European Investment Bank

The EU bank

EIB water sector lending orientation: strengthening water security

December 2017

EIB WATER SECTOR LENDING ORIENTATION:

STRENGTHENING WATER SECURITY

CONTENT

Water security is defined as the capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality water for sustaining livelihoods, human well-being, and socio-economic development, for ensuring protection against water-borne pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability. (UN Water)

1. INTRODUCTION

In 2008, "The EIB's Water Sector Lending Policy" set out how the Bank supports EU policy objectives in the water sector. This lending guidance revisits the investment priorities identified in that document in light of developments since its publication.

In the EU, new infrastructure requirements to achieve compliance with the requirements stipulated in the Urban Waste Water Treatment and the Drinking Water Directives is nearing completion, albeit some additional investment is still needed to attain 100% compliance. The water management challenges in the EU are now increasingly shifting to mainly operating, maintaining, upgrading and renovating water infrastructure systems, tackling emerging pollutants and implementing the requirements under the Water Framework and the Floods Directives.

Internationally, the UN's Millennium Development Goals have been superseded by 17 Sustainable Development Goals and 169 integrated and indivisible targets for attaining sustainable development by 2030. These include a series of targets designed to focus on all aspects of the water cycle and designed to provide water security which is a precondition for attaining sustainable development. They include, inter alia, targets for adequate sanitation and access to safe drinking water for all by 2030.

While EIB investment has so far primarily contributed to drinking water and sanitation infrastructure, **sustained investment is needed to avert risks to water security**. The quantity of good quality water available to mankind is threatened due to pressures from changes in demography, climate, and land use, as well as from increasing demand for food and energy. These pressures are expected to persist well into the 21st century. Lack of water security, and more generally sustainability, could translate into loss of growth and jobs and lead to social and political tensions, and possibly national or international conflict, having an impact on the global value chains of businesses and increasing migration pressures.

Water investments are fully in line with the Bank's overall policy goals (infrastructure, environment, innovation and SMEs), while at the same time often contributing directly to its transversal objectives (cohesion and climate action). The EIB provides strong value-added through its water lending. Through different financial products, the Bank has the ability to finance all relevant players from national, regional, and municipal operators to private operators as well as SMEs and industries. The Bank's long-term lending makes it a particularly suitable financier of the water sector's needs, where investments have long economic lives, often well above 25 years.

The EIB is the largest IFI lender to the global water sector, having provided EUR 64 bn to 1400 water projects, contributing to investments amounting to EUR 200 bn. However, the estimated average global investment needed into all forms of water infrastructure is a staggering EUR 640 bn per year until 2030.

This document explains the Bank's investments orientation in the sector. It provides stakeholders with general information regarding the Bank's approach when assessing the acceptability of projects. This document exclusively considers water sector specific topics and focuses in particular on the issue of water security. While addressing water security has a strong social and climate dimension, this document does not make detailed reference to the Bank's E&S safeguards or procurement rules which apply generally to all projects. [1] The document also does not go into the financial or credit aspects of Bank lending. Whether it is for water supply, wastewater treatment, flood risk reduction or other water related investments, the cross-cutting theme is the improvement of *water security*. This is why *water security* is the over-arching topic of this document.

[1] Cfr the EIB's "Environmental and Social Handbook" and "Guide to Procurement" (see www.eib.eu)

Combined with the requirements of the sector directives and other policy drivers, water-related Bank financing should contribute to long-term water security and sustainability. Over the years, the Bank has built up significant experience preparing, reviewing, implementing and monitoring projects. An interpretative document is useful in that it lays out some key principles and useful guidance for the identification or development of projects acceptable for Bank financing.

