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# LEGAL ASPECTS OF URBAN CLIMATE CHANGE ADAPTATION. ITALIAN CITIES: A CASE STUDY*

## Abstract

Much of the climate discourse of today is held on the reduction of greenhouse gases (GHG) emissions and reducing humanity's ecological footprint on Earth. However, as climate change is already impacting our planet, adaptation measures to climate change are also required. Rising temperatures, the multiplication of intense precipitation events and related pluvial and river floods, drought events and water scarcity as well as the increase of frequency of wildfires represent a few of the multiple climate change impacts that governments and citizens have to deal with. For ecological reasons, climate change affects areas very differently based on geographic location and urban centers represent climate 'hotspots' as areas with high vulnerability. As a consequence, cities and towns play a crucial role in tackling climate change effects. The aim of this essay is to analyze the legal aspects of climate change adaptation set by local governments to prevent and manage damages related to climate-related risks. After determining the international, European and Italian legal framework on adaptation, the purpose of the article is to identify the legal instruments used by local administrations to develop adaptation measures. In particular, the analysis focuses on the legal aspects related to three dimensions of local adaptation: urban greening as a nature-based solution for heat waves risks; the management of water-related risks; the civil protection planning function of municipalities. Considering the impacts of the mainstreaming process on planning tools, special attention is directed towards the issue of integration and coordination between the

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different urban and sectoral planning instruments required by the Italian multi-level governance legal system.

**Keywords**

Climate change, Adaptation, Italian cities, Urban greening, Water risks, Civil protection

**Résumé**

Une grande partie du discours climatique actuel porte sur la réduction des émissions de gaz à effet de serre (GES) et la réduction de l'empreinte écologique de l'humanité. Cependant, comme les changements climatiques ont déjà un impact sur notre planète, des mesures d'adaptation aux changements climatiques sont également nécessaires. La hausse des températures ; la multiplication des épisodes de précipitations intenses ainsi que les inondations pluviales et fluviales qui en découlent ; les épisodes de sécheresse ainsi que la pénurie d'eau ; et l'augmentation de la fréquence des feux de forêt ne sont que quelques-uns des multiples effets des changements climatiques auxquels les gouvernements et les citoyens doivent faire face. Pour des raisons écologiques, les différentes juridictions peuvent être affectées par des impacts bien divers selon leurs emplacements géographiques. Les centres urbains représentent des « points chauds » du climat, c'est-à-dire des zones très vulnérables. Par conséquent, les villes et les agglomérations jouent un rôle crucial dans la lutte contre les effets des changements climatiques.

L'objectif de cet essai est d'analyser les aspects juridiques des mesures d'adaptation mises en place par les gouvernements locaux pour prévenir et gérer les dommages liés aux risques climatiques. Après avoir déterminé le cadre juridique international, européen et italien

régissant l'adaptation aux changements climatiques, l'objectif de cet article est d'identifier les instruments juridiques utilisés par les administrations locales pour développer des mesures adaptatives. En particulier, l'analyse se concentre sur les aspects juridiques liés à trois dimensions de l'adaptation locale : le « verdissement urbain » comme solution naturelle aux risques de canicule, la gestion des risques liés à l'eau et la planification de la protection civile par les municipalités. Compte tenu des impacts du processus d'intégration sur les outils de planification, une attention particulière est accordée à l'intégration et la coordination entre les différents instruments de planification urbaine et sectorielle requises par le système juridique italien qui présente plusieurs niveaux de gouvernance.

**Mots-clés**

Changement climatique, adaptation, villes italiennes, verdissement urbain, risques reliés à l'eau, protection civile

## INTRODUCTION

Climate change is already affecting Earth significantly and the Mediterranean Region is particularly vulnerable to the increase of its impacts[1]. In the Italian territory the probability of extreme events related risks has increased by 9% in the last twenty years and, more specifically, although resilience and adaptation capacity affect the entire country, southern Italian municipalities show a low level of resilience to disasters[2].

[1] Intergovernmental Panel on Climate Change, "Europe", *Climate Change 2014 – Impacts, Adaptation and Vulnerability: Part B: Regional Aspects: Working Group II Contribution to the IPCC Fifth Assessment Report*, vol 2 (Cambridge University Press, 2014) <https://doi.org/10.1017/CBO9781107415386>.

[2] Donatella Spano *et al, 'Analisi del rischio. I cambiamenti climatici in Italia'* (CMCC, 2020) 40 <10.25424/CMCC/ANALISI_DEL_RISCHIO>.

The impacts of climate change differ considerably among the territories and urban centers represent climate change *'hotspots'* as areas with high vulnerability and exposure[3]. Considering these features as well as the functions of municipalities which impact on local management of risks, cities and towns play a crucial role in tackling climate change effects[4]. Not surprisingly, in parallel with the recent increase of the interest on the issue within the international and European debate, climate adaptation is progressively being included in urban agendas.

This article aims to examine the legal aspects of adaptation processes developed by the municipalities of Italy. Some Italian cities and towns have drawn up specific strategies and plans with the specification of a set of actions, whose implementation requires the mainstreaming of climate change adaptation into the existing urban policies. The purpose of the analysis is therefore to identify the legal instruments through which local authorities develop adaptation measures to respond to climate related risks. Considering the impacts of the mainstreaming process on planning tools, special attention is directed towards the integration and coordination issue between the different urban and sectoral planning instruments required by the Italian multi-level governance legal system.

The first part of the article outlines an overview of the international, European and Italian framework in the subject of climate change adaptation. In the subsequent paragraphs, the analysis focuses on legal aspects related to three dimensions of local adaptation. Paragraph No. 2.1 is devoted to the juridical aspects of urban greening as a nature-based solution for

[3] Ibid 46.

[4] Aleksandra Kazmierczak *et al, 'Urban adaptation in Europe: how cities and towns respond to climate change'* [EEA report No. 12, European Environment Agency (EEA), 2020] 12 https://doi.org/10.2800/324620.

reducing the risk related to heat waves. In paragraph No. 2.2., the main features of the multilevel management of water related risks are examined. Lastly, an analysis of the legal features of local disaster preparedness is presented, with regard to the civil protection planning function of municipalities.

