

PRESERVATION OF LAND AND WATER RESOURCES

Sectoral Strategic
Guidelines



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THE 10 AREAS OF ACTION OF CDP'S 2022-2024 STRATEGIC PLAN



ENERGY
TRANSITION



CIRCULAR
ECONOMY



PRESERVATION
OF LOCAL
TERRITORIES



SOCIAL
INFRASTRUCTURE



CAPITAL
MARKETS



DIGITISATION



TECHNOLOGICAL
INNOVATION



SUPPORT TO
STRATEGIC SUPPLY
CHAINS



INTERNATIONAL
COOPERATION



TRANSPORT/
LOGISTICS HUBS

KEY MESSAGES

- In the light of ongoing climate change and pressures over commodity prices, **the preservation of the environment and natural resources** plays an increasingly central role in protecting the health and wellbeing of communities, as well as economic sustainability, and is therefore the subject of **numerous global regulatory initiatives** inspired by the guidelines of the UN 2030 Agenda.
- Preserving the territory and natural resources, and in particular water, is **of the utmost importance for Italy given its geographical position in the heart of the Mediterranean Sea**, which is a **climate change hot-spot** characterised by significant overheating and exposure to extreme weather events.
- Italy is paying the price **of decades of poor land stewardship** (high rates of land take, soil sealing, poor prevention of hydrogeological instability, scarcity of green spaces in urban areas), **and inadequate management of water resources** (outdated and inefficient water infrastructure, unsustainable water exploitation and consumption patterns).
- In this context, we can identify **two priorities**:
 - ▶ **actions for preserving land.** Interventions must aim at **mitigating hydrogeological risk, restoring woodland cover, greening urban areas** and enhancing **sustainable and regenerative agriculture systems**;
 - ▶ **boosting the efficiency and sustainable management of the water sector.** Projects should prioritise the **modernisation and upgrading of infrastructure**, encourage greater **reuse of waste-water** and support **efficiency-boosting measures in the agricultural sector**.
- The effective pursuit of the above-mentioned priorities depends on at least two cross-cutting enabling factors: **clear and well-defined strategic national guidelines must be issued** for the different areas of action and **governance structures must be streamlined**. Success will also depend on additional factors specific to the water sector: **implementing a fully integrated, industrial approach to water services management** and **strengthening reward schemes, expanding water data collection** and **aligning water prices** with investment needs in all phases of the water cycle.
- In this area, CDP can play a role, in line with **additionality** and **complementarity** criteria, **to help speed up projects eligible for the National Recovery and Resilience Plan (PNRR) and fill investment gaps** in sectors and territories in which market operators are unable to mobilise adequate resources or in which investment needs exceed the public funds available. An allied strand for CDP is **supporting public administrations** in planning and implementing projects.
- To ensure **transparency** and accountability of decision-making processes, CDP measures the quality and impact of the projects it supports. To do this, CDP uses a **set of monitoring and assessment KPIs** designed for each area of action.




1. Context


1.1
Global reference
framework for
the preservation of
local territories
and water resources

1.2
Italy's
positioning: strengths
and gaps

1. CONTEXT

1.1 GLOBAL REFERENCE FRAMEWORK FOR THE PRESERVATION OF LOCAL TERRITORIES AND WATER RESOURCES

 **The preservation of the environment and natural resources** plays an increasingly central role in protecting the health and wellbeing of communities, as well as the productivity of economic systems. **Climate change**, which manifests itself in a variety of ways (rising temperatures, rising sea levels, water stress, loss of biodiversity, and more frequent, severe and extensive extreme weather events), is jeopardising **the security of the natural capital on which more than half the world’s GDP depends**¹.

 The proven link between the climate crisis, environmental degradation and socioeconomic impacts on communities and businesses has spurred numerous global regulatory initiatives, inspired by the **UN 2030 Agenda**, which sets multiple sustainable development goals directly related to the protection of natural ecosystems and the ability to adapt to climate change. These include, in particular, goal 6 **“Clean water and sanitation”**, goal 11 **“Sustainable cities and communities”**, goal 13 **“Climate action”**, goal 14 **“Life below water”**, and goal 15 **“Life on land”**.


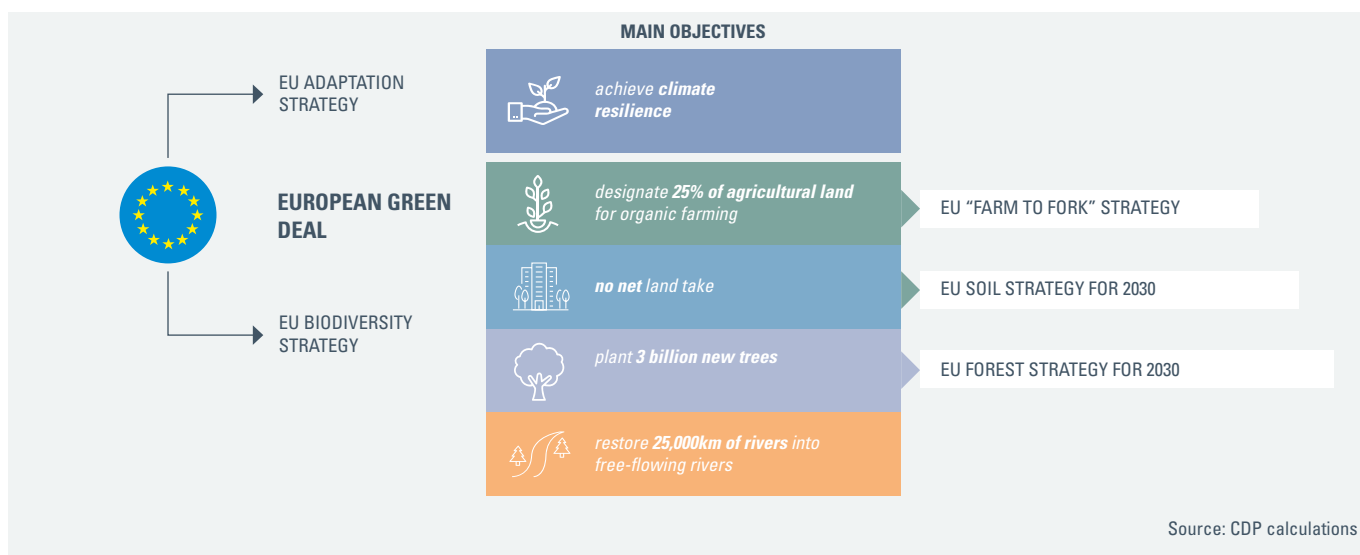
 The **EU’s policy commitment** to meeting the environmental goals of the UN 2030 Agenda is outlined in the **Green Deal** which, in addition to setting ambitious decarbonisation targets to achieve climate neutrality by 2050², promotes the **protection and restoration of biodiversity and natural capital**, the **reduction of soil and water pollution** and the **strengthening of the EU’s capacity to adapt to climate change**³. The Green Deal guidelines on safeguarding the environment and natural resources are further outlined in two key EU strategies: (i) the **New EU Strategy on Adaptation to Climate Change by 2050** and (ii) the **EU Biodiversity Strategy for 2030** (Figure 1). **The New EU Strategy on Adaptation to Climate Change** identifies a series of policy actions geared towards **making the EU climate-resilient by 2050**. Although mitigation actions to reduce climate-altering emissions and limit global warming are the main way to combat climate change, are necessary, too, **actions to adapt to the impacts of ongoing climate change**⁴, all the more so considering that economic losses due to the increasing frequency of climate-related disasters in the EU amount to more than 12 billion euro per year⁵. In order to strengthen climate resilience, the European Commission is promoting a climate change adaptation plan that has the following features: **smart**, by acquiring more and better climate-related data, **systemic**, by implementing nature-based solutions⁶, and **fast**, by securing resources to fill the current investment gap in adaptation projects.

