAN Zixin, HOU Yu, WEI Tianxing, OUYANG Libin
Japanese Commercial Street and Its Effect on Community Development: The Case of Ningyocho

ZHANG Xiuning, DENG Hong
Mobility and beyond: explore the spatial-functional effect of cycling ban on Huangpu, Shanghai through crowd-sourcing data

ZUTSHI Surbhi
Uniqueness and Integration: Strengthening collective identity of Faridabad

Special Sessions

MOMIRSKI Lucija Azman
Does maritime mindset facilitate the processes of industrial symbiosis (IS) in port city territories?

Sustainable Strategies in Mobility Planning towards Resilient Cities

Bruno MONARDO, Sapienza University of Rome, Italy
Chiara RAVAGNAN, Sapienza University of Rome, Italy

Abstract

The recent times see cities at forefronts in the fight against the pandemic in the framework of the harmful effects of climate change and urban inequalities issues. This territorial and urban condition is emphasizing the need for a 'holistic' approach to urban resilience and the importance to focus on sustainable mobility policies and planning towards green and inclusive metropolis. The main goal of this paper is to investigate and highlight innovative approaches in European Sustainable Mobility Plans, aimed at overcoming the sectoral critical aspects within a metropolitan resilience perspective. Bologna represents a paradigmatic case of sustainable metropolitan area with new plans based on resilience, cohesion, connectivity. Findings and lessons are expected to be useful in order to extract relevant suggestions for the specific interpretation styles of resilience in planned strategies and specific projects to be applied, notably in the European context.

Keywords

Resilience, Mobility, Metropolitan Cities

1. Resilient cities in changing scenarios

The contemporary city is characterized by high levels of soil sealing and private mobility which contribute to air pollution, a progressive lack of biodiversity, water risks, global warming fostering frequent calamitous events in the framework of climate changes (IPCC, 2014). Urban sprawl is also accompanied by a fragmentation of public space, urban fabrics and local communities which feed the metropolitan socio-economic polarization, exacerbated in the new millennium by the economic crisis of 2008 and the pandemic of 2020. In particular, the recent times see big cities at forefronts in the fight against the pandemic facing the spatial, environmental and social issues of poor accessibility to public facilities, lack of open green and blue spaces and infrastructure, imbalanced distribution of commons, discontinuity of pedestrian and cycle networks, worsened by social distancing measures related to Covid-19 (Un-habitat, 2020; OECD, 2020a).

These issues have increasingly emphasized the need for an authentically 'holistic' perspective to urban resilience (UNDRR, 2010), already fostered by the Sustainable Development Goals and European Policies. Unfortunately, when a term is so successful to permeate the common international lexicon, it runs the risk of becoming trivial and suggests a clarification in order to define specific theoretical and operational references.

In this context, the paper intends to highlight how resilience can be considered the key to rethink the multiple dimensions of regeneration in a holistic approach, combining spatial, environmental, social and

institutional issues. In consistency with the recent theoretical and operational references for urban resilience (§ 1.2), this concept is reflected in the integrated approach of mobility strategies between public, green and movement spaces in the framework of climate changes and pandemic issues (§ 2). Furthermore, the concept is supported by a strategic set of planning tools, as in the case of Bologna (§ 3); hence the possibility to argue some main references for plans able to entangle the structuring choices for urban and environmental sustainability, tactical urbanism and participatory approach (§ 4).

1.1 Paper goals and methodology

Starting from the topics of common research projects and scientific collaborations, the main goal of authors in this paper is to investigate and highlight innovative approaches in mobility planning practices, aimed at overcoming the sectoral critical aspects in a holistic perspective of metropolitan resilience. Looking at the emerging interpretative trends of issues arising from climate change and pandemic phenomenon, it is possible to focus on different cultural models through the analysis of one specific case-study – Bologna metropolitan City – with particular reference to recent mobility strategies and tools. The work has adopted the inductive method and the classic case-study interpretation keys (Yin 1984) developed with a qualitative approach and supported by direct sources, in order to extract relevant suggestions to support the interpretation of urban resilience in planned strategies and specific projects to be applied, notably in the European context. In particular, virtuous experiences in Italy, France, Spain have delivered significant results and references useful for introducing innovation in policies and planning practices in the Italian context. To this end, the integrated and participated planning process in the metropolitan area of Bologna for the Sustainable Mobility Plan appears particularly advanced due to its consistency with the holistic approach promoted in EU policies.

