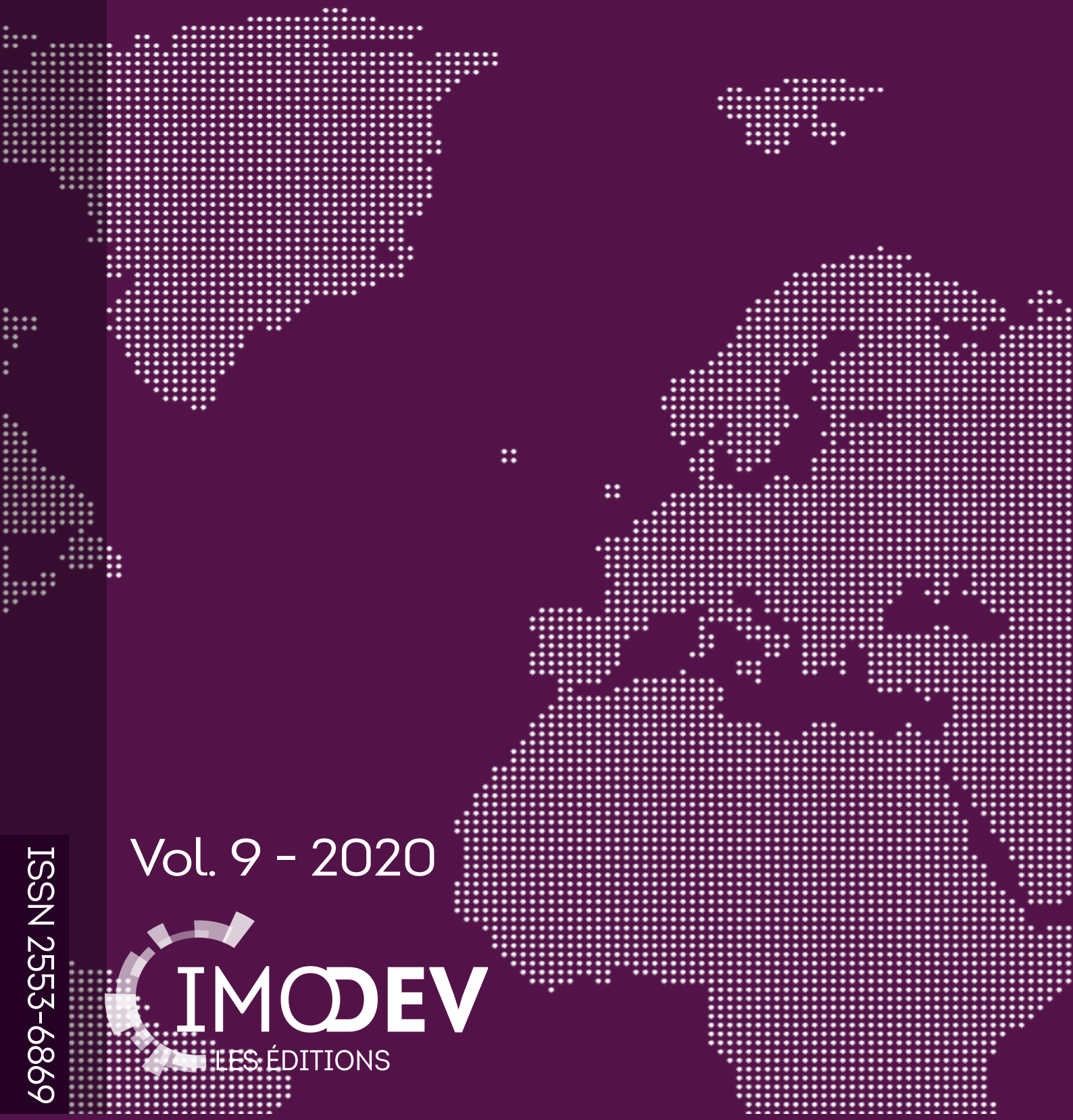
INTERNATIONAL JOURNAL OF **OPEN GOVERNMENTS**

REVUE INTERNATIONALE DES **GOUVERNEMENTS OUVERTS**



Vol. 9 - 2020

ISSN 2553-6869

IMODEV
LES ÉDITIONS

International Journal of Open Governments
Revue internationale des gouvernements ouverts

Direction :
Irène Bouhadana & William Gilles

ISSN : 2553-6869

IMODEV
49 rue Brancion 75015 Paris – France
www.imodev.org
ojs.imodev.org

Les propos publiés dans cet article n'engagent que leur auteur.

The statements published in this article are the sole responsibility of the author.