FIG. 1: EU STRATEGIC FRAMEWORK FOR PRESERVING LAND AND NATURAL RESOURCES



¹European Commission, “Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions EU Biodiversity Strategy for 2030 Bringing nature back into our lives”. 2020; World Economic Forum, “The Global Risks Report 2022”, 2022.


²For more details on the energy transition, see the Sectoral Strategic Guidelines for Energy Transition


³The Green Deal is also the reference framework for the 8th Environment Action Programme (EAP), adopted in March 2022, which will guide the development and implementation of European environmental policies until 2030.


⁴See European Environmental Agency, “Climate change adaptation”, 2019.

⁵European Commission, “Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions Forging a climate-resilient Europe - the new EU Strategy on Adaptation to Climate Change”, 2021


⁶Nature-based solutions are all the actions that rely on the sustainable management and use of nature to meet the challenges of climate change. For more details, see section 2.1 of this document.


 **The EU Biodiversity Strategy**, on the other hand, is the policy instrument developed by the EU to put Europe's biodiversity on a path to recovery by 2030, and to play a leading role in biodiversity protection at the global level. The goal is to ensure that by 2050 all of the world's ecosystems are restored, resilient, and adequately protected.


 The conservation of natural resources not only preserves biodiversity and the environment in general, but simultaneously generates economic and social benefits. In particular, it creates job opportunities, contributes to people's health and wellbeing and has significant cultural value. Depending on the health of ecosystems - terrestrial and marine - different safeguarding techniques are employed: conservation, restoration, remediation and mitigation.

 Among its main lines of action, the EU Biodiversity Strategy aims to:

- **bring nature back to agricultural land**, as also reflected in the European "Farm to Fork" strategy, by ensuring that at least 25% of the EU's agricultural land is organically farmed;
- **address land take**, as further outlined in the new EU Soil Strategy, which is aimed at achieving no net land take by 2050. 60-70% of soils in the EU are subject to severe degradation processes, with a loss of ecosystem services costing the EU around 50 billion euro per year⁷;
- **increase the quantity and resilience of forests**, as detailed in the New EU Forest Strategy for 2030, which proposes planting at least 3 billion new trees in the EU by 2030;
- **green urban areas**, through the dissemination of green infrastructure to reduce air, water and noise pollution, and to provide protection from flooding and heat waves, to be promoted through the adoption of urban greening plans in all cities with at least 20,000 inhabitants⁸;
- **restore freshwater ecosystems**, by restoring at least 25,000 km into free-flowing rivers by removing obsolete barriers and restoring floodplains and wetlands, also in order to achieve the ambitious goals of the Water Framework Directive.

 The protection of freshwater⁹ has long been a global priority, considering that it accounts for only 3% of the water on earth¹⁰. In Europe, of all the sectors regulated by EU environmental policy, water is the one with the **most extensive legislation**.

 The **2000 Water Framework Directive**, a milestone in water protection, has introduced an innovative approach to managing and protecting aquatic ecosystems in an integrated way, with emphasis on the following aspects: protecting people from health and safety risks (**social aspect**); ensuring efficient access to water resources for the population and for manufacturing purposes (**economic aspect**); conservation of resources and the protection of their ecological functions (**environmental aspect** or intergenerational sustainability). More specifically, the directive is based on the **precautionary, preventive and polluter-pays principles** and requires Member States to protect inland surface waters, transitional waters, coastal waters and groundwater, above all through rational use.

 The objective of the Water Framework Directive was to achieve "**good status**" for all surface water and groundwater bodies by 2015¹¹, by preventing deterioration of water quality and quantity, improving water status and ensuring sustainable use based on a long-term protection of available water resources. While the directive was successful in establishing a framework for the integrated management of over 110,000 water bodies in the EU, there have been delays in achieving good status of the water bodies at EU level (currently less than half have achieved this quality standard).

 Overall, the regulatory measures adopted by the EU focus on four areas:

- protection of water resources from **pollution by nutrients and/or other chemicals** from agriculture, household use and industry, through a number of legislative acts (even before the WFD was adopted in 2000). The discharge of untreated

⁷ European Commission, Directorate-General for Research and Innovation, Veerman, C., Pinto Correia, T., Bastioli, C., et al., "Caring for soil is caring for life. Ensure 75% of soils are healthy by 2030 for food, people, nature and climate: report of the Mission board for Soil health and food", Publications Office, 2020.

⁸ The European Commission also intends to strengthen this mission through the adoption of a new EU nature restoration law, which will be presented to the European Parliament in June 2022, with the aim of curbing the net loss of urban green spaces by 2030.


⁹ Freshwater is groundwater or surface water with a low concentration of dissolved salts.

¹⁰ Energy Strategy (Politecnico Milano 1863), Water management report: le applicazioni ed il potenziale di mercato in Italia, 2018.

¹¹ A surface water body with good ecological status shows low levels of distortion resulting from human activity.

or inadequately treated urban and/or industrial waste-water is still today the main point source of water pollution¹².

- **excessive water abstraction**, which is linked, among other causes, to increasing urban population and high demand for water by the agricultural and tourism sectors. To address this problem, the EU Regulation on water reuse (Regulation (EU) 2020/741) was approved, which sets minimum requirements for water quality, risk management and monitoring. The issue is particularly significant considering that several European regions are facing increasingly frequent, severe and prolonged periods of drought, with multiple ripple effects: reduced river and groundwater levels, stunted tree and crop growth, increased pest attacks and forest fires. In Europe, losses caused by **droughts (approximately 9 billion euro per year)** particularly affect the agricultural sector, the energy sector and the public water network¹³;
- **flood risk** in river basins and coastal areas, for which the regulatory framework requires Member States to identify the areas most at risk of flooding and to develop flood risk management plans (Directive 2007/60/EC on the assessment and management of flood risks);
- quality of water intended for human consumption, covered by a specific EU directive¹⁴, the Drinking Water Directive (DWD), which was the first European Citizens' Initiative (ECI). The DWD aims to reduce the consumption of bottled water and **improve access to drinking water** (particularly for the most vulnerable groups).

 Despite the broad scope of European legislation on freshwater protection, its implementation in Member States has been slow; the **failure to meet the objectives** of the Water Framework Directive has been due to lack of investment, poor integration of freshwater protection objectives into other sectoral policies (agriculture, energy and transport), slow implementation of measures and the need to better tackle chemical pollution¹⁵.



¹² EEA, 2018a; EC, 2019b. A point source of pollution is a single identifiable source of water pollution.


¹³ See footnote 5.


¹⁴ Directive (EU) 2020/2184 of the European Parliament and of the Council of 16 December 2020 on the quality of water intended for human consumption.