2. Emerging mobility for resilient metropolitan cities

In a theoretical perspective, the polysemous nature of the term "resilience" in urban policies is enabling innovative multi-disciplinary entanglement, implementing a virtuous dialogue between several knowledge domains (such as health, ecology, environment, socio-economy, law, planning). Resilience is an answer to urban complexity and interactions, guiding all these sectors towards a sustainable urban metabolism, the use of smart technologies, the implementation of eco-friendly and adaptive urban spaces and networks. "Urban Resilience is the capacity of individuals, communities, institutions, businesses, and systems within a city to survive, adapt, and grow no matter what kinds of chronic stresses and acute shocks they experience" (Rockefeller Foundation, '100 Resilient Cities' initiative).

2.1 Towards a holistic approach to urban resilience

Moreover, resilience, deepened in the framework of an ecosystemic perspective (Acerno, 2015), is related to the concept of anti-fragility (Taleb, 2007, Blecic & Cecchini, 2016) that fosters the capability of adaptation to external perturbations, facing vulnerability and preventing risks, offering multiple and coordinated actions and ways of interventions that enable improvements of systems within rapid stresses and long-lasting changes. This concept thus fosters a proactive character of dynamism and adaptation of transformation choices to environmental, economic and socio-cultural changes and pays attention to the uncertainty of the scenarios and the scarcity of resources and the need for data analysis, flexibility, and reversibility. At the same time, it affirms the importance of being rooted in the *milieu* and place-based approaches, focusing on the overall and multi-scale quality of the networks of physical, cultural, economic and social relationships. With such objective, it is evident that urban resilience requires an integrated innovation between material networks (infrastructures and transports as well as green corridors) and immaterial networks (ICT, regulated social interactions and institutional cooperation) considered strategic vectors for a 'smart city' and for the 'right to the city' (Amato et al., 2019; Lauri, 2021).

In an operational perspective, the post-pandemic recovery policies, launched in 2020-21 through the allocation of huge public resources at international level (i.e. the USA 'American Jobs Plan' or the 'Next Generation EU'), put the emphasis on the resilience concept (Italian 'National Recovery and Resilience Plan', 2021) that fosters an integrated strategy on material and immaterial networks (from the ecological transition of rails to MaaS), in consistency with the cohesion principles of territories and civic communities. Furthermore, the documents point out the importance of the strategic dimension for planning in order to coordinate the different interventions and actions coming from the stakeholders and the city-users and to mend the separation between top-down policies and bottom-up practices.

2.2 Mobility strategies and urban regeneration

The post-COVID-19 phase brings with it the potential to build "a new normal" (OECD, 2020b) in cities, placing issues related to the health and social distress of citizens but also to the vulnerability of economic systems at the centre of regeneration strategies. Urban planning, which was born in the industrial age as a discipline aimed at addressing sanitation problems and the organization of urban networks and services, took on new responsibilities in the twentieth century, starting from the awareness of the complexity of contemporary city, and of the deep interrelations between anthropic and natural dynamics in the Anthropocene era (Crutzen, 2000).

In this context, mobility models and infrastructures assume a central role, starting from data that confirm not only the contribution of road transport to greenhouse gas emissions in European urban areas (equal to about 25%) but also the related economic and health effects (EEA, 2021).

The global and European agendas offer a reference framework for national, regional and local governments to promote a new paradigm of sustainable development, giving priority to investments and resources that hold together objectives intervention (environment and landscape, mobility and infrastructures, public space and urban services), tools (policies, plans, programs, projects) and scales of intervention (European, national, regional, local) placing the theme at the centre of a multilevel governance framework of resilience.