À PROPOS DE NOUS

La **Revue Internationale des Gouvernements ouverts (RIGO)/ the International Journal of Open Governments** est une revue universitaire créée et dirigée par Irène Bouhadana et William Gilles au sein de l'IMODEV, l'Institut du Monde et du Développement pour la Bonne Gouvernance publique.

Irène Bouhadana, docteur en droit, est maître de conférences en droit du numérique et droit des gouvernements ouverts à l'Université Paris 1 Panthéon-Sorbonne où elle dirige le master Droit des données, des administrations numériques et des gouvernements ouverts au sein de l'École de droit de la Sorbonne. Elle est membre de l'Institut de recherche juridique de la Sorbonne (IRJS). Elle est aussi fondatrice et Secrétaire générale de l'IMODEV. Enfin, elle est avocate au barreau de Paris, associée de BeRecht Avocats.

William Gilles, docteur en droit, est maître de conférences (HDR) en droit du numérique et en droit des gouvernements ouverts, habilité à diriger les recherches, à l'Université Paris 1 Panthéon-Sorbonne où il dirige le master Droit des données, des administrations numériques et des gouvernements ouverts. Il est membre de l'Institut de recherche juridique de la Sorbonne (IRJS). Il est aussi fondateur et Président de l'IMODEV. Fondateur et associé de BeRecht Avocats, il aussi avocat au barreau de Paris et médiateur professionnel agréé par le CNMA.

IMODEV est une organisation scientifique internationale, indépendante et à but non lucratif créée en 2009 qui agit pour la promotion de la bonne gouvernance publique dans le cadre de la société de l'information et du numérique. Ce réseau rassemble des experts et des chercheurs du monde entier qui par leurs travaux et leurs actions contribuent à une meilleure connaissance et appréhension de la société numérique au niveau local, national ou international en en analysant d'une part, les actions des pouvoirs publics dans le cadre de la régulation de la société des données et de l'économie numérique et d'autre part, les modalités de mise en œuvre des politiques publiques numériques au sein des administrations publiques et des gouvernements ouverts.

IMODEV organise régulièrement des colloques sur ces thématiques, et notamment chaque année en novembre les *Journées universitaires sur les enjeux des gouvernements ouverts et du numérique / Academic days on open government and digital issues*, dont les sessions sont publiées en ligne [ISSN : 2553-6931].

IMODEV publie deux revues disponibles en open source (ojs.imodev.org) afin de promouvoir une science ouverte sous licence Creative commons CC-**BY-NC-ND** :

1) la *Revue Internationale des Gouvernements ouverts (RIGO)/ International Journal of Open Governments* [ISSN 2553-6869] ;

2) la *Revue internationale de droit des données et du numérique (RIDDN)/International Journal of Digital and Data Law* [ISSN 2553-6893].

ABOUT US

The **International Journal of Open Governments / Revue Internationale des Gouvernements ouverts (RIGO)** is an academic journal created and edited by Irène Bouhadana and William Gilles at IMODEV, the Institut du monde et du développement pour la bonne gouvernance publique.

Irène Bouhadana, PhD in Law, is an Associate professor in digital law and open government law at the University of Paris 1 Panthéon-Sorbonne, where she is the director of the master's degree in data law, digital administrations, and open governments at the Sorbonne Law School. She is a member of the Institut de recherche juridique de la Sorbonne (IRJS). She is also the founder and Secretary General of IMODEV. She is an attorney at law at the Paris Bar and a partner of BeRecht Avocats.

William Gilles, PhD in Law, is an Associate professor (HDR) in digital law and open government law at the University of Paris 1 Panthéon-Sorbonne, where he is the director of the master's degree in data law, digital administration and open government. He is a member of the Institut de recherche juridique de la Sorbonne (IRJS). He is also founder and President of IMODEV. Founder and partner at BeRecht Avocats, he is an attorney at law at the Paris Bar and a professional mediator accredited by the CNMA.

IMODEV is an international, independent, non-profit scientific organization created in 2009 that promotes good public governance in the context of the information and digital society. This network brings together experts and researchers from around the world who, through their work and actions, contribute to a better knowledge and understanding of the digital society at the local, national or international level by analyzing, on the one hand, the actions of public authorities in the context of the regulation of the data society and the digital economy and, on the other hand, the ways in which digital public policies are implemented within public administrations and open governments.

IMODEV regularly organizes conferences and symposiums on these topics, and in particular every year in November the Academic days on open government and digital issues, whose sessions are published online [ISSN: 2553-6931].

IMODEV publishes two academic journals available in open source at ojs.imodev.org to promote open science under the Creative commons license CC-**BY-NC-ND**:

1) the *International Journal of Open Governments/ Revue Internationale des Gouvernements ouverts (RIGO)* [ISSN 2553-6869] ;

2) the *International Journal of Digital and Data Law / Revue internationale de droit des données et du numérique* (RIDDN) [ISSN 2553-6893].