¹⁵ European Commission, Fitness Check of the Water Framework Directive and the Floods Directive, SWD(2019) 439 final.


1.2 ITALY'S POSITIONING: STRENGTHS AND GAPS

 Strengths	 Gaps
<p>Agricultural area under organic farming higher than the European average</p> <hr/> <p>Extensive availability of renewable freshwater resources</p> <hr/> <p>Good level of technological expertise and research ecosystem in the water sector</p> <hr/> <p>High quality water in the network</p>	<p>High rate of land take and soil sealing</p> <hr/> <p>Significant lack of investment for the prevention of hydrogeological instability</p> <hr/> <p>Lack of urban green spaces</p> <hr/> <p>Unsustainable water exploitation and consumption patterns</p> <hr/> <p>Outdated and inefficient water infrastructure</p>


 Preserving the territory and natural resources, and in particular water, is particularly important for Italy given its geographical position in the heart of the Mediterranean Sea. The Mediterranean basin is indeed a **climate change hot-spot**, i.e. an area subject to more significant overheating than other areas and characterised by strong variability in average temperature and precipitation values. In Southern Europe, a global temperature increase of 1.5°C or 2°C would trigger **water scarcity**, albeit to a moderate extent, which would affect 18% and 54% of the population respectively¹⁶.

 In Italy, in the last 11 years alone, **extreme weather events** related to water have increased at an average annual rate of 25%, affecting 602 municipalities, causing 406 cases of infrastructure damage from heavy rain, 486 floods and 134 cases of river flooding¹⁷.

 In addition to these events, the country has been affected by the drought that occurred in 2022. In the first months of the year, the rate of **rainfall halved** compared to the averages for the period¹⁸. The situation was made worse by the **particularly high temperatures**¹⁹, which increased the evaporation of water from soil, lakes and rivers and the transpiration of moisture from plants.

 In the long term, due to climate change, the **average annual availability of renewable water resources** could fall by between a minimum of 10% by 2030, if an aggressive mitigation approach is adopted, to a maximum of 40% by 2100 (with peaks of 90% for Southern Italy) if greenhouse gas emissions are not reduced²⁰.

 Overall, Italy is among the EU countries that have suffered the **most severe economic losses due to extreme weather events caused by climate change** (1,556 euro per capita between 1990 and 2020, behind France's 1,606 euro, but ahead of Germany's 1,303 euro and Spain's 1,448 euro)²¹. Estimates for the coming years predict a further increase in economic impacts: the effects of climate change could result in an **annual GDP loss of over 110 billion euro** by 2100. Damages are expected to be large for the **agricultural sector** (where yield losses could mean a drop in production estimated at between 12.5 and 30 billion euro) and for the **tourism sector** (where loss of attractiveness due to heat waves and lack of snow during the winter season could cause losses of up to 50 billion euro)²².

 In the light of this scenario, by focusing on land preservation (high rates of land take and soil sealing, desertification, hydrogeological instability, lack of green spaces in urban areas), and natural resources protection, in particular water resources (outdated and inefficient water infrastructure, unsustainable water exploitation and consumption patterns).

¹⁶ Intergovernmental Panel on Climate Change (IPCC), Climate Change 2022: Impacts, Adaptation, and Vulnerability. Chapter 13. Cambridge University Press.

¹⁷ Osservatorio di Legambiente Cittàclima, "Il clima è già cambiato. Le città e le reti di fronte alla sfida dell'adattamento climatico", 2021.

¹⁸ MIPAAF (Ministry for Agricultural, Food and Forestry Policies), Informativa alla Camera del Ministro Patuanelli sullo stato di crisi causato dalla siccità, 13 July 2022.


¹⁹ May 2022 was the warmest on record, beating the value of May 2003; June 2022 was the second warmest June on record.


²⁰ Ispra, "Open ecological transition: where is the Italian environment going?", December 2021


²¹ European Environmental Agency.

²² Euro-Mediterranean Center on Climate Change, "G20 Climate Risk Atlas. Impacts, policy, economics", 2021.

1.2.1 Land preservation


 In 2021, the **share of irreversible artificial land cover**²³ in Italy amounted to 7.1% of the national surface area (against an EU average of 4.2%). Despite the decrease recorded in the resident population, land take in the country has grown unabated in recent years. In 2021 alone, **land take affected over 69 km²**, despite a population decline of 405,000 people. If the rate of land take were to remain at the current level in the coming years, it is estimated that the increase in the amount of land taken by 2050 would put Italy (Chart 1) a long way from achieving the EU targets (no net land take by 2050) and the UN Agenda (aligning consumption with population change)²⁴.

 Land take is generally associated with a **high rate of soil sealing** (2.79% in Italy against an EU average of 1.76%²⁵). This negatively affects the ground's ability to filter and absorb water, increasing the risk of **water scarcity** and **soil degradation** leading in the most extreme stages, to phenomena of **desertification**, notably in the South of Italy (in Sicily, Basilicata, Molise and Apulia more than 55% of the territory is considered at risk of desertification, against a national average of 28%)²⁶. These threats are compounded by further issues relating to **contaminated sites** where human activities have caused changes to the soil, subsoil and groundwater that pose risks to the surrounding environment and human health. These degraded and abandoned areas should be fast-tracked for **remediation and regeneration processes** (there are 271 orphan sites in Italy, mainly concentrated in the most densely populated and urbanised regions, such as Campania, Lombardy, Sicily, Emilia-Romagna and Veneto)²⁷.

 In this context, an important role can be played by **agricultural practices**, in particular organic farming practices, which help to **preserve soil biodiversity and organic matter**. Italy already has a strong organic farming sector, ranking **fourth in Europe** (after Sweden, Estonia and Switzerland) for **agricultural land used for organic crops** (16% against an EU average of 9.1%)²⁸.

 Land take is also a major cause of **overheating of urban areas** (the urban heat island effect), where temperatures are on average about 2°C higher than in surrounding agricultural and natural areas²⁹. **Indeed, more than half of new artificial land cover is concentrated in urban and peri-urban areas**³⁰. This happens often **at the expense of green urban areas**, which cover less than 20% of the total area of provincial capitals and metropolitan cities in Italy. This shortcoming is partly due to the lack of adequate planning (in Italy, **only 8 out of 109 provincial capitals have a Green Plan** for urban greening, an instrument envisaged by the EU Biodiversity Strategy for 2030³¹), but also to the limited amount of financial resources - mainly private - allocated for increasing the number of green spaces in Italy.

 While urbanisation contributes to the depletion of green areas in and around cities, it also leads to the progressive depopulation of rural and mountainous areas, contributing **to the natural expansion of forested areas** on abandoned agricultural and grazing land. Indeed, since the Second World War, Italian forest area has tripled, now covering almost 40% of the national territory and exceeding the share of agricultural area³². However, the progressive weakening of land stewardship practices exposes Italian forests to **increasingly frequent extreme disturbance events** (in 2021 alone, fires affected over 158,000 hectares of forest area), **compromising the valuable functions of woodland, such as absorbing CO² and mitigating hydrogeological risks**³³.