Urban resilience finds particular concreteness in the choices aimed at strengthening sustainable mobility and ecosystem services in the construction of urban networks, reconfiguring the methodological references for the planning, design and management of urban space. Integration of urban and mobility strategies and tools are the base for innovation and the keys of best practices. Looking at the 'space of movement', new planning tools can overcome ancient separations with the land use design and the open space system by concretely implementing integrated regeneration strategies (Un-Habitat, 2020; OECD, 2020a).

First of all, the EU SUMP (Sustainable Urban Mobility Plan) officially introduced through the 'Mobility Urban Package' [(COM 2013) 913] and the following and progressively implemented by the 27 member states represents the ambition of combining mobility and transport infrastructures with the urban space design in order to implement the ecological transition through the coordination of different infrastructure networks and urban spaces, overcoming a sectoral approach. The main good practices have been held in Bologna as well as in Bruxelles Capital Region, Grenoble and Great Manchester.

Furthermore, the combination of cycle, green and public spaces networks are the specificity of Spanish practices experimented in the context of the arising role of the *Estrategia Nacional de Infraestructura Verde y de la Conectividad y Restauración Ecológicas* through new tools that integrate the construction of mobility, public spaces and green networks: emblematic examples are the tools place put in in Vitoria-Gasteiz such as the integrated *Mobility and public space Plan* and the *Plan de Acción Territorial de la Infraestructura Verde del Litoral de la Generalitat Valenciana* (Ravagnan, 2019) where the cycle system is a backbone for the construction of a multiscalar green infrastructure.

Additionally, many Mobility Plans are developing “local mobility grids” (Cerasoli & al., 2021) in order to improve local accessibility of facilities and centralities. This goal is supported by the theoretical concept of the “ville du quart d'heure” (Moreno, 2020) consolidated within years of studies and pointed out in the phase of Pandemic in the Paris case study. The 15 minutes-city promotes a reorganization of local accessibility with compact fabrics and services, in order to enable an increase in the quality of life in the ordinary phases and risk reduction during environmental and health crises. A proposal for a local grid is also developed in the Good Move Mobility Plan for the Capital-Region of Bruxelles 2020-2030 (awarded as best SUMP in 2020), where the design strategy of the ‘Espace rue’ proposes an hypothesis to organize relationships, interactions and conflicts between public spaces and mobility space at local and urban scale, highlighting the importance of an integrated approach to streets, in consistency with the indicators of the “healthy street” defined by Transports for London (Transport for London, 2020).

Finally, the flexible and reversible expansion of the space dedicated to pedestrians and local greenery in the framework of “tactical urbanism”, from the Superillas in Barcelona (Rueda, 2016) to “Piazze aperte” in Milan is clearly paying a growing attention to cycle paths, as a method for the implementation of temporary bike lanes or as an experimentation for future structural projects of cycle systems in SUMP, in order to test the interest of citizens and the possible synergies and conflicts with other forms of mobility and public spaces (Amato et al., 2019).

These strategies are the common keys of numerous experiments and studies at an international level that reveal an acceleration and timeliness of practices in some metropolises: Bologna, Milan, Paris, Brussels, Barcelona, Madrid, New York, Bogotá, Lima (OECD, 2020a). This timeliness is closely linked to the consolidation of structural choices on sustainable mobility considered a priority both by the administration and by the citizens, who have been involved for years in participatory processes and debates on urban regeneration. Among these, Bologna represents an emblematic case in Italy, also for being the first metropolitan city to approve the Sustainable Urban Mobility Plan following the EU format.

3. Bologna Metropolitan City: holistic approach to mobility

Bologna represents a paradigmatic case of sustainable, thriving community, a surprising cradle of policies, plans and projects conceived, developed and implemented following the idea of an emerging identity of ‘small metropolis’ based on resilience, cohesion, attractiveness, and connectivity to be pursued through the construction of innovative tools in which mobility networks are not conceived as a sectoral dimension but as crucial bridge connecting ‘polis’ to ‘civitas’ and ‘urbs’.