NATURE-BASED SOLUTIONS FOR SMARTER CITIES: BRINGING CITIES TO LIFE, BRINGING LIFE INTO CITIES

by **Marino CAVALLO** and **Simone FERRARO**, University of Bologna and Metropolitan City of Bologna – Research, Innovation and European Project management Service.

Ten years ago, after the global economic and financial crisis the European Commission defined a new strategy for overcoming that stagnant situation and achieving a sustainable future: The Europe 2020 strategy for smart, sustainable and inclusive growth[1]. The strategy consists of five headline targets to be achieved by all E.U. member states, targets that were quantified through a number of indicators[2] and that were translated into national targets[3]. In comparison to 1990 levels, today's figures show that significant progresses have been made. On the other hand, especially for what concerns the objectives related to climate change and not merely to statistical level of greenhouse gas emissions, the path ahead seems significantly long[4]. We assume that these unsatisfactory results depend on a not sufficient effort in the implementations of the following priorities: 1. Smart growth for developing an economy model based on knowledge and innovation; 2. Sustainable growth for promoting a more resource efficient, greener and more competitive economy; 3. Inclusive growth for fostering a high-employment economy delivering social and territorial cohesion.
As demonstrated by the results obtained by the Covenant of Mayors for Climate and Energy Policies[5], these priorities, could be optimally implemented at urban level thanks to the policies made possible by the so-called 'smart and sustainable cities'[6]. The

[1] EUROPEAN COMMISSION, *Communication from the Commission, Europe 2020 A strategy for smart, sustainable and inclusive growth*, 2011 O. J., C 88, 88/27 [hereinafter Commission Communication Europe 2020].
[2] The indicators defined in 2011 were: 1) Employment (75% of the 20-64 year-olds to be employed); 2) R&D/Innovation (3% of the E.U.'s Gross Domestic Product - public and private combined - to be invested in R&D/Innovation); 3) Climate change/energy (greenhouse gas emissions 20% (or even 30%, if the conditions are right) lower than 1990; 20% of energy from renewables; 20% increase in energy efficiency); 4) Education (reducing school drop-out rates below 10% and at least 40% of 30-34–year-olds completing third level education); 5) poverty/social exclusion (at least 20 million fewer people in or at risk of poverty and social exclusion). Commission Communication Europe 2020, p. 10.
[3] EUROPEAN COMMISSION, *The urban and regional dimension of Europe 2020. Seventh progress report on economic, social and territorial cohesion*, 2011.
[4] EUROSTAT, *Smarter, greener, more inclusive? Indicators to support the Europe 2020 Strategy*, 2019, p. 46.
[5] I. GARCÍA, D. KHANDKE, *Cities and civil society as allies for the energy transition in the EU and US. Lessons for successful civil society engagement*, Washington, G.M.F., 2019, p. 17.
[6] Distinctive aspects of a smart city that is sustainable: (i) sustainability: (related to city infrastructure and governance, energy and climate change, pollution, waste, and social, economic and health); (ii) quality of life (Q.o.L.) (improving Q.o.L. in terms of emotional and financial wellbeing); (iii) urban aspects (includes technology and

new use of the term made possible by this *Metonymy* - a city can be smart[7] because of its sustainability - shows once again how the meaning of a smart city is 'multi-faceted', including this description "qualities of people and communities as well as ICTs"[8].

This 'smart and sustainable cities' is a source of value for several aspects: using digital technology to reduce costs and optimize resources, in a way that its current use does not compromise their use by future generations, so that it is sustainable; it has direct channels of communication with the public, it operates with open information and allows the budgets invested in to be monitored, so that it is inclusive and transparent; offering suitable infrastructure to generate high-quality employment, innovation, competitiveness and business growth, in order for it to generate wealth; using technology that improves people's quality of life, giving quick access to more efficient public services, so that it is made for the citizens.

Moreover, the level of government represented by urban contexts is the most suitable, as: – they are already under pressure from increasing population, pollution, extreme weather events and rising sea levels; – they generate more than 70% of global greenhouse gas emissions and more than 80% of global gross domestic product.

The urban contexts already account for more than half of the world's population, which is projected to reach two-thirds by 2050. As a matter of fact, environmental sustainability is intrinsically linked to urban planning, site creation, civic engagement, social inclusion, regeneration, health and wellbeing[9].

Moreover, when this presents elements of scalability, local civic policy has been considered to be able to influence national policy itself.

The importance of the local level can also be demonstrated through precise scientific results. It has been studied as if all cities with more than 100,000 inhabitants today adopted the 1.5° C action plans prepared by the city of London[10], this could lead to a reduction of about 40% of carbon dioxide emissions, thus achieving one of the objectives set in the Paris Agreement (C40).