 Land take, soil sealing and abandonment of rural and mountainous areas are compounded by the intrinsic geomorphological fragility of the Italian territory and the increased frequency of intense rainfall events. Together, these factors increase the risk of landslides, debris floods and flash floods, **exposing the territory to the growing threat of hydrogeological instability**. More than **18% of Italian territory is classified as being at high risk for landslides and floods**³⁴. Overall, **Italy is the fourth country in the EU**, after Romania, Bulgaria and Greece, **for percentage of inhabitants (over 15%) living in areas highly vulnerable to natural disasters** (Chart 2)³⁵.

²³ Irreversible land take means the change from non-artificial land cover to permanent artificial land cover.

²⁴ Ispra, "Land consumption, territorial dynamics and ecosystem services. Edition 2022", 2022.

²⁵ Ispra, "Land consumption, territorial dynamics and ecosystem services. Edition 2021", 2021. Although land take often involves soil sealing, novel construction techniques that mitigate this effect (e.g. green roofs or rainwater harvesting tanks) are becoming available and should be appropriately incentivised. See section 2.1 of this document.

²⁶ Ministry for Southern Italy and Territorial Cohesion, The European House – Ambrosetti, "Verso Sud (Looking Southward). Europe's strategy for a new geopolitical, economic, and socio-cultural season in the Mediterranean", 2022.

²⁷ MITE (Ministry of Ecological Transition), 2021.

²⁸ Eurostat, 2020.

²⁹ See footnote 24.

³⁰ See footnote 24.

³¹ ASVIS, "Infrastrutture Verdi urbane e periurbane", March 2022.

³² Istat, updated figure for 2020.

³³ Legambiente, "La bioeconomia delle foreste", 2021.

³⁴ ISPRA, "Landslides and floods in Italy: hazards and risk indicators", 2021.

³⁵ ESPON Database. 2018 figures.

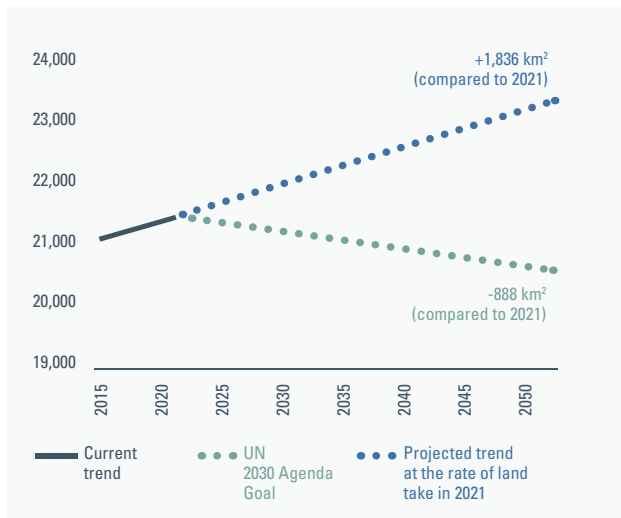
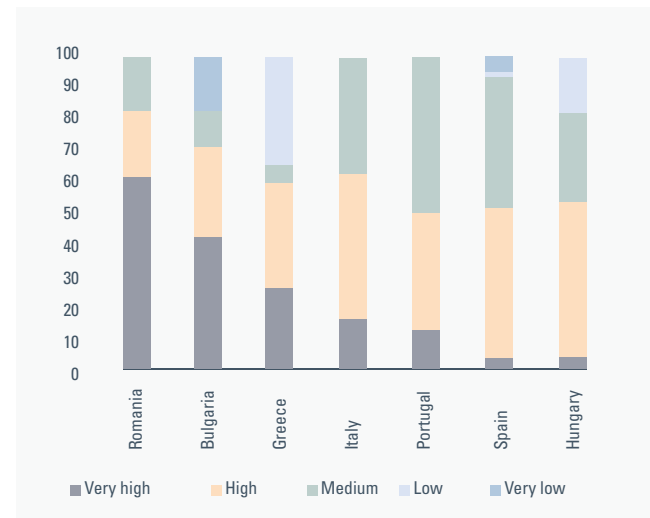
CHART 1: SCENARIOS ON LAND TAKE IN ITALY (KM² OF LAND TAKEN)


CHART 2: RESIDENT POPULATION BY LEVEL OF TERRITORIAL VULNERABILITY (% , 2018)



Source: CDP calculations based on ISPRA, ESPON data



This situation notwithstanding, **investment in prevention continues to be strongly inadequate**: between 1999 and 2021, Italy spent an average of 1.55 billion euro per year on managing emergencies related to hydrogeological instability, compared with only 0.3 billion euro used for prevention measures³⁶. This tendency to “chase the emergency” is attributable, at least in part, to **the lack of clear national policy identifying climate change adaptation as a priority**. Italy is one of six EU countries (together with Sweden, Slovenia, Poland, Malta and Greece) yet to officially adopt a national adaptation plan³⁷.

1.2.2 Preservation of water resources



Italy is a country with **abundant freshwater resources** thanks to its many rivers and lakes, groundwater bodies and abundant rainfall, which naturally irrigate fields and sustain surface and groundwater sources (Chart 3³⁸). However, the country has failed to manage its water resources efficiently and sustainably. For more than 20 years, Italy has held the record among EU countries for the **highest abstraction of freshwater for drinking purposes** from surface water or groundwater bodies (about 9 billion m³)³⁹. These high values are partly due to the wasteful use of drinking water for non-drinking purposes: washing roads and cars, watering gardens and flushing toilets⁴⁰.



The water drawn in Italy is of good quality, as 84.8% comes from underground sources, which are naturally protected and require fewer treatment processes to make the water suitable for human consumption. Accordingly, **Italian water quality is among the best in Europe**⁴¹. Moreover, **Italy ranks 2nd in the European Union for low nitrate presence** in groundwater, another indicator of the high quality of Italian groundwater⁴².



Italy holds the record in Europe for **per capita urban consumption**: 223 litres per day compared to an EU average of 125⁴³ (Chart 4). This is in addition to the other uses of water resources (53% of total consumption is agricultural, 21% industrial, 6% for energy generation)⁴⁴.



With regard to water use in agriculture, **relies heavily on irrigation**: with more than 2.5 million hectares, it ranks second in terms of irrigated land after Spain and fourth in terms of the ratio of irrigated area to utilised agricultural area⁴⁵. Water consumption in agriculture is estimated at around 15-20 billion m³ per year⁴⁶.

³⁶ See footnote 23.

³⁷ European Climate Adaptation Platform Climate-ADAPT.

³⁸ The sum of the internal water flows (the total volume of surface runoff and groundwater generated by rainfall, minus the water lost through evapotranspiration) and external water flows (the volume of water from rivers and aquifers originating in neighbouring territories) of each country. See Eurostat, Renewable Freshwater Resources.

³⁹ Istat, Water abstraction for drinkable use. This figure refers to water for urban use.

⁴⁰ The European House - Ambrosetti, White Paper 2022: Value of Water for Italy, 3rd edition.

⁴¹ See footnote 40.

⁴² See footnote 40.

⁴³ In provincial capitals and metropolitan cities, per capita consumption even reaches 236 litres per day (Utilitatis, Blue Book 2022).

⁴⁴ Economic and Financial Document, 2022.

⁴⁵ Eurostat, Farm and agricultural land characteristics.