The bullet points below summarise the most important key requirements that are frequently not met in water investment projects submitted to the EIB. They therefore deserve special attention:

- **Integrated Water Resources Management (IWRM):** Water utilities and water resources management projects should, as a rule, be properly embedded in a long-term holistic planning framework for water resources management (e.g. River Basin Management Plan) and, where appropriate, in relevant national, urban or regional planning frameworks;
- **Option Analysis:** Design of water utilities and water resources management projects and important project components should always include proper analysis of options for attaining the social, economic and environmental objectives of projects. Such analyses of options are also required in Environmental Impact Assessments (EIA). In the EU, they are compulsory under the EIA Directive and, for certain projects, also under the Water Framework Directive and the Habitats Directive;
- **New Water Sources:** Development of new water resources (desalinated sea water or water from inter-basin transfers) is only supported if all alternative demand side measures[2] have been sufficiently considered and no better alternatives are available;
- **Climate Risk & Vulnerability Assessment (CRVA):** For projects and areas that are vulnerable to climate change impacts, the Bank requires promoters to consider climate risks and to incorporate adaptation measures into project planning, design and operation;
- **Cost recovery:** appropriate cost recovery, taking account of affordability issues, needs to be in place, i.e. project-related revenues should cover at least operational and maintenance costs and in any case that the overall revenues from tariffs, taxes or transfers should cover the full project cost;
- **Flood risk management plans:** With the exception of emergency reconstruction measures, all flood risk reduction measures should consider the integration of nature-based solutions and follow the preparation of flood risk assessment and management plans as required in the EU by its Floods Directive and respect the provisions of the Water Framework Directive.

This water sector investment orientation document is by no means exhaustive, but aims to set out some of the key principles that the Bank follows to ensure that it is able to contribute to minimise risks to water security, to maximise the associated benefits and ensure sustainable development.

2. BACKGROUND

2.1 EIB investment in the water sector

As the EU bank, the EIB's objective is to provide long-term finance for sound, sustainable investment projects in support of EU policy goals in Europe and beyond.

Lending to provide support for the implementation of water policies to strengthen water security is a key area of EIB activity. It is one of the largest lenders to the global water sector to date with more than EUR 64bn supporting over 1400 projects. Loans for water and sanitation projects account for EUR 3-4 bn annually, of which 90% are for projects in the EU. On average, EIB financing accounts for about 30% of project cost and thus contributes to investments of EUR 9-13 bn annually. The average project size in the EU is approximately EUR 150 million and around EUR 50 million outside the EU.
Although EIB finance has so far been mainly provided for new or upgraded sanitation and drinking water infrastructure, the Bank increasingly supports projects in other areas such as flood risk reduction, erosion prevention, new water supply (including desalination), new efficient technologies and revitalisation of water courses.

[2] Including leakage reduction and other measures to reduce non-revenue water

The EIB predominantly supports projects in EU Member States. Through dedicated mandates, it also supports projects in: EU Enlargement Countries, countries in the EU's neighbourhood, Africa, Asia, Latin America and the Caribbean as well as Central Asia.

The Bank is committed to making a significant contribution to water security to underpin economic growth.

EIB support to the water sector consists predominantly of direct lending to municipalities and publicly owned utilities. The choice of the form of support is made in accordance with the need of the project or the promoter and available instruments at a given moment. The EIB also provides project loans for public-private partnership projects, and intermediated loans to reach smaller public and private entities, including SMEs, as well as equity and fund investments inside and outside the EU. [3] Where warranted, tailored structured solutions can be developed, such as bond-pooling solutions to reach smaller and riskier promoters and to leverage additional private funding to the sector.

To increase the Bank's value-added, the Bank also helps to ensure that promoters have access to relevant technical assistance where necessary, including helping promoters to access grant funds where available. Specific technical assistance facilities such as JASPERS for EU projects or MeHSIP for projects in Southern Mediterranean countries are available to support project development. There are several other technical assistance facilities to support projects outside the EU. Nevertheless, funds for the provision of technical assistance are limited and the Bank mobilises its resources where the need is greatest and the added value highest, as assessed on a case by case basis.

2.2 Water crises threaten growth and jobs

Water is an important resource to ensure the viability of human settlement, ecosystems, agriculture, energy production and industry. Disruptions in the supply or availability of water of sufficient quality have severe direct, negative impacts, not only on humans and biodiversity, but also on economic activity with disruption of production and value chains. Similarly, excess water in the form of floods poses a risk to human life, nature and economic activity. It has become abundantly clear that society is as dependent on water as it is on supply of energy.

Water also plays a key role in sustaining the ecosystems which ensure availability of clean water resources and in regulating risks of too much or too little water.