---

infrastructure, sustainability, governance and economics; (iv) intelligence or smartness (commonly quoted aspects of smartness include smart economy, smart people), (v) smart governance, smart mobility, smart living and smart environment. UNITED NATIONS, *New Urban Agenda*, 2017, p. 19.

[7] UNITED NATION GENERAL ASSEMBLY, *Resolution A/72/257*: *Science, technology and innovation for development*, (31 July 2017), recital 30 "Smart Cities are innovative cities that use Information and Communication Technology (I.C.T.) to increase the efficiency of urban services and operations and improve quality of life in ways that ensure economic, social and environmental sustainability.".

[8] V. ALBINO, U. BERARDI, R. M. DANGELICO, «Smart Cities: Definitions, Dimensions, Performance, and Initiatives», *Journal of Urban Technology*, n° 22/2015, p. 3.

[9] O.E.C.D., *The Metropolitan Century: Understanding Urbanization and its Consequences*, Paris, O.E.C.D. Publishing, 2015 p. 15.

[10] L. LATHAM, «Smart cities as sustainable cities? (London Climate Action Week 2019)», Julie's Bicycle – Insights, August 2019 [https://juliesbicycle.com/news/smart-cities-as-sustainable-cities/].

An example can be found in the way in which this type of city can achieve a comprehensive and balanced management of the environment through a transversal and continuous approach. Though there are certainly specific areas of urban environmental policies, starting with the extension and management of public greenery and protected areas, a protection strategy must inevitably cover all aspects affecting ecosystem resources. At the same time, although there are fundamental acts (starting with urban planning) that also define the basic characteristics of an urban configuration from an environmental point of view, it is also true that choices concerning the networks of functional services and the location of productive activities have a significant impact on environmental balances. The second digital revolution provides city governments with a multitude of new tools (now only partially used) to monitor environmental conditions and functional networks (water, energy, waste) and orient their choices towards protection. This will require, however, a redefinition of the relationships between administrations and service managers aimed at a greater sharing of information, analysis tools and objectives.
In this paper we will demonstrate that an effective and efficient model for this new type of service is the promotion of cultural ecology through the support for the implementation of Nature-Based Solutions[11] to tackling the challenges that European societies will have to face in the coming years.

§1 – SMART CITY: KEY ACTORS OF THE FUTURE

The concept of smart city does not only refer to its ability to make technological innovations but to its ability to affect the indices of variation rather than level in service innovation promoting of new models[12]. Cities rely on too many external

[11] *See*, *ex multis*: E. SANYÉ-MENGUAL *et al.*, «Social acceptance and perceived ecosystem services of urban agriculture in Southern Europe: The case of Bologna (Italy)», *PLoS ONE*, n° 13/2018; F.A.O, «Nature-Based Solutions for agricultural water management and food security», *Land and Water Discussion Paper*, 12/2018; C.M. RAYMOND *et al.* (dir.), *An Impact Evaluation Framework to Support Planning and Evaluation of Nature-based Solutions Projects. Report prepared by the EKLIPSE Expert Working Group on Nature-based Solutions to Promote Climate Resilience in Urban Areas*, Centre for Ecology & Hydrology, Wallingford, 2017; N. KABISCH *et al.* (dir.), *Nature-based Solutions to Climate Change Adaptation in Urban Areas*, Springer Open, 2017; J. MAES, S. JACOB, «Nature-Based Solutions for Europe's Sustainable Development», *Conservation Letters*, n° 10/2017, p. 121; N. KABISCH *et al.*, «Nature-based solutions to climate change mitigation and adaptation in urban areas: perspectives on indicators, knowledge gaps, barriers, and opportunities for action», *Ecology and Society*, n° 21/2016; , E COHEN-SHACHAM *et al.* (dir.), *Nature-based Solutions to address global societal challenges*, I.U.C.N., Gland, 2016; R. MORENO-PEÑARANDA, *Biodiversity and Culture, Two Key Ingredients for a Truly Green Urban Economy*, in R. SIMPSON *et al.* (dir.), *The Economy of Green Cities. A World Compendium on the Green Urban Economy*, Springer, Dordrecht, 2013, pp. 337-349. I. ZWIERZCHOWSKA *et al.*, «Introducing nature-based solutions into urban policy – facts and gaps. Case study of Poznań», *Land Use Policy*, n° 85/2019, p. 161. *May I finally cite* M. CAVALLO, S. SPILLARE, *Metropolitan Agriculture and Nature-Based Solutions*, Franco Angeli, Milano, 2018.
[12] Fields of Smart Cities: (i) innovation, entrepreneurship and the generation of economic activity; (ii) smart specialization; (iii) promotion and support of

resources, hence the need to redefine models of urban sustainability for which cities should respond to the needs of people through solutions that do not introduce excessive imbalances in the economy and society. In this way, from different existing definitions of smart cities and conceptual variations often replacing 'smart' with alternative adjectives, a new concept could actually emerge. According with the one developed by I.C.L.E.I., this would be a model of a city ready to provide the conditions for a healthy and happy community in the difficult conditions that global, environmental, economic and social trends can bring[13].