⁴⁶ Felici, Maria Luisa, Lo stato dell'irrigazione in Italia, Geologia dell'Ambiente, no. 1/2018

CHART 3: RENEWABLE FRESHWATER RESOURCES (MILLION M³)

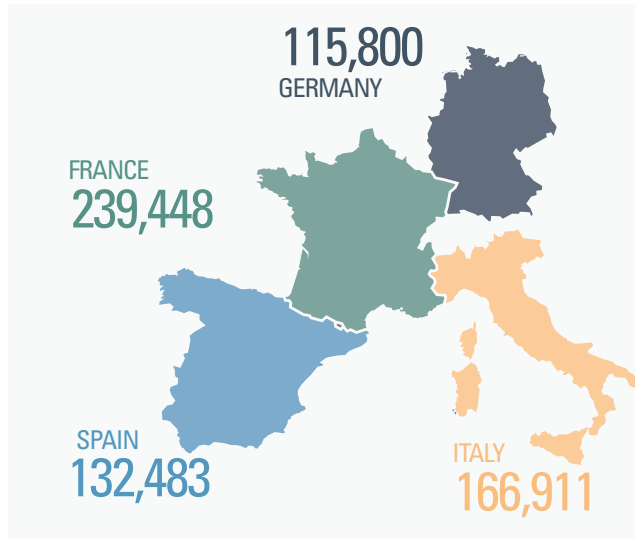
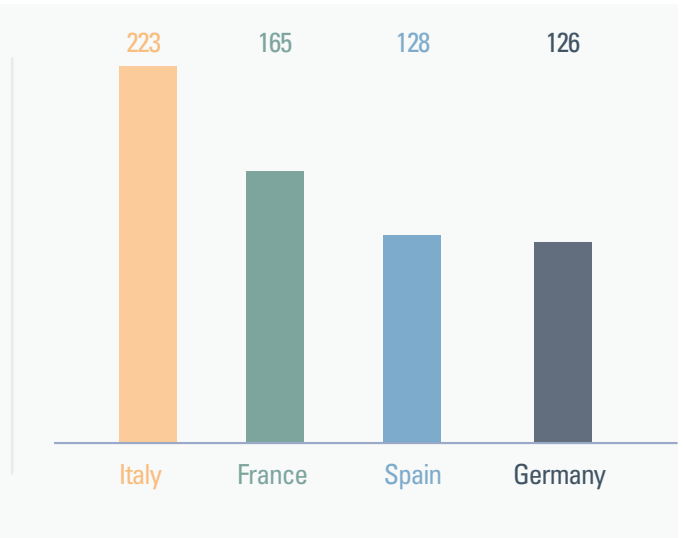




CHART 4: PER CAPITA CONSUMPTION OF DRINKING WATER (LITRES PER INHABITANT PER DAY)





Source: CDP calculations based on Eurostat, EurEau data

Note: Renewable water resources for Italy might be underestimated, as they are only given by the difference between rainfall and evapo-transpiration (without data on external water flows). In both charts, the data are for the latest available year for each country.

 A key aspect of efficient and sustainable water management is the provision and quality of water infrastructure. Italy is home to **532 large dams**, of which only 367 are fully operational, with a total capacity of approximately 13.5 billion m³ and an average age of 65 years⁴⁷. No precise census on the capacity of small-scale reservoirs is available, but a recent estimate counts more than 26,000 artificial reservoirs⁴⁸. A significant proportion of these infrastructures, approximately 40% of large dams and 50% of small dams, fall in high or medium-high risk seismic areas⁴⁹.

 Another key element for efficient water use is the quality of the water distribution networks which, in Italy, are **very old**: 60% of the network is more than 30 years old and 25% more than 50 years old⁵⁰. Infrastructure obsolescence generates **staggering water losses**: 41% of the water fed into Italian distribution networks is lost (more than double of that recorded by France and 7 times higher than in Germany⁵¹, Chart 5).

 Lastly, the sewerage network and wastewater treatment plants are also critical for proper water management. Nearly 3 out of 10 inhabitants (around 18 million) are not connected to a public treatment plant and live in municipalities with no treatment service (339) or in municipalities where wastewater is only partially treated. The **inadequacy of sewerage and wastewater treatment infrastructure**⁵² has triggered, to various extents, several **EU infringement** procedures concerning some areas of Italian territory⁵³.

 This deficit is the result of **low and inadequate levels of investment** compared to the needs that have historically characterised the management of these infrastructures, especially in certain areas of the country (South and Islands). Per capita investments in integrated water management, i.e. the public water supply, remain far below the European average (almost half), despite steady growth in recent years.

⁴⁷ ISPRA, Water resources in the geological context of the Italian territory, 2020. This figure does not take into account subsequent changes due to the construction/demolition or downsizing of existing dams that occurred after the publication of the report. By law, "large dams" are defined as those having a water-retaining structure (dam or weir) (i) exceeding 15 m in height or (ii) creating an artificial reservoir with a volume of at least one million m³ of water. These infrastructures are state-owned, and most of them (309) are primarily for hydroelectric use.

⁴⁸ ISPRA, "Data Yearbook", data for 2021.

⁴⁹ See footnote 48.

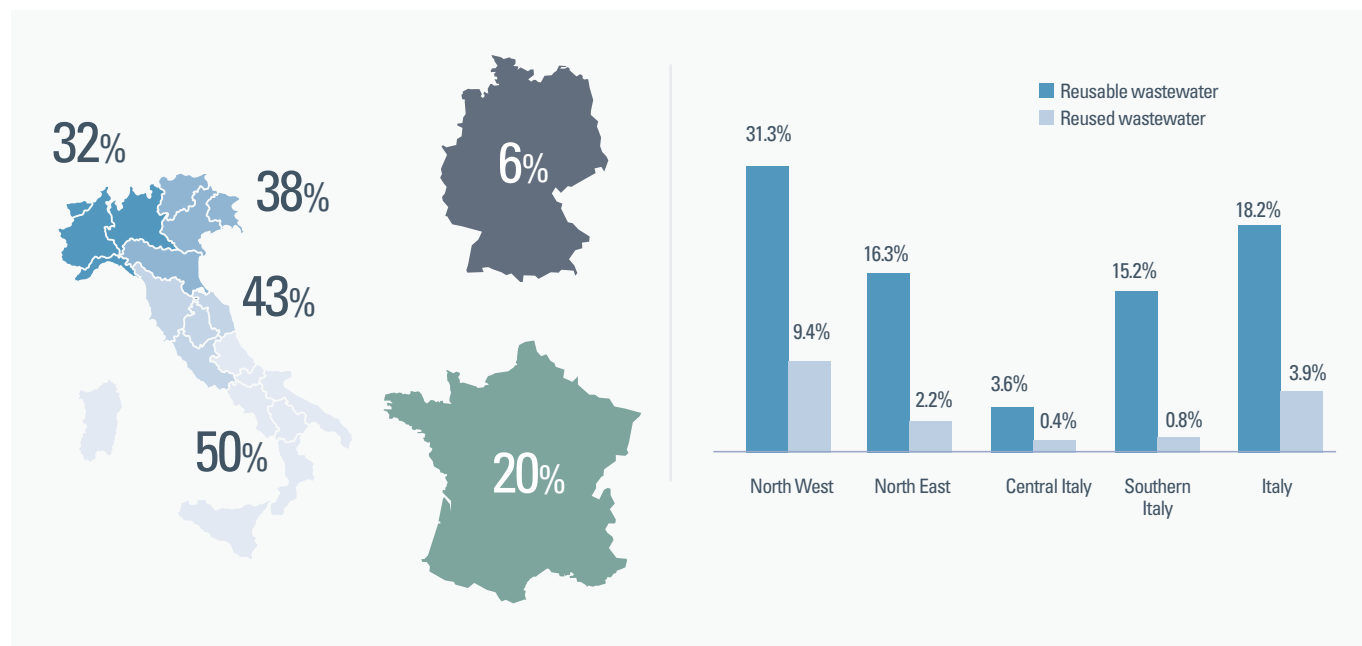
⁵⁰ See footnote 40.