## PART 1. URBAN CLIMATE CHANGE ADAPTATION OF ITALIAN MUNICIPALITIES

Italian local initiatives aimed at climate change adaptation are not isolated measures devoid of a larger framework. However, climate adaptation has become a regulated domain only over the past decade.

From an international perspective, adaptation was acknowledged as an instrument to contrast climate change with equal importance as the mitigation strategies under the Paris Agreement[5]. Likewise, the issue was included among the targets to be achieved of the 2030 Agenda for Sustainable Development and the Sendai Framework for Disaster Risk Reduction (2015-2030), which put a particular emphasis on the role of local authorities at making cities safe and resilient[6] as well as at reducing disaster risk[7].

At an EU level, within the context of the Green New Deal, in February 2021 a new adaptation strategy was adopted by the European Commission with the purpose of determining the coordinates of the European action to become climate resilient by 2050, as it is set out in the European Climate Law proposal. The strategy identifies the local level as *‹‹the*

[5] Art. 7 and Art. 8 of the Paris Agreement. Regarding the evolution of this issue within the UNFCCC, see Jonathan Verschuuren, 'Climate Change Adaptation under the United Nations Framework Convention on Climate Change and Related Documents' in Jonathan Verschuuren (eds), *Research Handbook on Climate Change Adaptation Law* (Edward Elgar, 2013) 24; Stefano Nespor, *'L'adattamento al cambiamento climatico: breve storia di un successo e di una sconfitta*' (2018) 1 Riv. giur. ambiente 29.

[6] See Target 11.5 and Target 11.b of the SDG No. 11. The targets 13.1, 13.2 and 13.3 of the SDG refer to adaptation as well.

[7] Global target E of the Sendai Framework for Disaster Risk Reduction (2015-2030).

*bedrock of adaptation*›› to be financially supported within a systemic approach and to be considered as a high priority[8]. However, neither in the 2021 Strategy nor in the European Climate Law proposal are specific measurable targets determined. This shortage may be caused by the difficulties in identifying standardized indicators capable of measuring a complex process which impacts on such a significant amount of policy areas.

In this framework, a particularly significant contribution in the fostering of local adaptation derives from intergovernmental local partnerships as well as international and European city networks[9]. Although this type of European and international initiatives do not legally bind local authorities to achieve the subscribed objectives, they contribute to sensitizing local public opinions as well as local authorities on this issue and redefining their urban political agenda by promoting the share of best practices, technical support and tools for the planning and the implementation of adequate adaptation actions.

Regarding the national background, the main document set by the Italian government is the National Strategy for Climate Change Adaptation, which was adopted in 2015[10] under the influence of the 2013 European Strategy for climate change adaptation[11]. The strategy was approved after a long procedure including institutional actors as well as academia, with the contribution of other stakeholders through a public consultation. The strategy represents the national vision on climate-change adaptation and its aim is to identify risks and vulnerabilities of the national territory, to increase general awareness on the topic and to determine the tools

[8] This perspective is also coherent with the vision set out in the Urban Agenda for the EU where adaptation is identified as one of the priority themes to be addressed, putting special focus on vulnerability assessments, climate resilience and risk management.

[9] *Inter alia* the Global Covenant of Mayors for Climate and Energy, the Climate Adaptation Partnership, Making Cities Resilient Campaign. For an overview of the other international city networks concerning local adaptation, see Box 4.4 in Kazmierczak (n. 4) 89.

[10] Directoral Decree No. 86 June 16, 2015.

[11] COM (2013) 216 final.

and actions used to reduce damages derived from climate-change. The national strategy consists of three documents: a report on state of the art scientific knowledge on impacts, vulnerabilities and climate change adaptation in Italy; a document that identifies the main policy sectors interested by the strategy; an examination about EU and Italian legal framework on adaptation[12].

In accordance with the National Strategy, the National Plan for Climate Change Adaptation would serve as a key legal instrument to implement objectives defined by the strategy. However, the plan has not been approved thus yet[13]. A draft of the document was published online and, as was already pointed out in the literature[14], an integrated analysis with regional and local levels appears to be missing. In the draft plan there is no analysis to be found regarding the implications on local legal framework or regional strategies.

The absence of a national regulation defining common criteria and methodologies could represent a disincentive[15] and an obstacle to the construction of local strategies. Despite this, a few instances of local adaptation strategies were developed in Italy, even though they represent a small portion compared to local mitigation plans and strategies[16]. Following the

[12] Particularly, in the latter document, the 2013 EU strategy on adaptation to climate change as well as existing tools to facilitate the mainstreaming climate change adaptation were examined.

[13] In October 2020 the SEA screening procedure of the plan was concluded with the Directoral determination 20 October 2020, n. 346, which established that the SEA has to be conducted on the plan.

[14] Filomena Pietrapertosa *et al*, 'Urban climate change mitigation and adaptation planning: are Italian cities ready?' (2019) 91 Cities 93 <10.1016/j.cities.2018.11.009>.

[15] D. Reckien *et al*, 'How are cities planning to respond to climate change? Assessment of local climate plans from 885 cities in the EU-28' (2018) 191 Journal of Cleaner Production 207 <10.1016/j.jclepro.2018.03.220>.

[16] Pietrapertosa (n. 14) 101. See also Luca Adami *et al*, 'Covenant of Mayors committed to local sustainable energy: the Italian case' (2019) 222 WIT Transactions on Ecology and the Environment 35 <10.2495/EQ180041>.

categorization set by Reckien et al.[17], the majority of local adaptation plans designed by Italian municipalities consist of plans of International and European networks. The most common is the SECAP, developed by municipalities as a result of the signing of the new Covenant of Mayors. It is a local plan which integrates mitigation and adaptation measures within the same document[18]. In other cases, the adaptation plan was adopted in a separate planning document[19].