A new model of urban sustainability is reflected in the design of new services[14], capable of presenting themselves as a link of three areas of work: governance, people engagement, technology and Information and Communications Technology (ICT) platforms[15]. Therefore, we have to consider not only technological aspects but also transparency, two-ways accountability, and digital literacy[16]. The result of this action will be the enhancement of civic engagement for the construction of a new kind of city: a smart sustainable city. Thanks to the policies fostered by public bodies, a new framework for action reflecting the urgency and scale of climate change will be hopefully designed.

We have already stressed that the smart city concept is fuzzy and undetermined. In order to clearly determine its boundaries, in the next section we will describe its practical application through a review of Nature-Based Solutions models that will soon be implemented in the Metropolitan City of Bologna. Bologna faces pressures around migration, economic development and industrial legacy. In order to achieve a change, scalable co-designed Nature-Based Solutions bringing together the entire community will be suitable. Bologna is seeking to design - and in a later stage to implement - an urban mobility network for bicycles that will also retain water and act as a green corridor, meaning it will have trees and green infrastructure elements in smart design. The multifunctional mobility network will be a Nature-Based Solution integrating sustainability mobility functions. The scope of this project is to exploit the green economy in order to stimulate an already vibrant Small and

entrepreneurship; (iv) promotion of R&D and innovation; (v) clustering and collaboration.

[13] V. ALBINO, U. BERARDI, R. M. DANGELICO, «Smart Cities: Definitions, Dimensions, Performance, and Initiatives», *Journal of Urban Technology*, n° 22/2015, p. 6.

[14] A. STRINGHINI, «Smart cities: information and communication technology and citizen participation», *International Journal of Open Governments*, n° 8/2019, p. 81.

[15] We assume that the Information and Communications Technology (ICT) infrastructure acts as the 'glue' which integrates all the other elements of the smartness of the city acting as a foundational platform. ICT infrastructure functions as the nerve centre, orchestrating all the different interactions between the various core elements.

[16] According to Antonella Stringhini: "Digital literacy requires content and local services in a variety of languages and formats that are accessible to all people, who also need skills and capabilities, including media, information, and digital literacy", *Ibidem*.

Medium-sized Enterprises (SME) community around urban mobility and greening parts of the city[17].

§2 – SMART CITIES AS RESILIENT CITIES BECAUSE OF THE NATURE-BASED SOLUTIONS

According to the definition stated by Beck Dawson, the Chief Resilience Officer in the City of Sydney, urban resilience is "the capacity of individuals, communities, institutions, businesses and systems within a city to survive, adapt and thrive, no matter what kinds of chronic stresses and acute shocks they experience"[18]. From this definition it is possible to conclude that this concept is closely related to other recent and important elements: 'circular economy' and 'climate resilience'. We can define circular economy as a new economic model, based on regenerative processes and collaboration, that shares knowledge, resources, and services in order to increase economic opportunities and positive environmental impacts. Other interpretations of possible concepts connected with urban sustainability have promoted the same anthropocentric approach and have defined Climate resilience as "the ability of the system to evolve from climate shocks and stresses so we might increase our ability to create positive possible futures"[19].
The topic of the resilience is really important for the future and is important for us to study how a city can be a resilient city. There are some innovative areas that are related with the concept of smart sustainable city. The circular economy, the capacity of the economy of reusing raw materials, to reuse the process, to improve the different processes related with the productions of goods and services. The 'design thinking of service', for instance the digital service, aims at the engagement of citizens and at the better knowledge of the needs of the consumers with a new kind of market and new capacity to design market tailored to the needs of the citizens and the consumers.
This 'design thinking of service' can also offer an example of how the link between Nature-Based Solutions and the resilience of the city can be concretely legitimized by its inhabitants. One of the ways to achieve this is to promote actions that demonstrate the link between policy initiatives by public authorities and those needed to combat climate change.

---

[17] Connecting Nature project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 730222. *See* [https://connectingnature.eu/].
[18] M. O'LEARY, «Cities of the future: the importance of making the Twin Cities smart», *Minnpost*, 04 May 2017
[https://www.minnpost.com/community-voices/2017/04/cities-future-importance-making-twin-cities-smart/]
[19] These are the definitions that emerged from the working groups participating in "Climate Resilience and Circular Economy Workshop" held in Bologna on 8 November 2019 within the European Program IUC for the International Urban Cooperation.