Within few years the local public institutions, the Metropolitan City and the Municipality of Bologna in particular, have been able to pursue an extraordinary rich and effective path conceiving, discussing and approving numerous integrated and coherent tools in order to face the emerging challenges of contemporary urban communities. Bologna Municipality has recently approved an intriguing new General Urban Plan (July 2021) pursuing an advanced strategic profile according to the innovation principles introduced by the Emilia Romagna Regional law (n. 24/2017). Looking at the inter-municipal level, recent planning tools as the Metropolitan Strategic Plan, the Metropolitan Territorial Plan and the Sustainable Urban Mobility Plan (SUMP) are proving to be original interpretations of integrated and inclusive planning process, particularly consistent with the holistic approach promoted by European policies. In the following lines it is particularly highlighted the crucial role played by mobility and its plans in pursuing and interpreting urban resilience.

3.1 The ‘architecture’ of plans supporting the emerging metropolis

In Italy, metropolitan areas are still a young, ‘in progress’ juridical reality. The first legislative measure that had instituted them more than 30 years ago (l. 142/1990) didn’t find mature conditions to be implemented. The relaunch occurred only few years ago by the re-introduction of the ‘Metropolitan City’

institution (l. 56/2014), whose primary mission was the identification and coordination of development strategies for the whole metropolitan area through a Strategic Plan.

Within the framework of the UN 'Agenda 2030' objectives and the 'Bologna Charter for Environment', Bologna - the first new Metropolis constituted in Italy (2015) - approved its Metropolitan Strategic Plan (PSM 2.0) in 2018 with the aim of pursuing three fundamental dimensions: sustainability, inclusiveness and attractiveness. Sustainability in its environmental, economic and social dimensions nourished by the culture of legality and education in civic values. Inclusiveness, interpreted as the ability to enhance differences and peculiarities, transforming them into common assets and wealth. Attractiveness as openness to the original, unexpected, different issues, aware of how to increasingly strengthen its international and cosmopolitan identity.

The Metropolitan Territorial Plan (PTM) fosters a sustainable and resilient, attractive territory, in which the protection of the environment, the beauty of urban and natural places, work and innovation can find unitary and propulsive synthesis.

The plan, approved in 2020, already in full Covid-19 emergency, is the main vector of new tasks: promoting urban regeneration, enhancing ecosystem services, managing the progression towards 'zero new land consumption', redistributing in an equalized way, on a metropolitan scale, the resources generated by the main urban transformations. The 'territorialization' of development strategies represents the specific object and added value of PTM with particular attention to territorial and urban resilience, risk prevention, service accessibility, welfare system, quality of production areas and above all the adequacy of mobility networks and infrastructural connections.

3.2 Sustainable Urban Mobility Plan: cultural roots and Bologna interpretation

At the end of 2019, Bologna was also the first metropolitan city to approve the Sustainable Urban Mobility Plan (SUMP), the 'Italian interpretation' of the EU strategic tool designed to meet the mobility demand of residents, economic activities and city-users for the quality-of-life improvement. SUMP promotes the innovation of traditional approaches between 'settlement' and 'movement' space through the principles of resilience, integration, participation. Its formalization at EU level represents the climax of an evolutionary path starting from the Action Plan on Urban Mobility (COM 2009, 490) and the Transport White Paper (2011), as well as through a consultation conducted on behalf of the European Commission from 2010 to 2013 with the involvement of numerous experts and sector players; the work finally led to the 'Urban Mobility Package' [(COM 2013) 913] which recognized the SUMP as a new strategic tool for integrating mobility, accessibility and the city realm all over EU urban and metropolitan areas. In some countries as France or Italy it has become compulsory for cities or polycentric areas with at least 100,000 inhabitants. The joint work has merged into the first and second edition of SUMP Guidelines (Rupprecht Consult 2013, 2019), official documents by the European Commission addressing public and private stakeholders towards the collective conception, implementation and management of the plan with the ambition of integrating mobility networks, transportation systems and urban planning strategies.

Unlike the more traditional approaches to mobility planning, the SUMP philosophy hinges on main axes as the participatory involvement of citizens and diffused stakeholders, the coordination of administrations at different levels, the harmonization of sectoral strategies enhancing the synergy between existing and in progress tools. The SUMP aims at participatory democracy, processualism, prefiguration and evaluation of evolutionary scenarios, careful monitoring and remodelling of the implementation phases.