Independently of this aspect and the formal denomination, local adaptation plans seem to have the same legal nature. They are acts which provide an assessment of local climate change related risks and vulnerabilities of the territory and a determination of priorities. Therefore, they simply define a strategic direction of the municipality, without any binding provisions setting mandatory rules. The transposition of the contents of the adaptation plans into ordinary urban planning would make those provisions binding[20]. For this reason, the legal framework and the mainstreaming adaptation in urban policies are analyzed in the next paragraphs, with regard to the following policy areas: urban greening, the management of water related risks and local civil protection planning for disaster preparation and emergency management.

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[17] Reckien (n. 15) 210-211.

[18] Some geographically closed municipalities, considering their small size and their analogous morphological as well as climatic features, developed a shared SECAP. *Ex multis*: SECAP of Delta PO area, SECAP of Alto Polesine area, SECAP of Ferrara and Terre Estensi Association, SECAP of InterMunicipality Association of Val Cosa and Val d'Arzino, *etc.*

[19] This is the case of the Local Adaptation Plan of the city of Bologna, the Local Adaptation Plan of the municipality of Ancona, the Climatic Resilience Plan of the city of Turin, *etc.*

[20] Gabriele Torelli, 'Il contrasto ai cambiamenti climatici nel governo del territorio. Un PAESC per la laguna di Venezia' (2020) 2 Federalismi.it 196, 201; Francesco Gaspari, 'Città intelligenti e interventi pubblico' (2019) 1(98) Il diritto dell'economia, 71, 78. Regarding the legal nature of the act, analogous conclusions were worked out in the SECAP of Cesena and in the Climate Change Adaptation Strategy of Reggio Emilia.

## PART 2. URBAN GREENING SOLUTIONS FOR THE RISK OF HEAT WAVES

One of the most widespread climate change impacts seriously affecting urban environments is the average temperature elevation and the increase of heat waves risks. Moreover, urban areas are significantly affected by the 'heat island' phenomenon due to urban infrastructures and waterproof surfaces[21]. The combination of these phenomena represents a problem which impacts the health of citizens[22] and makes urban adaptation a priority in the policy agenda. Green infrastructures are an efficient measure to this purpose, as they reduce air temperature through evapotranspiration and shading processes[23].

Green infrastructures are the result of an ecosystem-based approach that does not only contribute to reducing vulnerability to risks and impacts of extreme weather events and natural disasters, they also reduce the carbon footprint. Therefore, these infrastructures represent an important prevention measure and local authorities play a relevant role in the implementation of such[24].

The Minister Decree 2 April 1968, n. 1444, is the act that set the first regulation of green area in urban planning. Specifically, the decree provided a minimum quota of 'public areas with park facilities' compared to dwelling houses. The ambiguous expression of 'public areas

[21] Spano (n.2) 46.

[22] Dan Li and Elie Bou-Zeid, 'Synergistic Interactions between Urban Heat Islands and Heat Waves: The Impact in Cities Is Larger than the Sum of Its Parts' (2013) 52(9) JAMC 2051 <10.1175/JAMC-D-13-02.1>; Paola Michelozzi *et al*, 'Surveillance of summer mortality and preparedness to reduce the health impact of heat waves in Italy' (2010) 7(5) Int. J. Environ. Res. Public Health 2256 <10.3390/ijerph7052256>.

[23] Kazmierczak (n. 4) 53.

[24] COM (2013) 249 final.

with park facilities' was interpreted as green areas with facilities by local authorities[25]. However, the legislator did not issue a unitary legal definition of urban green area with the approval of the more recent Law No. 10 of January 14, 2013, and the persisting lack of it negatively affects local administration[26].

Besides this aspect, law No. 10/2013 amended the previous regulation on urban green areas with the aim of increasing the incisiveness of some of its provisions, such as: the introduction of new obligations for local authorities[27] and new prescriptions to ensure compliance with green public areas in urban planning[28]; the establishment of a special committee targeted at monitoring the implementation of Law No. 113/1992[29]. Moreover, Law No. 10/2013 determined a list of possible measures to promote the local development of green urban areas[30]. However, no mechanism was introduced to make the latter provisions binding or to significantly incentivize local authorities to invest in green infrastructures[31].

Within this legal framework, urban greening is no longer considered merely a matter of decorum of the city but an essential element for environmental quality[32] and urban

[25] Alberto Abrami, 'La recente disciplina giuridica del verde urbano' (2013) 68(4) L'Italia forestale e montana 165, 166 <10.4129/ifm.2013.4.01>.

[26] Valentina Giomi, 'Il verde pubblico come risorsa comune: da necessario strumento di soddisfacimento di bisogni collettivi a forma di tutela di beni vincolati' (2016) 4 GiustAmm.it 1, 9-10.

[27] Article 2 of the Law No. 10/2013, which amended Law No. 113 of January 29, 1992. As a result of such obligation, municipalities, for instance, must work out a tree register.

[28] Article 4, par. 2, of the Law No. 10/2013.

[29] This is the Committee for public green areas development which was established under Article 3 of the Law No. 10/2013.

[30] Article 6 of the Law No. 10/2013.

[31] Tree planting in urban areas of metropolitan cities was promoted in the financial program established under Art. 4 of the Decree-Law No 111 of October 14, 2019, and the Ecological Transition Minister Decree of October 9, 2020. The amount of resources aimed to this objective was recently incremented under Art. 1, par. 570, of the Law No. 178 December 30, 2020 (2021 Budget Law).

[32] Giuseppina Mari, 'Il verde urbano pubblico e la pubblicazione del verde privato' (2018) 1/2 Rivista giuridica dell'edilizia 39, 41.

resilience. Not surprisingly, urban greening is categorized as a local public service[33], regarding both its development and its maintenance[34]. Due to the significant costs related to these functions, the new legislation incentivizes partnerships and other initiatives inspired by the principle of horizontal subsidiarity[35].

A relevant legal aspect of this issue is that urban greening does not only include public areas but also private green spaces. This means that local authorities exercise administrative powers with the aim to guarantee an adequate level of protection on local green heritage. An example of these powers is the identification of a private area as an urban greening with the definition of a targeted constraint in land use planning. According to the jurisprudence, this identification has an indefinite validity and is the result of a 'conformative power' of the local authorities, meaning a power with no expropriating effects[36].