This assumption can be demonstrated starting from the consideration that even the same technology that in the near future can allow the achievement of the objectives set by the most recent international climate agreements is only a tool and not a result to aim at.
Technology that will remain a mere technique without the action of professionals in sectoral policies such as cultural ones. Cultural policies that, if not implemented within the specific level of government represented by local institutions, would risk remaining devoid of concrete effects.
Concrete effects are only possible if this action is accompanied by the commitment of public institutions to the dissemination of a civic culture focused on environmental issues: The Cultural Ecology.
From this premise, the conclusion is that only by strengthening the existing links between local cultural and environmental policies it will be possible to create a 'new social contract' capable of effectively combating climate change.
Among the various public policies, in particular, cultural policies were considered to be the most appropriate to achieve these effects. The opportunities provided by the use of this specific sector would stem from its ability to: i) form a vital part of human experience in everyday life; ii) bring communities together; iii) lead to a strengthening of every action and to inspire the realization of new ones; iv) provide public spaces to reflect, contemplate and elaborate shared moments of criticism; v) motivate citizenship, activism and guide paths for positive change; vi) be a catalyst for innovation (representing a test bed for new models, technologies, and so on); vii) and influence markets.
Drivers for developing this cultural ecology for the new agro ecological city were defined in a *manifesto* few years ago[20]. The proposal involved a self-regulated collective governance, through which reframing the territory and rethinking the agri-food sector. This considers as a means to merge producers and citizen's goals and to promote the shared knowledge and food awareness. Besides that, in this *manifesto* it was stated that policy has to support a bioregional supply chain and active actions for the mitigation of climate change. This declaration was written with a clear awareness about the deep linkage between culture and biodiversity in the development of local policies. This was yet another explanation of how civic and cultural aspects could be a creative inspiration for policy makers at the local level. A concept that refers to "long term interactions between human societies and the ecosystems they inhabit, and encompasses local ecological

[20] M. CAVALLO, S. SPILLARE, *Metropolitan Agriculture and Nature-Based Solutions*, Franco Angeli, Milano, 2018, pp. 111-116.

knowledge and practices"[21]. For improving the spread of this 'Cultural ecology' an urgent need is to connect this knowledge within the urban context. Currently implemented Nature-Based Solutions have the potential to be scaled-up to the city level and transferred as examples to other cities in Europe and across the globe. They have further potential to link cities with their hinterland to address shared challenges. A large number of European cities are poorly represented in Nature-Based Solutions research, which have often focused on particular areas. In addition, while the majority of European urban areas are either small or medium sized, there are many large cities that are also in need of a large scale response to the challenges of climate and water stress. Other challenges that cities manifest, and that have a potential impact on the ability of these cities in building resilience using Nature-Based Solutions include health and wellbeing (especially its financial implications), cultural heritage, unemployment and migration. Every scalar response to societal challenges should be realized with respect to the population size. For this reason, an active support to transdisciplinary, bottom-up processes, and to the achievement of creative dialogue between and within communities with respect to Nature-Based Solutions, cannot be left out. The time has come for a more dedicated and concerted effort to scale up and out Nature-Based Solutions in these new policy cycles.

§3 – NEW KIND OF URBAN WELFARE: MORE THAN ENVIRONMENTAL BENEFITS

We have to concretely build the smart sustainable city. The first step is to take into account the needs of measuring the progress in reaching these objective and ensuring the accountability and the clear responsibility in the work around the objectives of the new smart sustainable city. The continuous growth of the urban population could be an example of the several obstacles that we will face in the future. This is the reason why we need a new policy tailored at the demographic change of the population capable of also providing for the impact on the environment of the city. Even if the economic crises has reduced the government's ability to actively manage these process, we have to focus our planning process on these challenges. But we have also - at the same time – to take into account our opportunity related with the design of urban policy able to face and to fight the global climate change. We have to consider the possibility and the opportunities of new policies for a better planning of infrastructures learning from past mistakes in the planning of the former industrial city. Using new services to reduce the gap in this city could be an answer.

[21] R. MORENO-PEÑARANDA, *Biodiversity and Culture, Two Key Ingredients for a Truly Green Urban Economy*, in R. SIMPSON *et al.* (dir.), *The Economy of Green Cities. A World Compendium on the Green Urban Economy*, Springer, Dordrecht, 2013, p. 338.