In Italy the mobility plan concept represents the mature evolution of the 'Mobility Urban Plan' (PUM), originally introduced in 2000 drawing inspiration from the French '*Plan de Déplacements Urbains*' (PDU), born in 1982 with the law LOTI (*Loi d'Orientation des Transports Intérieurs*). Originally the French model

was based on the principle of 'right to transport' mostly meant in its technical-functional dimension; afterwards, the plan profile was enriched with themes and contents related to the emerging ecologic-environmental dimension (law LAURE, *Loi sur l'Air et l'Utilisation Rationnelle de l'Énergie*, 1996) and 'urban welfare' policies (law SRU, *Solidarité et Renouvellement Urbain*, 2000). In the last decades, PDU has reached an explicit organic integration with urban and inter-municipal planning tools, strengthening its 'strategic' role by denying the sectoral dimension and expanding urban and metropolitan identity. Therefore, if the mobility plan allows the virtuous integration of social, environmental and symbolic dimensions with land use and infrastructural design, it could give substance to the original Lefebvrian idea of the 'right to the city' (Lefebvre 1968), recovered and interpreted with growing awareness in the literature that discussed the metamorphosis of urban lifestyles (Mitchell 2003, Harvey 2013, Secchi 2013).

Indeed, the French model of 'movement space' and 'network urbanism' (Dupuy 1991), which has inspired the EU idea of sustainable mobility plan, is not limited to pursuing the efficiency (and safety) of displacement vehicles, the rethinking of parking system or the rational circulation of people and goods, but proposes a more inclusive idea of urban welfare policies, prefiguring the passage from '*droit au transport*' (LOTI, 1982) to '*droit à la mobilité*' (*Loi d'Orientation des Mobilités*, LOM, 2019), tackling every form of inequality, marginalisation and isolation in the city.

In the first national Sustainable Mobility inter-municipal plan, the vision aims to "make Bologna metropolitan area more attractive through high levels of urban quality and liveability in order to enhance the cohesion and attractiveness of the territorial system as a whole and strengthen the role of its capital as international city".

The tool pursues the objectives of territorial development and regeneration by placing the crucial focus on values, rights and primary needs of the community, from health to safety, from accessibility to essential services and social inclusion, from education to work and leisure.

The holistic approach evoked in the disciplinary debate finds concreteness in the macro-objectives that outline the pillars of urban and territorial sustainability. The mobility and accessibility issues stand out in their kaleidoscopic interpretations: from the physical-spatial dimension of the reconnection between centrality and peripheries, to the "environmental imperative" of tackling emissions and fostering resilience to climate change.

The accessibility ensured by collective transport networks and by encouraging micro-mobility is then seized as an opportunity to restore urbanity, social cohesion, proximity facilities and a 'sense of belonging' to the communities widespread across the territory (Monardo 2020). Bologna, even in times of pandemic, confirms the rule that requires the administrations traditionally active in outlining integrated policies and open processes to be resilient and embrace adaptive flexible geometries facing striking times and undesired events.

In the Bologna SUMP the resilience approach is highlighted by the "Biciplan", a sort of ecological cycle metro (inspired by the Réseau Vélo of the Paris region), conceived 'ex-ante' and integrated into the new plan, a precious resource for its capacity to create an organic framework, the 'Bicipolitana', bike structural and interconnected network that proved to be very effective both for the tactical interventions solicited by the health emergency and for the long term strategic relationship system.

4. Metropolitan resilience and urbanity. Open issues

In the pandemic season, cities and metropolitan areas have been identified as the privileged domain for rethinking plans, programs and projects useful to manage the community health issues looking at specific

problems as the correlation between settlement densities, public transportation and virus spread or the pathological rise of structural inequalities at social and economic level (Nomisma, 2020).

According to emerging principles in the scientific-disciplinary debate, despite the persistent crisis, this condition represents the trigger to speed up processes of urban regeneration requiring an integrated approach to urban planning and mobility, in order to create the conditions for more inclusive, green and resilient cities (OECD, 2020a, 2020b), mostly aiming at proximity displacements (Moreno, 2020), non-polluting active mobility, flexible and inclusive public spaces (Un-Habitat, 2020) (Honey-Rosés 2020).