⁵¹ EurEau, Europe's water in figures: an overview of the European drinking water and waste water sector, 2021 edition.

⁵² Utilitatis, Blue Book 2022. Data for 2018.

⁵³ See footnote 52. Approximately 939 towns and cities are affected by the infringement procedures, with an organic load corresponding to a population-equivalent of 29 million inhabitants.

CHART 5: LOSSES IN WATER DISTRIBUTION (%) CHART 6: REUSABLE AND REUSED WASTEWATER IN ITALY (%)



Source: CDP calculations based on EurEau, ARERA data



Despite these weaknesses, the Italian water sector has two significant strengths:

1. Italy is one of the leaders in Europe for the implementation of **wastewater reuse** schemes, third after Spain and France. However, there are wide margins for improvement: against an estimated potential reuse of around 18%, only 4% of wastewater is actually reused at present, almost all of it in the northern regions (Chart 6)⁵⁴. Enabling technologies for treated water to be easily fed back into the network are not yet widespread. Obstacles to the reuse of treated wastewater also include the low cost of water abstracted from the environment and the lack of dedicated networks for the transport and distribution of purified water (only 16 out of 79 wastewater plants are equipped with them), which is therefore mainly transported via existing irrigation canals (indirect irrigation installations);
2. Italy stands out for its good level of **technological expertise** and its research ecosystem, with more citations per year for water-related publications and patent applications for environmental technologies than the European average. In particular, patent applications in the water sector concern technologies for water purification, removal of metals and debris, and methods for recycling and treating waste-water⁵⁵.

⁵⁴ ARERA, Memoria dell'autorità di regolazione per energia reti ambiente nell'ambito dell'esame delle risoluzioni sulle iniziative urgenti per il contrasto all'emergenza idrica, 19 July 2022.

⁵⁵ See footnote 40.



2. Areas of focus and strategic priorities

**2.1
Land preservation**

**2.2
Preservation of
water resources**

2. AREAS OF FOCUS AND STRATEGIC PRIORITIES



1

LAND PRESERVATION: PROMOTING THE TERRITORY'S CLIMATE RESILIENCE, STRENGTHENING ITS ADAPTIVE CAPACITY TO ENSURE THE SAFETY OF CITIZENS AND BUSINESSES, FOCUSING ON HYDROGEOLOGICAL RISK MITIGATION MEASURES, REFORESTATION AND GREENING OF URBAN AREAS AND THE STRENGTHENING OF SUSTAINABLE FARMING SYSTEMS.

2

PRESERVATION OF WATER RESOURCES: PROMOTING MORE EFFICIENT AND SUSTAINABLE MANAGEMENT OF WATER MANAGEMENT, THROUGH THE MODERNISATION AND UPGRADING OF WATER INFRASTRUCTURES, GREATER REUSE OF WASTEWATER AND EFFICIENCY-BOOSTING MEASURES IN AGRICULTURE.

- In light of the situation described in the previous paragraphs, we can identify **two areas of focus** consistent with the activities of Cassa Depositi e Prestiti and the 2022-2024 Strategic Plan:
 - ▶ **promoting the land preservation**, supporting in particular **climate resilience** actions to strengthen the country's **adaptive capacity** as well as **prevention systems and tools**;
 - ▶ **encouraging more efficient and sustainable management of the water sector** through the modernisation and upgrading of infrastructure, greater reuse of waste-water and the implementation of efficiency-boosting measures in agriculture;

2.1. LAND PRESERVATION

- In light of the ongoing climate change, boosting **Italy's resilience will be essential for the safety and wellbeing of its citizens, as well as for the development of companies**, especially in key sectors of the national economy such as agrifood and tourism. In this sense, actions should target two main needs: (i) **strengthening adaptive capacity**, also in order to curb the loss of ecosystem goods and services and (ii) **strengthening prevention systems**, to minimise the human and economic costs of extreme natural events. Based on these considerations, we outline **three strategic priorities**:
 - ▶ **hydrogeological risk mitigation**, including **both structural measures** (projects and actions to control and regulate hydrogeological processes) **and non-structural measures**, focusing on land management and stewardship⁵⁶. More specifically:
 - among the **structural measures**, priority should be given to **nature-based solutions**, including **nature restoration** actions, such as restoring the free flow of rivers and reforesting the most fragile hillsides⁵⁷, and to **green infrastructure for sustainable urban drainage systems** (e.g. bio-retention areas and retention basins to control storm water flow). Resorting to "old-fashioned" measures (consolidation of mountain and hillsides, construction of new embankments, reshaping of riverbeds, weirs, etc.), although sometimes necessary, may further increase land fragility⁵⁸;
 - among the **non-structural measures**, the **development of monitoring networks and warning systems** should be promoted to improve the collection and sharing of geographical-environmental information. This involves the use of satellite technologies and space-based earth observation tools⁵⁹, also in order to streamline the scheduling of **maintenance work** on existing infrastructure;
 - ▶ **support for reforestation projects and urban greening plans**, with a focus on **urban forestation projects**, but also **climate-resilient building and renovations** (such as green roofs and walls, vertical forests, shady tree barriers) as part of broader urban

⁵⁶ The PNRR has moved in this direction by allocating 2.49 billion euro for structural and non-structural measures for flood risk management and hydrogeological risk reduction, with a view to ensuring the safety of 1.5 million people currently at risk (M2C4.2 - Investment 2.1).

⁵⁷ An example of a nature-based solution to combat hydrogeological risk is the restoration and redevelopment programme for the Po River area, aimed at recovering the riverbed and its riparian strips, a project to which the PNRR has allocated 0.36 billion euro (M2C4.3 - Investment 3.3).

⁵⁸ See Legambiente, Protezione Civile Nazionale, "Le buone pratiche per gestire il territorio e ridurre il rischio idrogeologico", 2007.

⁵⁹ Italian Court of Audit, "Gli interventi delle Amministrazioni dello Stato per la mitigazione del rischio idrogeologico", Resolution of 18 October 2021, no. 2017/2021/G.

regeneration projects aimed at **reducing land take** and **de-sealing the soil**. The PNRR has made some progress in this direction by allocating 0.33 billion euro for the protection and enhancement of urban and extra-urban greenery, providing for the planting of at least 6.6 million trees by 2024 in the 14 metropolitan cities⁶⁰. However, to contribute effectively to the European target of planting 3 billion new trees, Italy would have to plant an additional 227 million trees by 2030⁶¹;

- ▶ **promotion of regenerative agriculture and sustainable farming systems** in order to combat soil erosion and degradation, supporting the **spread of organic farming** (in order to meet the EU objectives for 2030, the agricultural area with organic farming in Italy must be increased by 1.8 million hectares⁶²) and **climate-smart agronomic practices**, such as **precision farming**, which is still a limited practice in Italy (in 2020, it was estimated that only 3-4% of the utilised agricultural area in Italy was managed with precision farming, far from the national target of 10% by 2021⁶³), leveraging the opportunities offered by the deployment of new digital technologies (big data, AI)⁶⁴.