These administrative powers cohere not only with the concept of social utility of private property established by Article 41, par. 2, of the Constitution, but also with the moral and legal perspective regarding environmental law based on common duties and shared responsibilities[37].

In this legal framework, two main legal tools are used by local administrations for the management of green areas: local green plans and local green regulations. According to ISTAT

[33] Deliberation No. 6/2015 of the Committee for public green areas development.

[34] Massimiliano Atelli, 'Il verde urbano è servizio pubblico locale (2015)' 2 Rivista Quadrimestrale di Diritto dell'ambiente 234, 244.

[35] Mari (n. 32) 48.

[36] Consiglio di Stato, II, sentence No. 476 of January 21, 2020; Consiglio di Stato, III, sentence No. 4188 of September 8, 2015; T.A.R. Toscana, I, sentence no. 1345 of November 3, 2017; T.A.R. Emilia-Romagna, I, sentence No. 1095 of November 13, 2014.

[37] Fabrizio Fracchia, 'The Legal Definition of Environment: From Rights to Duties' (2005) 06-09 Bocconi Legal Studies Research Paper 1 <10.2139/ssrn.850488>.

data, although local green regulations are considerably spread among some municipalities, the number of local green plans adopted by local authorities is particularly scarce[38].

The local green plan is a volunteer tool and its purpose is to determine the fundamentals of the urban greening system[39]. Specifically, it regulates the relationships between different urban and suburban green spaces as well as the relationships between city areas and rural areas. The guidelines for urban green management and indications for sustainable planning recently approved by the committee represent an important document which defines the objectives, the minimum content and the implementation modalities of local green plans. Therefore, the guidelines[40] and the national strategy of urban greening[41] represent a new common framework that could encourage the development of local green plans.

One might consider it reasonable for local administrations to include in the local green plan the assessments of local adaptation plans regarding the risks and vulnerabilities of the territory. Doing so, green infrastructures could be developed coherently with climate change adaptation challenges as well.

[38] ISTAT 'Rilevazione dati ambientali nelle città' (2019) in www.istat.it. These data consider only the capitals of provinces.

[39] Regarding the main aspects of urban green plans, see Emanuela Coppola, 'Urbanistica e verde: dal concetto di standard al Piano del verde' in Alessandro Claudi de Saint Mihiel (eds), *La valorizzazione dei parchi urbani. Progetti e tecnologie per gli spazi verdi nella città di Napoli* (CLEAN, 2011) 194.

[40] Comitato per lo sviluppo del verde pubblico, Linee guida per il governo sostenibile del verde urbano (2017).

[41] Comitato per lo Sviluppo del Verde, Strategia nazionale del verde urbano (2018).

Local Green Regulations are legal acts approved by municipalities which establish specific rules regarding the development, maintenance, protection and use of public as well as private green spaces[42].

Scholars have distinguished two types of local green regulations. The first category includes regulations forbidding damages on trees and requiring specific authorization to make interventions on them. Doing so, these regulations establish a 'conformative' constraint within the limit of proportionality. On the other hand, the second category concerns regulations which provide stricter rules, like the mandatory replacement of a tree that was removed or an alternative payment of an indemnity. In this case, acts are based on the assumption that private green spaces are considered public goods. According to the doctrine however, these regulations may be incompatible with the current legislation and the limits of local regulation powers[43].

The latter legal aspects that were analyzed concern legal tools specifically designed with the purpose of promoting green infrastructures in their territory. However, it is also important to mention cases in which climate change adaptation measures are included within the land-use regulations. An example of innovative strategy implemented by municipalities is the integration of specific index and standard requirements into building regulations. The city

[42] These local green Regulations are approved under art. 7 of Legislative Decree No. 267 of August 18, 2000, since the content of these regulations is related to the fundamentals and original functions of municipalities *ex* Art. 118, par. 2, and Article 117, par. 6, of the Constitution. Regarding this latter aspect, see Mari (n. 32) 59.

[43] Benedetto Graziosi, 'I nuovi Regolamenti Comunali per il verde urbano e la pubblicizzazione del "verde privato"' (2012) 6 Riv. giur. edilizia 189, 198.

of Bolzano[44] as well as several other municipalities[45] provided the Building Impact Reduction index to be respected for new buildings and building renovations. An analogous index named as Climatic Impact Reduction was established by the city of Milan. These indexes define a ratio between green surfaces and non-green surfaces that has to be respected in order to limit waterproofing of the surfaces. An analogous example is also the case of Building Regulations requiring a minimum quota of green rooftop for specific types of buildings. Therefore, even in these cases, local authorities implement the mainstreaming of adaptation through 'conformative powers' that directly impact on *ius aedeficandi* of private property owners[46]. Such measures contribute to increasing the green surface of the municipal territory by reducing not only the risk of heat waves hereby examined, but also water related risks. However, the water sector and the management of risks associated to it are mainly managed through a supra-municipal governance system. Considering that this multilevel governance system significantly conditions local decisions regarding climate adaptation on water sector, a specific analysis regarding this topic is presented in the next paragraph.

## PART 3. THE MULTILEVEL MANAGEMENT OF WATER RELATED RISKS

The increase in temperature and the variation of the frequency and intensity of rainfalls exacerbate hydraulic as well as geo-hydrological risks[47]. They represent risks that particularly

[44] The Building Impact Reduction index is established under Art. 19 of the Building Regulation of the city of Bolzano.

[45] The Building Impact Reduction index was provided by the municipality of Bologna (Art. 56 of Building Regulation of the municipality) and the municipality of Reggio Emilia (Sub-attached A6 of Building Regulation of the municipality), among others.

[46] Regarding this aspect, see Stefano Fanetti, 'Adattamento ai cambiamenti climatici e proprietà edilizia in contesti urbani' (2019) Annuario di diritto comparato e di studi legislativi 227, 253.

[47] Spano (n. 2) 44.

affect Italian territory since 91% of Italian municipalities are located in flood and landslide risk areas[48].

The subject is mainly regulated under part III of the Italian Environmental Code which sets out a complex governance system aimed at risk planning and prevention[49], by explicitly defining the distribution of competence among different authorities[50].