We have to consider also the opportunity of better link between urban and rural areas in this new kind of smart sustainable cities. In the research, in the analysis we find some pillar of the smart city. One pillar is innovations, the development of entrepreneurship and the generation of economic activities. Another pillar is related with the better production of knowledge and the attractiveness of talent in such kind of city, and, of course, the possibility to experiment a digital society based on the digital economy and digital services. The Bilbao group on smart cities studies proposed this statement regarding smart cities: "'smart' combination of this elements: education, knowledge, digital society that make sound management of the available resources through open governance"[22].

The idea of Nature-Based Solutions has emerged as both a challenge and an opportunity to assist urban communities in the transition towards sustainability. But Nature-Based Solutions are still a complex problem for many city-makers, and there are still many obstacles (physical, cultural, ecological, legal, and so on) to embedding these kinds of solutions into urban planning, policy frameworks, and innovative city design. Individually, cities have been experimenting and testing countless site-specific solutions and strategies (from micro to macro scale) over the decades and those continue to be living examples of effective urban successful transition strategies. We therefore consider necessary to draw on this body of knowledge and the processes that gave rise to it, and go beyond it by engaging cities in further refining and then mainstreaming radically innovative mechanisms for climate change adaptation and greater human wellbeing through Nature-Based Solutions. Our goal is to establish the E.U. as a global leader for climate resilience, collaborative processes, and innovation for Nature-Based Solutions.

Smart Sustainable cities are more than environmental entities. The added value of this is kind of cities can be found in something more than their environmental benefits. We have also to consider the role of the Nature-Based Solutions, in this kind of cities for a new kind of urban welfare. The integration of the Nature-Based Solutions into city and citizen life is really a new concept of urban welfare based on multiple-function Nature-Based Solutions integrated in urban strategic planning and guaranteeing the accessibility of green spaces and new business models based on the green jobs. Socio-economic and cultural factors are highly correlated with the access to green spaces and with the quality of those spaces. There is a clear link between exposure to natural environments and reduced income-related health inequality, suggesting that this could be related to the opportunities they offer for physical activity and stress relief. One of the ways in

[22] COMMITTEE OF DIGITAL AND KNOWLEDGE-BASED CITIES OF U.C.L.G., *Smart Cities 2017: International study on the situation and development of the ICT*, U.C.L.G., Bilbao, 2017, p. 13.

which the Nature-Based Solutions can promote health and wellbeing is by facilitating social cohesion and by increasing social interactions, in particular between ethnic groups. Parks and other green infrastructure can also stimulate a sense of place attachment, further strengthening social cohesion. Often their positive impacts and co-benefits are not equally distributed and can lead to higher land prices and rents, pushing low-income residents out of neighborhoods with Nature-Based Solutions. In order to prevent this, new modes of governance and collaboration frameworks are required, especially those that integrate public investments in Nature-Based Solutions with private sector and citizen-led initiatives.

CONCLUSIONS

Working with nature means reframing spaces: Nature-Based Solutions promote the integration of social, cultural and environmental aspects. And the cooperation with different actors is important to set a local ecosystem as a key for Smart and Sustainable cities development at local level. So the key words for the future in such kind of city areas: co-creation with local communities; the role of the communities to lead local development and the development of the local market; local identity of the economic activities of a territory and the principle of 'horizontal' subsidiarity with new model of governance based on the cooperation between citizens and public administrations[23]. The exponential growth of urban populations calls for a policy response that optimizes land resources. Moreover, urban policies need to be tailored to the demographic changes in the population. Smart road policies are needed to make best use of scarce space and cities need effective resilience policies to be able to respond to disasters. The opportunities that these challenges can offer are the design of urban policies that complement global climate policies and reduce overall cost of emission reduction and - for developing countries - to close the gap with developed economies. Links can be fostered between urban and rural areas to boost the region's economic potential, whereas to shift demographic scale can be an opportunity for growth and social inclusion policies.

BIBLIOGRAPHY

ALBINO V., BERARDI U., DANGELICO R. M., *Smart Cities: Definitions, Dimensions, Performance, and Initiatives*, Journal of Urban Technology, 4 Feb. 2015

CAVALLO M., SPILLARE S., *Metropolitan Agriculture and Nature-Based Solutions*, Franco Angeli, 2018

[23] J. A W VAN ZEBEN; A. BOBIĆ, *Polycentricity in the European Union*, Cambridge University Press, Cambridge, 2019, pp. 64-65.