2.2. PRESERVATION OF WATER RESOURCES

- The pursuit of optimum water resource management leads to the identification of the following strategic priorities:
 - ▶ **modernisation and upgrading of water infrastructure** in order to make water management more efficient and combat the effects of climate change more efficiently. In particular, it is necessary to:
 - **upgrade water abstraction and supply infrastructure**. Efficient exploitation of reservoirs makes it possible to abstract greater quantities of water, replenish the water table and mitigate the effects of climate change (e.g. floods). It is necessary to restore the full storage capacity of existing dams, which, after several decades, is still to be achieved (out of a total of 532 existing large dams, only 379 are operating without restrictions)⁶⁵. Alternative solutions include the construction of new reservoirs and rainwater harvesting measures (in Italy only 10% of 300 billion m³ of rainfall per year is intercepted⁶⁶). Rainwater harvesting is a particularly suitable solution for (i) areas with scarce surface water, (ii) areas where groundwater is deep or (iii) areas where groundwater cannot be used due to soil conditions and/or water salinity or acidity. Lastly, **desalination** is a valuable method for securing freshwater without affecting groundwater reserves. The **technologies needed** are already available and can generate large quantities of freshwater at ever lower energy costs and with fewer ecological consequences. However, the abstraction of marine or brackish water for drinking purposes in Italy only accounts for 0.1% of total abstraction and occurs in only two river basin districts (Sicily and the Northern Apennines)⁶⁷. On the contrary, this solution is widely used in countries most lacking freshwater, such as Israel, where desalination accounts for 40% of the national supply,⁶⁸ or Spain, the fourth largest country in the world in terms of installed desalination capacity⁶⁹;
 - **modernise and increase the efficiency of water networks**, especially in order to reduce water losses. In Italy, the network replacement rate is 0.42% per year, whereas the rate consistent with a technical lifetime of 50 years should be 2%⁷⁰. Additional strategic actions include: installing sensors on the network to transmit information such as flow rate or water pressure, smart water meters, water simulation software for planning upgrade and optimisation projects, organising water networks into smaller homogeneous sections, with metered connection points, for more efficient and timely management⁷¹. Priority should be given, where possible, to projects in the Apennine and Island river basins, where the network infrastructure is less efficient and losses are higher than the national average⁷²;
 - **upgrade sewage and wastewater treatment systems** to ensure that the water discharged into the natural environment is clean and suitable to feed rivers and groundwater bodies and for reuse. The absence or uneven distribution of wastewater

⁶⁰ See action line M2C24.3 - Investment 3.1.

⁶¹ ASVIS, "Infrastrutture Verdi urbane e periurbane", March 2022. This estimate is based on the ratio of the surface area of Italy to that of the EU-27.

⁶² CDP calculation based on Eurostat data, 2020.

⁶³ Osservatorio Smart Agrifood, "Smart Agrifood: condivisione e informazione, gli ingredienti per l'innovazione", 2020. The 10% target was set by the Ministry for Agricultural, Food and Forestry Policies (see MIPAAF, "Agricoltura di precisione. Linee Guida", 2016).

⁶⁴ See Rete Rurale Nazionale 2014-2020, Ministry for Agricultural, Food and Forestry Policies, "Verso la nuova strategia nazionale per un sistema agricolo, alimentare e forestale sostenibile e inclusivo".

⁶⁵ Le grandi dighe italiane - Una risorsa per il territorio, L'acqua: rivista bimestrale dell'Associazione idrotecnica italiana, 6/2019.

⁶⁶ Utilitalia, Recovery, Coldiretti: bene 4 mld per infrastrutture idriche, attese da anni, News & Media, 23 February 2021, <https://www.utilitalia.it/notizia/253aed9d-45b3-42e4-9cfe-9d6dc6fa034c>

⁶⁷ Utilitalia, Ambiente: dissalazione al palo in Italia, solo lo 0,1% dell'acqua potabile, 20 June 2017.

⁶⁸ Michaela Castelli, Utilitalia e le soluzioni per sconfiggere la crisi: "Pensiamo al mare: è il nostro grande serbatoio", Speciale Acqua, La Stampa, 19 September 2022.

⁶⁹ Info Mercati Esteri, Osservatorio Economico, Dove investire (Spagna), https://www.infomercatiesteri.it/dove_investire.php?id_paesi=92

⁷⁰ Cresme, Rapporto Accadueo, 2018.

⁷¹ Acea, Tecnologia e digitalizzazione al servizio delle reti idriche. In particular, organising the water distribution network into smaller homogeneous sections makes it possible to determine the network's water balance, and hence improve the service, by optimising the search for leaks and isolating portions of the network when necessary.

⁷² See footnote 52.

collection and treatment systems in the municipal territory, especially in areas with scattered housing, mountainous or remote areas, prevents the closing of the water cycle, which is essential to preserve water resources.

- ▶ **increase wastewater reuse** - once treated and processed - to limit abstraction from water bodies, particularly groundwater, reducing human pressure on ecosystems, mitigating conflicts over water use and increasing potable water savings. In particular, this practice must be prioritised (i) in urban use, avoiding the use of drinking water for washing the streets or flushing the toilet, (ii) in industrial uses for washing and cooling plants, (iii) in farming, a sector which uses a large amount of water, where treated water reduces the need for mineral fertilisers, conveying the right amount of nutrients (mainly nitrogen, phosphorus and potassium) and other elements that improve soil fertility, with environmental and economic benefits for farms⁷³.
- ▶ **support for efficiency measures in the farming sector** to ensure water saving and irrigation efficiency. In Italy, the main irrigation method used by farms is sprinkler irrigation, which is not an efficient way of using water. Promoting the adoption of precision irrigation solutions will save significant amounts of water while also improving irrigation efficiency by removing the risk of percolation⁷⁴. Indeed, drip irrigation is the most efficient irrigation method for delivering water and nutrients in the right amounts and at the right time, saving 50% of water compared to traditional systems⁷⁵. Moreover, currently available technologies such as electronics, sensors, information technology and other tools allows for better water management and improvements in crop yield.

- The effective pursuit of the strategic priorities outlined above is linked to at least six enabling contextual factors:

⁷³ Ref Ricerche, "Riuso delle acque depurate in agricoltura: una scelta indifferibile", Position paper no. 158, September 2020.

⁷⁴ Anbi, PAC post 2020 e direttiva quadro acque: Consorzi di Bonifica, ANBI e Irrigants d'Europe rilanciano la sfida sulle risorse idriche.