The main institution for hydrogeological system protection is the River Basin District (RBD) Authority, which is established in each RBD area recognized by Article 64 of the Environmental Code[51]. The authority develops the basin district plan, a sectorial land plan representing an informational, normative and technical-operative tool which it uses in order to plan and determine actions and rules to protect and valorize the soil and to guarantee the correct use of water resources[52].

The basin district plans have a general normative content with directives and guidelines aimed at coordinating the use of planning power of public authority. These plans may also contain prescriptive provisions which bind upon public authorities, but they also may produce this legal effect towards private entities as well[53].

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[48] Alessandro Trigila *et al*, *Dissesto idrogeologico in Italia: pericolosità e indicatori di rischio* (Rapporto 287, Ispra, 2018).

[49] Some of the provisions which discipline this topic are the result of the transposition of European Directives, especially the Water Framework Directive 2000/60/EC and the Floods Directive 2007/60/EC.

[50] The competences are determined under Articles 57-63 of the Environmental Code.

[51] According to Article 64 of the Environmental Code, Italy is divided into 7 river basin districts.

[52] Art. 65, par. 1, of the Environmental Code.

[53] Art. 65, par. 4, of the Environmental Code. Concerning this issue, see Paola Lombardi 'Il rischio idrogeologico: paesaggio, ambiente e governo del territorio nella prospettiva degli strumenti di pianificazione' (2019) 2 Rivista giuridica di urbanistica 236.

Basin district plans may be developed and approved as sub-basin plans or component sectoral plans[54]. The hydrogeological system plan is an example of the latter type of plans, aiming to identify the areas with hydrological risks and to determine the restrictions and other measures to take in the same areas. The hydrogeological system plan is a component of the basin district plan and it has the same legal nature as well as the same purpose of the basin district plan[55]. Therefore, the hydrogeological system plan is a logic and functional *prius* over urban planning, acting in the same way as the basin district plan[56]. Consequently, the hydrogeological system plan may also produce legal binding effects on public and private entities[57] and for this reason, municipalities are not allowed to grant building authorizations in contrast with the provisions of the hydrogeological system plan[58].

The flood risk management plan is another important planning tool developed by the Authority of river basin districts. It was introduced under the Italian transposition of the Directive 2007/60/EC and aims to prevent, protect and prepare for flood events. For this purpose, preliminary maps of flood hazards and risks are developed by the authority and the regions. While flood hazard maps provide information regarding the probability of flood events in the area, flood risk maps determine potential negative impacts of floods by subdividing the area into four risk categories within the three scenarios defined in the flood hazard maps[59].

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[54] Article 65, par. 8, of the Environmental Code.

[55] Corte Costituzionale sentence No. 232 of July 23, 2009.

[56] Consiglio di Stato, IV, sentence No. 2563 of May 20, 2014; Consiglio di Stato, IV, sentence No. 3780 of June 22, 2011.

[57] Cassazione penale, III, sentence No. 55003 of June 16, 2016; Consiglio di Stato, IV, sentence No. 6438, of September 26, 2019.

[58] Cassazione penale, III, sentence No. 55003, of June 16, 2016.

[59] Maria Alessandra Sandulli, 'Cambiamenti climatici, tutela del suolo e uso responsabile delle risorse idriche' (2019) 4 Rivista giuridica dell'edilizia 291.

Public authorities conform to the provisions of flood risk management plans, for instance, by respecting provisions related to urban planning[60]. The explicit reference to Art. 65, par. 4, of the Environmental Code in the latter provisions may be interpreted such as that these plans produce legally binding effects on public and private entities as well as the basin district plans.

The competence of local authorities regarding the regulation of hydrogeological and hydraulic risks are therefore particularly limited, as the functions are mainly performed by the RBD Authority[61]. From an organizational perspective, in accordance with Art. 63, par. 5, of the Environmental Code and the provisions of statutes of the authorities[62], municipalities are not part of the Permanent Institutional Conference, which constitutes the deliberative body of the Authority that adopts the aforementioned plans[63].

Within this context, river contracts may contribute to enhancing the participation of municipalities in decision-making processes related to the issue. River contracts were officially acknowledged for the first time within an international context at the Second World Water Forum where they were defined as an instrument for promoting the adoption of a rule system

[60] Art. 7, par. 6, of the Legislative Decree No. 49 of February 23, 2010.

[61] Paola Lombardi, 'La città ed il rischio idrogeologico tra vecchie e nuove competenze' (2016) 2 Il Piemonte delle Autonomie. The competences of municipalities regarding hydrogeological and hydraulic risk management may differ among the regions, in accordance with Art. 62, par. 1, of the Environmental Code.

[62] The reference is to the statute's provisions of the following RBD Authorities: RBD Authority of Eastern Alps; RBD Authority of Po river; RBD Authority of Northern Apennines; RBD Authority of Central Apennines; RBD Authority of Southern Apennines.

[63] The competences of the Permanent Institutional Conferences are defined under Art. 63, par. 6, of the Environmental Code.

in which public interest, economic performance, social value and environmental sustainability are equally effective for the redevelopment of a river basin[64].

Under the influence of the international debate as well as the European experiences[65], the use of river contracts has spread in Italy as well. Initially, river contracts were legally acknowledged by some Regions within their legislation, as in the Region of Lombardia, or included in the Regional Water Protection Plan, as in the Region of Piemonte[66]. An early national framework was the *National Charter of River Contracts*, which is a soft law act, approved during the *5th National Table on River Contracts*, which contains information regarding the purpose and the adoption procedure of river contracts[67]. Subsequently, in 2015, common criteria and requirements were defined aiming to harmonize the interpretation of river contracts[68] and a national legal recognition of the tool was set out by the Italian legislator with the amendment of the Environmental Code[69].

River contracts are currently regulated under Art. 68 *bis* of the Environmental Code, defined as voluntary instruments of negotiated and strategic planning meant to protect and ensure good management of water resources, enhance fluvial landscape and safeguard from hydraulic risks. Therefore, river contracts may contribute positively to the development of climate change adaptation processes: unsurprisingly, the National strategy for climate change

[64] Maria Laura Scaduto, *River Contracts and Integrated Water Management in Europe* (Springer, 2016) 4.