Are local administrations proving to be equipped to manage conditions and opportunities suddenly opened up by the crisis and design virtuous scenarios of transformation? Ideas and initiatives paint a multicolour landscape and reveal the pendulum between many tactical, pop-up initiatives and rare strategic scenarios. Urban and metropolitan actors are called to face a terrific challenge: issues at stake are relevant and the cultural 'dna' of mobility styles, more or less sensitive to sustainable displacements, is making the difference even in emergency contingencies. The temptation to encourage micro-mobility with "pret à porter" tactical urban planning has proved unavoidable, but international cases clearly demonstrate that the short-term approach cannot be enough.

The local administrations that have responded more promptly and effectively to the pandemic challenge seem to largely coincide with those traditionally active in designing integrated policies, and therefore equipped with new plans, programs and other tools consistent with a vision of overall strategic transformation. In fact, the implementation of coordinated actions between short and long-term choices requires a wide range of strategic and operational tools able to manage emergency and temporary interventions within balanced relationship frameworks, maximizing the virtuous effects in space and time (Lydon 2015).

The Bologna experience shows how the cities that have adopted timely and convincing measures are those with a consolidated cultural background, capable of promoting and implementing tools characterized by holistic and strategic approaches able to re-boost synergistically physical and intangible networks for urban and metropolitan resilience.

The integrated and inclusive planning process in the metropolitan area of Bologna appears particularly advanced due to its consistency with the holistic approach promoted in EU policies and implemented by significant metropolitan areas in western Europe. Its recent planning path shows the integration of mobility networks and public transportation systems with urban patterns, green-blue corridors and public spaces to be planned through participatory democracy's steps. Recent Bologna metropolitan tools represent the essential matrix useful to rethink and adapt spaces and forms of mobility, struck by unpredictable emergencies.

Original principles of new mobility plans escape from the sectoral dimension, assuming a strategic role through the ambition to integrate infrastructural space and land use design at metropolitan scale. It's the attempt to prefigure a "new urbanity" based on the synergy between the dimension of movement and the space of stasis that we all have experimented during lockdowns.

What is meant by "new urbanity"? It is one of the most complex and polymorphic concepts: prestigious schools of thought speak of urbanity as "the reciprocal adaptation of urban fabric morphology and conviviality form" (Choay 1994, 1996). It represents the intertwining of the social '*mixité*' which promotes integration, and the public space in all its forms, which becomes the privileged place for its development. And the mobility spaces, with particular attention to the pedestrian and cycle paths, offer original and creative interpretations of urbanity (Levy 1997, 2004).

The lesson that emerges from the change in lifestyles as a result of the pandemic cannot therefore concern only the optimization of what already exists: it is necessary to rethink the infrastructural sites in the intertwining with urban functions, reflect on the consequences of the density remodulation, not only residential, but that of workplaces, university towns, urban services for education, free time, consumption and above all the flow densities in the space of movement, with a regulated downsizing of the capacity of collective transport carriers to be made more attractive and safe, preventing at the same

time dangerous crowds during peak hours. All features that must find a new interpretative key in terms of public health protection.

Mobility is not just an opportunity of creating relationship spaces but embodies the 'place' essence wherever it is produced. Not just a technique to connect nodes and areas, but the vector of an everlasting new 'urbanogenesis'.

Research context and authors' contribution

This paper illustrates the first findings of some investigation paths within the 'Sapienza' University of Rome International Research Project "Infrastrutture per la mobilità. Verso nuovi paradigmi interpretativi e nuovi strumenti operativi per la resilienza delle città metropolitane europee" (coord. Monardo B. and Ravagnan C.) and of the participation to the Working Group "Covid-19, Cities and Governance" of the Global Pandemic Network (coord. Lauri C. and Crispi G.). In this framework §1 and 2 are attributable to C. Ravagnan, and § 3 and 4 to B. Monardo.

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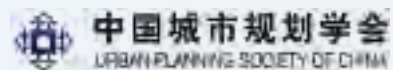
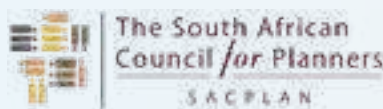
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