⁷⁵ Fieragricola, "Il futuro dell'acqua in agricoltura? Irrigazione smart e digitalizzata", Interview with Giulia Giuffrè, Irritec, UN water ambassador, 21 March 2022, <https://www.fieragricola.it/it/il-futuro-dell-acqua-in-agricoltura-irrigazione-smart-e-digitalizzata>;



**3.
Enabling
factors
and CDP's role**

**3.1
Enabling factors**

**3.2
CDP's role**

3. ENABLING FACTORS AND CDP'S ROLE

3.1. ENABLING FACTORS

1. **Developing clear and well-defined strategic national guidelines** for the different areas of action. The failure to adopt a National Adaptation Plan, for example, is one of the main causes of (i) the lack of investment in hydrogeological instability prevention programmes and (ii) the lack of drought risk management proactive measures;
 2. **Simplifying governance structures**, by streamlining the processes and structures involved, which must be assigned specific and defined coordination or implementation tasks. This is especially true in the area of hydrogeological risk mitigation, where the high number of national and local structures involved in decision-making processes has resulted in responsibilities being fragmented which hinders acceleration of expenditure and action⁷⁶. Similarly, in the water sector average project completion time is longer than for public works (5.2 years vs. 4.4 years)⁷⁷. The design phase of water infrastructure projects alone requires 3 separate authorisation procedures, which can involve up to 15 entities across the different phases;
 3. **achievement of full operational capacity for integrated water management**, which is the aim of one of the reforms under the PNRR, to speed up contract award procedures, especially in areas with infrastructure gaps and overcome the water management divide (mainly in the South and the Islands)⁷⁸. Persistent infrastructure gaps are also associated with the high fragmentation of management that characterises the public water supply. 83% of the water service providers are local authorities with very limited investments; the remaining 17% are industrial operators, more than half of which are small-sized;
 4. **promoting and strengthening reward schemes** to incentivise adequate performance levels in the water sector. The Italian Energy Networks and Environment Regulator (ARERA), by regulating the technical quality of the integrated water management, has generated a significant increase in investment expenditure. Besides public water supply, other sectors could benefit from the application of similar rules, setting specific goals to contain wasteful water use, and identifying the actions to pursue them, for example in agriculture by promoting the deployment of more modern and advanced technologies;
 5. **improving the monitoring and collection of data** on water use and water infrastructure. Data on water use is of poor quality at global and national level due to several challenges in data collection⁷⁹: inconsistencies between older and more recent datasets and between different databases; lack of information on agricultural and industrial uses; lack of data for some territories; low monitoring frequency (in some cases every 5 years); local differences and poor centralisation of data collection and monitoring strategies;
 6. **aligning the water tariffs** - which currently stand at EUR 2.11/m³, among the lowest in Europe - with the sector's investment needs. Excessively low water tariffs limit the investment capacity of operators⁸⁰ and discourage citizens from using water responsibly.
- In this context, CDP can contribute to bridging the gaps highlighted, playing a role of **additionality and complementarity** with respect to the market, focusing on the challenges in preserving the local territories and water resources, such as:

⁷⁶ Italian Court of Audit, "Gli interventi delle Amministrazioni dello Stato per la mitigazione del rischio idrogeologico", Resolution of 18 October 2021, no. 2017/2021/G.

⁷⁷ Ref Ricerche, "Riduzione dei tempi delle opere idriche: quali orientamenti?", October 2020, position paper no. 162.

⁷⁸ See footnote 54.

⁷⁹ See footnote 40.

⁸⁰ The data seem to confirm this hypothesis: a clear correlation has emerged between the rates paid by citizens and the investment made by the operator in their area's infrastructure. See Utilitalia, Il servizio idrico in Italia, 2019.

3.2. CDP'S ROLE

- ▶ the **presence of positive externalities**, which limit the ability to fully capture the benefits generated by investments, such as in the case of urban greening, and of **negative externalities**, which limit the costs of unsustainable choices and behaviour (use of intensive farming techniques that contribute to soil degradation and erosion);
 - ▶ **insufficient expenditure and investment** due to the lack of projects with an attractive risk-return profile for market operators, for **hydrogeological risk prevention** projects and for the **modernisation and maintenance** of water infrastructures. Therefore, the growing role of **sustainable finance** can offer an important opportunity to the sector, which already pursues sustainability goals.
- In particular, CDP can take action – also depending on the degree of autonomy it enjoys in the various markets/sectors and on the specific characteristics of the different counterparties – in order to:
 - ▶ **help close the investment gap** in sectors and territories where operators are unable to mobilise adequate volumes of resources, including through the use of **blended finance** instruments and **complementing the public resources already allocated**;
 - ▶ **promote investment** in projects requiring **long-term commitment**, also with respect to the time horizon of public programmes, acting as a catalyst for the resources of other operators;
 - ▶ **support**, also in partnership with other **National Promotional Banks and Institutions (NPBI)**, **initiatives and investment projects** with important positive impacts on national territories related to the protection of natural resources;
 - ▶ **support public administrations** in the management of authorisation processes, also to help **simplify and/or speed up those processes**, in the planning of actions and in project **implementation** and **monitoring/evaluation**, especially for the measures included in the PNRR and the Complementary National Plan;
 - ▶ **improve the technical quality of investments**, by promoting projects linked to facility management plans to ensure effective management and maintenance of infrastructure over the years;
 - To specifically assess the relevance, priority and strategic coherence of actions in the areas of focus identified, CDP applies **additionality and complementarity** criteria, picking the most appropriate operational tools according to counterparty characteristics (type, geographical location, etc.).

The background of the slide features a close-up, slightly blurred view of solar panels. A semi-transparent blue line graph is overlaid on the panels, showing a fluctuating upward trend. The graph has several peaks and valleys, with the most prominent peak occurring in the middle of the frame. The overall color palette is dominated by blues and greens, with a warm, golden light source in the upper right corner, suggesting a sunrise or sunset. Two large, solid blue rectangular blocks are positioned on the left and right sides of the slide, partially overlapping the solar panels and the graph.

4. Recommendations

4. RECOMMENDATIONS

For each area of focus, we provide below a non-exhaustive summary of the **specific strategic guidelines** spelling out CDP's **priority** actions for the **Preservation of land and water resources**.

AREAS OF FOCUS	 <h3>LAND PRESERVATION</h3>
STRATEGIC PRIORITIES	<p>A.1 Promote actions for hydrogeological risk mitigation, both through structural measures, with particular emphasis on nature-based solutions, and through non-structural measures, supporting the development of monitoring networks and warning systems</p> <p>A.2 Support reforestation and urban greening plans, leveraging forestation plans and climate-resilient building and renovations (green roofs and walls, vertical forests, shady tree barriers)</p> <p>A.3 Promote regenerative agriculture and sustainable farming systems to counter soil degradation and erosion, focusing on the uptake of organic farming and climate-smart farming techniques (e.g. precision farming)</p>
AREAS OF FOCUS	 <h3>PRESERVATION OF WATER RESOURCES</h3>
STRATEGIC PRIORITIES	<p>B.1 Modernise and upgrade the water infrastructure, in particular the water abstraction infrastructure, the water networks and the sewerage and wastewater treatment systems</p> <p>B.2 Increase wastewater reuse - once treated and processed - to limit abstraction from water bodies, particularly groundwater</p> <p>B.3 Support efficiency measures in the farming sector to ensure water saving and irrigation efficiency</p>

cdp 