[65] On river contracts cases in Europe, see Scaduto (n. 64); Andrea Bianco and Giorgio Pineschi, 'I contratti di fiume nel contesto normativo europeo e nazionale' in Massimo Bastiani (ed.), *Contratti di fiume. Pianificazione strategica e partecipata dei bacini idrogeografici* (Dario Flaccovio, 2011) 139.

[66] Scaduto (n. 64) 47.

[67] Adele Portera, 'I contratti di fiume' (2017) 18 Federalismi.it 1, 18.

[68] Tavolo Nazionale Contratti di Fiume - Definizioni e requisiti qualitativi di base dei Contratti di Fiume.

[69] Art. 59, par. 1, of the Law No. 221 of December 28, 2015.

adaptation as well as the draft of the national plan for climate change adaptation identify river contracts as a *soft* measure to be promoted.

A particularly interesting aspect is that the purpose of these tools is not only implementing the basin district plans but also contributing to the determination of their content, through the participation of local public entities as well as that of local private communities. However, the integration of basin and sub-basin plans made by river contracts has to be coherent with the provisions of the pre-existing basin and sub-basin plans[70].

The river contract is signed by the parties after an inclusive procedure where public authorities as well as private citizens define a 'document of intent' and they collect and exchange information for the definition of the objectives. As the river contract is signed, public authorities and private parties must respect the obligations aimed to the achievement of the objectives set out by the agreement. The approval procedure of river contracts is not formally defined by national law since some indications are defined only in the mentioned recommendations[71]. However, some Regions has formalized the phases of the river contract approval procedure into their legislation[72].

Since Art. 68-*bis* of the Environmental Code does not indicate the legal nature of the river contracts, there is uncertainty regarding this particular juridical aspect. Despite their

[70] See Tavolo Nazionale Contratti di Fiume - Definizioni e requisiti qualitativi di base dei Contratti di Fiume.

[71] Tavolo Nazionale Contratti di Fiume - Definizioni e requisiti qualitativi di base dei Contratti di Fiume.

[72] See Art. 6-*bis*, par. 3, of the Regional Law of Molise No. 1 of January 24, 2018 and Art. 12, par. 3, of the Regional Law of Friuli-Venezia Giulia No. 11 of April 29, 2015. The Region of Campania has defined the constitutive bodies of the river contracts under Art. 4 of the Regional Law No.5 of May 6, 2019, whereas the phases of the approval procedure were determined within regional guidelines.

denomination, river contracts are not considered contracts regulated by civil law[73], but they belong to the category of "public-private agreements". Considering the definition provided by regional legislations[74] and the legislative references contained in some river contracts[75], they may be considered negotiated planning agreements[76]. These agreements are negotiated among public actors as well as public and private actors with the purpose of implementing united development actions, after an evaluation of the competences of the parties[77].

Therefore, river contracts constitute an important tool to be promoted within a new framework of a consensual urban and district basin planning, which could positively impact on the management of hydraulic and hydrogeological risks through the enhancement of participation by local authorities and civil society under the principle of vertical and horizontal subsidiarity[78].

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[73] Loretta Moramarco, 'I "contratti" di fiume: gestione negoziata del territorio fluviale per la tutela delle acque e la mitigazione del rischio idrogeologico (art. 68 *bis* cod. ambiente introdotto dall'art. 59, l. 28 dicembre 2015, n. 221)' (2017) 5 Le Nuove leggi civili commentate 910.

[74] Art. 2, par. 1, of the Regional Law No. 5 of May 6, 2019 of the Region Campania; Art. 40 bis, par. 1, of the Regional Law of the Region Calabria No. 19 April 16, 2002.

[75] See *ex multis* the river contract of Torrente Sangone basin, the river contract of Torrente Agogna basin, the river contract of Torrente Belbo basin. In the documents of the river contracts of Olona-Bozzente-Lura, Seveso and Northern Lambro, river contracts are qualified as 'local development framework agreements' (Accordi Quadro di Sviluppo Territoriale) under art. 3 of the Regional Law No. 2 of marzo 14, 2003, which are regional negotiated planning tools.

[76] The "public-private agreements" are regulated under Art. 2, par. 203, of Law No. 662, of December 23, 1996.

[77] As highlighted in Gianluca Maria Esposito, *Amministrazione per accordi e programmazione negoziata* (Edizioni scientifiche italiane, 2000) 55 ff and Antonio Barone, 'Urbanistica consensuale, programmazione negoziata e integrazione comunitaria' (2001) 2 Rivista italiana di diritto pubblico comunitario 261, this type of agreement differs from the category of agreements regulated under art. 11 of Law No. 241/1990.

[78] Emanuele Boscolo, *Le politiche idriche nella stagione della scarsità. La risorsa comune tra demanialità custodiale, pianificazioni e concessioni* (Giuffrè, 2012) 85 ff.

Besides this instrumentation, the aforementioned measures for the reduction of soil waterproofing[79] also represent a local climate change adaptation response that mitigates these types of water related risks. In this regard, some Regions[80] recently introduced provisions that turn the respect for the principle of hydraulic invariance[81] into a mandatory rule for the municipalities of their territory, aiming to reduce and mitigate floods and hydrogeological risks. In these cases, this has resulted in that compensatory actions must be carried out in the case of soil proofing reduction compared to pre-transformation conditions.

The general reduction of precipitation events on Italian territory is another relevant climatic stress factor for urban areas, and it will increase the frequency of droughts and water scarcity[82]. In a national context, the main institution responsible for the management of water scarcity risks is the Permanent Observatory of water uses, which was set up in each basin district under specific protocol agreements. The main functions of the Observatory is the collection, updating and divulgation of data regarding water use and availability as well as the definition of proposals for regulation of water withdrawals. However, the activities and the role of the Observatory may differ depending on the severity of the water scarcity. In the case of low and medium severity scenarios, for instance, the Observatories become the steering

[79] See the end of paragraph No. 2.1.