COHEN E., WALTERS G., JANZEN C., MAGINNIS S., *Nature-based Solutions to address global societal challenges*, I.U.C.N., 2016: https://serval.unil.ch/resource/serval:BIB_93FD38C8836B.P001/REF> accessed 15 december 2019

COMMITTEE OF DIGITAL AND KNOWLEDGE-BASED CITIES OF U.C.L.G., *Smart Cities 2017: International study on the situation and development of the ICT*, U.C.L.G. 2017

EUROPEAN COMMISSION, *The urban and regional dimension of Europe 2020. Seventh progress report on economic, social and territorial cohesion*, 2011: https://ec.europa.eu/regional_policy/sources/docoffic/official/reports/interim7/interim7_en.pdf> accessed 15 december 2019

EUROSTAT, *Smarter, greener, more inclusive? Indicators to support the Europe 2020 Strategy*, 2019 <https://ec.europa.eu/eurostat/en/web/products-statistical-books/-/KS-04-19-559> accessed 15 december 2019

F.A.O., 'Nature-Based Solutions for agricultural water management and food security', (Land and Water Discussion Paper 2018) <http://www.fao.org/3/CA2525EN/ca2525en.pdf> accessed 15 december 2019

GARCÍA I., KHANDKE D., *Cities and civil society as allies for the energy transition in the EU and US. Lessons for successful civil society engagement*, G.M.F. 2019: https://energy-cities.eu/publication/cities-and-civil-society-as-allies-for-the-energy-transition-in-the-eu-and-us/

KABISCH N., KORN H., STADLER J, BONN A., *Nature-based Solutions to Climate Change Adaptation in Urban Areas*, Springer Open, 2017 https://www.springer.com/gp/book/9783319537504#aboutAuthors>

KABISCH N., FRANTZESKAKI N., PAULEIT S., NAUMANN S., DAVIS M., ARTMANN M., HAASE D., KNAPP S., KORN H., STADLER J., ZAUNBERGER K., BONN A., *Nature-based solutions to climate change mitigation and adaptation in urban areas: perspectives on indicators, knowledge gaps, barriers, and opportunities for action*, Ecology and Society, 2016: https://www.ecologyandsociety.org/vol21/iss2/art39/>

LATHAM L., 'Smart cities as sustainable cities? (London Climate Action Week 2019)' (Julie's Bicycle – Insights, 18 Aug 2019) https://juliesbicycle.com/news/smart-cities-as-sustainable-cities/> accessed 15 december 2019

MAES J, JACOB S., "Nature-Based Solutions for Europe's Sustainable Development"' in *Conservation Letters*, 27 Nov 2015: <https://conbio.onlinelibrary.wiley.com/doi/full/10.1111/conl.12216> accessed 15 december 2019

OECD, *The Metropolitan Century: Understanding Urbanization and its Consequences*, OECD Publishing 2015

O'LEARY M., *Cities of the future: the importance of making the Twin Cities smart*, Minnpost 04 May 2017:

https://www.minnpost.com/community-voices/2017/04/cities-future-importance-making-twin-cities-smart/> accessed 15 december 2019

RAYMOND C. M., BERRY P., BREIL M., NITA M. R. , KABISCH N., DE BEL M., ENZI V., FRANTZESKAKI N., GENELETTI D., CARDINALETTI M., LOVINGER L., BASNOU C., MONTEIRO A., ROBRECHT H., SGRIGNA G., MUNARI L., CALFAPIETRA C., *An Impact Evaluation Framework to Support Planning and Evaluation of Nature-based Solutions Projects. Report prepared by the EKLIPSE Expert Working Group on Nature-based Solutions to Promote Climate Resilience in Urban Areas*, Centre for Ecology & Hydrology 2017
http://www.eklipse-mechanism.eu/apps/Eklipse_data/website/EKLIPSE_Report1-NBS_FINAL_Complete-08022017_LowRes_4Web.pdf>

SANYÉ-MENGUAL E., SPECHT K., KRIKSER T., VANNI C., PENNISI G., ORSINI F., PROSDOCIMI GIANQUINTO G., *Social acceptance and perceived ecosystem services of urban agriculture in Southern Europe: The case of Bologna (Italy)*, PLoS ONE, 12 Sep. 2018
[https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0200993]

SIMPSON R., ZIMMERMANN M., *The Economy of Green Cities. A World Compendium on the Green Urban Economy*, Springer, 2013

STRINGHINI A., "Smart cities: information and communication technology and citizen participation", *International Journal of Open Governments*, 2019

UNITED NATIONS, *New Urban Agenda*, 2017
http://habitat3.org/documents-and-archive/new-urban-agenda/languages/

VAN ZEBEN J. A. W.; BOBIĆ A., *Polycentricity in the European Union*, Cambridge University Press, 2019

ZWIERZCHOWSKA I., FAGIEWICZ K., PONIŻY L., LUPA P., MIZGAJSKIIWONA ZWIERZCHOWSKA A., FAGIEWICZ K., PONIŻY L., LUPA P., MIZGAJSKI A., *Introducing nature-based solutions into urban policy – facts and gaps. Case study of Poznań*, Land Use Policy, 11 Sep 2018
https://www.sciencedirect.com/science/article/pii/S0264837718313383