[80] Regional Regulation of Lombardia No. 7 of November 23, 2017 under Art. 58-bis of Regional Law No. 12 of March 11, 2005 and the Regional President Decree of Friuli Venezia Giulia No. 83 of March 27, 2018 (Regulation) under Art. 14, par. 1, lett. k) of Regional Law No. 11, of April 29, 2015.

[81] In Viviana Pappalardo *et al.*, 'A hydraulic invariance-based methodology for the implementation of storm-water release restrictions in urban land use master plans' (2017) 31(23) Hydrological Processes 4046 <10.1002/hyp.11318>, hydraulic invariance is defined as *‹‹the condition for peak flow release from transformed areas to remain unvaried before and after land transformation››*.

[82] Spano (n. 2) 61.

committee for the management of events through assessing and proposing measures to be implemented for the mitigation of water scarcity [83].

Besides the activities of the observatory, the Drought Management Plan may also positively contribute to drought risk management in district territories. The Drought Management Plan is an instrument that should *‹‹provide a dynamic framework for an ongoing set of actions to prepare for, and effectively respond to drought››*, coherent with a risk management based approach[84]. However, since its adoption is not mandatory[85], a specific Drought Management Plan was drawn up only by the RBD Authority of the river Po[86].

As was illustrated within the analysis of this paragraph, the core of the administrative activities related to the management of water risks consists of planning activities. Alongside the sectorial plan examined so far, the civil protection plan represents another essential legal tool in local adaptation processes since it constitutes a municipal fundamental function which might enhance local disaster preparedness to the increase of frequency and intensity of the risks hereby examined. In the framework of an article concerning legal aspects of local climate adaptation, considering the relevance of such tool, this category of plans will be examined in the next paragraph.

[83] A common methodology for the monitoring activities of the Observatories was set out in specific guidelines drawn up by the Technical Committee of national coordination of the observatories, established under the Managerial Decree No. 475/STA – 2016.

[84] European Commission, *Drought Management Plan Report. Including Agricultural, Drought Indicators and Climate Change Aspects* (Technical Report - 2008 - 023) 6.

[85] The Drought Management Plan belongs to the category of supplemented plans of the RBD Authority provided by the Article 13, par. 5, of the Directive 2000/60/EC, the adoption of which is not mandatory.

[86] The Drought Management Plan of the RBD Authority of the river Po was adopted under deliberation of the Institutional Committee of December 7, 2016.

## PART 4. LOCAL CIVIL PROTECTION PLANNING: A FUNDAMENTAL FUNCTION FOR MUNICIPAL DISASTER PREPAREDNESS.

According to IPCC reports, risk is the result of the dynamic interaction between the vulnerability of a system, its exposure over time to the hazard as well as the climate-related hazard and the likelihood of its occurrence[87]. The significant increase of the frequency of extreme climate events has therefore seriously elevated the risks for the population. Within this context, considering adaptation in human systems ‹‹*the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities*››[88], disaster preparedness is fundamental to this purpose. Disaster preparedness is defined by the United Nations International Strategy for Disaster Reduction as knowledge and capacities developed by different actors *‹‹to effectively anticipate, respond to, and recover from, the impacts of likely, imminent or current hazard events or conditions››*[89]. In coherence with this definition, civil protection (CP) plans might be considered as administrative legal tools contributing to disaster preparation and thus to the reduction of climate-related risks[90].

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[87] Intergovernmental Panel on Climate Change, "Annex I: Glossary" [J.B. Robin Matthews (ed.)], *'Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty'* (In Press, 2018).

[88] Ibid 556.

[89] United Nations International Strategy for Disaster Reduction (UNISDR), *Terminology on Disaster Risk Reduction* (Geneva, Switzerland, May 2009) 21.

[90] The adoption of municipal CP plans became mandatory under the provisions of the Law-Decree No. 59 of May 15, 2012, converted, with amendments, by Law No. 100 of July 12, 2012.

CP planning as well as the coordination of rescue activities in disasters are a fundamental function of municipalities[91]. CP plans are drawn up not only by municipalities but also by Regions, Provinces and the authorities of the optimal territory size. The optimal territory sizes are determined by Regions within their civil protection plans with respect to the principles of subsidiarity, differentiation and adequacy and in coherence with the general criteria defined under a directive of the President of the Council of Ministers *ex* Art. 15 of the CP Code [92]. These perimeters are areas including one or more municipality with the purpose of optimizing CP activities, especially for small towns devoid of adequate human and technical resources [93]. With the 2020 amendment of the CP Code[94], optimal territory size plans are no longer drawn up by the municipalities of the area but by the Provinces, as long as it is not determined differently by regional laws [95]. An adequate participation of municipalities in the development and approval of the optimal CP territory size should be reasonably guaranteed within the national directive as well as regional guidelines, with the aim of facilitating the maintenance of coherence among plans.

Municipal CP plans are approved by the municipal council with a collegial deliberation, which encompasses the specification of revision and update procedures, and they are developed in accordance with the criteria and modalities defined with the directive *ex* Art. 15

[91] Art. 12, par. 1, of the CP Code and Law-Decree No. 78 of May 31, 2010, converted into Law No. 122, of July 30, 2010. Fundamental functions of Municipalities are determined under State Law in accordance with the lett. p), par. 2, of Art. 117 of the Constitution.

[92] Legislative Decree No. 1 of January 2, 2018.

[93] This provision is a derogation from Article 14, par. 27, of Law-Decree No. 78/2010 which includes CP among the fundamental functions of municipalities.

[94] Legislative Decree No. 3 of February 6, 2020.

[95] Number 2), lett. o), par. 1, of Art. 11 of the CP Code.

of the CP Code and the regional guidelines[96]. For this reason, the minimum content of the municipal plan may differ among the Regions.

However, within the context of the purposes specified under Art. 18, par. 1, of the CP Code, as observed by the doctrine, municipal plans should provide at a minimum the following information: territory mapping; identification of different types of risks; emergency action procedures; emergency areas; risk scenarios; emergency management structures; rescues coordination center, mixed operative center, municipal operative center; chain of command and organization of activities[97].

Normative provisions concerning public participation are a relevant innovation introduced by the CP Code. More in detail, the CP Code ensures that public participation of single and associated citizens[98] as well as volunteer organizations[99] in CP planning processes is guaranteed. The participation modalities of CP activities are defined through a President of Council of Minister directive[100], which has not yet been approved.

According to the draft of the directive published online[101], public participation is not merely a public communication or a public consultation, but a type of governance where the contribution of citizens makes administrative action more efficient and transparent. Within

[96] Lett. b), par. 1, of the Art. 11 of the CP Code.

[97] Vincenzo Pepe, 'La gestione dei rischi nel codice della protezione civile. Brevi note sul sistema italiano e francese' (2020) 1 *Federalismi.it* 213, 223.

[98] Art. 18, par. 3 and Art. 31, par. 1, of the CP Code.

[99] Under Art. 38, of the CP Code, CP volunteer organizations participate at the development and implementation plan activities and they may ask to public authorities for a copy of CP related studies and researches, within the limits determined by Law No. 241/1990 and Legislative Decree No. 33/2013.

[100] These elements will be defined through the same directive that disciplines the modalities of CP planning activities, under Art. 18, par. 4, of the CP Code.

[101] The draft of the mentioned directive is available in the following link: http://www.ancisardegna.it/wp-content/uploads/2019/01/bozza-direttiva-piani-territoriali.pdf. Accessed April 28, 2021.

this participatory governance, not only CP-related institutions and volunteer organizations are included, but also schools and the actors of the economic sector. These provisions are the result of a vision that identifies the inclusive management of the risks as a requirement to make local communities resilient.

Another relevant aspect related to CP planning is regulated under Art. 18, par. 4, of the CP Code. In accordance with these provisions, plans and programs regarding the use as well as protection and redevelopment of the land must be coordinated with CP plans, aiming to ensure coherence with risk scenarios and operative strategies. However, there are some doubts about the interpretation of this rule. Specifically, it is not clear how this obligation of coordination should be intended, since it is not named as an absolute and undoubtedly obligation of conformity. Moreover, it is not specified which the plans that must be coordinated with the CP plan are. In this rule, the superiority and binding nature of the CP plan over the urban plan is therefore not explicitly stated in the same unequivocal way as in the provisions related to the Landscape Plan[102] and the District Basin Plan[103].

Regarding this issue, the draft directive specifies that the purpose of this coordination is to define a direction for the future urban planning with the aim of forbidding new building works in the risk areas identified by the CP plan. The aim is therefore to plan the building intervention in a manner to enhance local resilience over the risks.

In accordance with the draft directive, the purpose of the coordination is also to guide risk adaptation, by including the following features in the Land-Use Plan: the different types

[102] Art. 145, par. 3 and 4, of Legislative Decree No. 42 of January 22, 2004.

[103] Article 65, par. 4, of the Environmental Code analogously establishes that land use and socio-economic development plans must be coordinated with the Basin District Plan. However, the rule states that the Basin District Plan may directly bind public authorities as well as private entities and Art. 65, par. 6, provides powers of substitution to be used by the Regions in case municipalities do not conform to its provisions.

of risks and the hazardous area of municipal territory; equipped areas and infrastructures for the safety and rescue of the population in the event of a disaster; strategic buildings for the organization of rescues; seismic micro zonation data. The directives ex art. 15 as well as the regional guidelines may be categorized as soft law measures which define a unitary policy direction without a legally binding force[104]. However, their provisions may condition the discretion of local administration responsible for urban planning.

Beyond the effectiveness of the aforementioned directive provisions, the choice of local administration not to adapt urban plans to the CP plan would not be coherent with the principle of reasonableness, since the determination of new risk scenarios and areas would depend on the discretion of the same local authority[105].

## CONCLUSIVE REMARKS

The steady increase of climate related risks and the rise of concern regarding their management are inducing a growing global interest on the topic of adaptation over the last decade. Within this issue, cities and towns play a crucial role, considering their high exposure and vulnerabilities to climate change impacts.

The article has presented an analysis of the main legal instruments involved in adaptation processes of Italian municipalities, with a reference to urban greening as a nature-based adaptation solution for heat waves risks, hydric and geo-hydrological risks management

[104] The directive *ex* art. 15 is issued by the President of the Council of Minister on the proposal of the Head of the CP Department, under an agreement to be signed within the Unified Conference or the State-Regions Conference. The directives determine a unitary technical direction for CP activities, respecting the peculiarities of the territories.

[105] Regarding hydrological and hydraulic risks, in case the CP plan set out the same provisions as the Basin District Plan, there would not be the same doubts considering the specific obligations of local authorities to adapt to its provisions (See par. 2.2).

and municipal functions in matters of civil protection. In the light of the results of the investigation, the local adaptation regulation revolves around several sectors which are disciplined under both municipal and supra-municipal planning tools in a framework of different competencies. In particular, water-related risks are mainly managed by supra-municipal authorities. However, the adhesion to agreements such as the River Contracts might enhance the participation of local authorities in the drawing up and the implementation of the supra-municipal plans; the strengthening of local awareness of such risks might therefore conditionate the reorientation of urban policies.

Regarding the planning and regulation set out by municipal administration, a preventative analysis of climate related risks of the territory through a local adaptation plan might facilitate interventions. A systemic approach based on an accurate mapping of local risks might orient the formulation, revision and modernizing of municipal plans so that a better coherence and coordination among local juridical tools would be developed. For this purpose, the definition of national and regional operative guidelines as well as the adhesion to international and European networks might facilitate the proliferation of such approaches and tools, especially in smaller towns devoid of adequate human and technical resources.

In conclusion, with the emergence of this issue, administrative discretion of local authorities is no longer conditioned by environmental interests in the shape of mitigation, but also in the form of adaptation to climate change. As a consequence of this, the mainstreaming of adaptation in administrative decisions through land-use planning and other legal tools examined here have an impact on the legal positions of citizens, with a special reference to their *ius aedeficandi*. These processes could be read as the result of a vision interpreting the sustainable city not only referring to its contribution to cutting GHG emissions, but also

interpreting it as a safe space for climate related risks that compromise its salubrity as well as its integrity, impacting both current and future generations.