Water resources and water security have come under increasing and significant pressure in recent decades. This pressure will continue to mount in the coming decades particularly as a result of, demographic change, economic growth, pollution, land-use change, ecosystem degradation and climate change. [4] [5] [6]

Water crises have thus consistently been identified by the World Economic Forum among the top risks for the global economy, both in terms of likelihood and impact. [7]

If the right investments are not made to respond to these developments and ensure water security, the result will be increasing water scarcity (chronic imbalance between clean water availability and demand) and more frequent and more intense floods as well as droughts, resulting in significant increases in water related risks to health and property.

Water insecurity may lead globally to economic losses in the order of EUR 450 bn annually from flood damage, droughts, irrigation related losses and inadequate water supply and sanitation.[8] These losses would be accompanied by a loss of jobs because 78% of all jobs globally are either heavily (42%) or

[3] Non-exhaustive list of products available. More information on EIB products is available at www.eib.org/products/index.htm
[4] United Nations World Water Development Report 2015, Water for a Sustainable World (2015)
[5] OECD, Securing Water – Sustaining Growth (2015)
[6] IPCC, Climate Change 2014 – Synthesis Report (2014)
[7] See e.g. World Economic Forum (WEF), Global Risks 2014, p. 16.
[8] OECD and GWP, Global Dialogue on Water Security and Sustainable Growth, Policy Statement (2015)

moderately (36%) dependent on water[9]. What is at stake is therefore economic growth, sustainability and jobs. Europe would be especially affected by floods and, increasingly, water scarcity. In developing countries, particularly in South Asia and in Africa, flood risks, water scarcity and pollution and lack of adequate sanitation and access to safe drinking water are all critical issues.[10] Ultimately, water insecurity may lead to disruption of value chains for industries globally and to conflict and increases in migratory pressure.

The WHO estimates that the benefits of providing adequate sanitation and access to safe drinking water for all developing countries are 4.3 times higher than the related costs. The annual benefits if all developing countries investment needs were met would be EUR 235 bn.[11]

Faced with these challenges, business attitudes to water are changing and a substantial number of large companies are now identifying water related risks. A survey of 300 of the 500 largest companies most vulnerable to water insecurity in the FTSE Global Equities Index shows that 68 % of responding businesses consider that water poses a substantive risk to their business. For 22%, issues around water could limit the growth of their business.[12]

In addition to economic losses and job losses, there is the value of lost ecosystems and the services they deliver. The EU Biodiversity Strategy sets as a target that by 2020 ecosystems and the services they support will be maintained and enhanced by including "green infrastructure" in spatial planning and restoring at least 15 % of degraded ecosystems[13]. Given the dependence of life and biodiversity on water, and the need for functioning ecosystems to maintain good water quality, the implementation of this target will contribute to the EU's sustainable growth and help the EU mitigate and adapt to climate change.

2.3 Water security requires investment

Although almost all of the EU has safe drinking water and sanitation in place, scenario calculations show that Europe will not be spared from impacts of global development. By 2050 increased occurrence of floods and droughts will lead to significant risks of negative impacts inter alia on health, biodiversity, hydropower production, thermal power production, inland navigation, tourism and agriculture. Furthermore, the dynamics of water scarcity will be dominated by socio-economic issues. In a scenario with extensive energy use and non-sustainable intensification of agriculture, most of Western and Southern Europe will experience severe water stress in the summer months, which in many areas could be significantly relieved through more sustainable development scenarios in spite of decreasing water availability.[14] To be water secure Europe will have to address these issues.

Water security is a cross-sectoral systemic issue that cannot be resolved by the water sector alone. It requires positive contributions from or investment in all sectors using water or having an impact on water resources in the context of a resource-efficient, circular economy.

Investment in "smart cities" combining cost-effective protection of people and assets against extreme hydrological events through the integration and conservation of green blue infrastructure, the decarbonisation of energy production, energy and water efficiency, water re-use and sustainable waste management have a significant role to play in this context.

[9] United Nations World Water Development Report 2016, Water and Jobs (2016)
[10] OECD op.cit.
[11] WHO, Global costs and benefits of drinking-water supply and sanitation interventions to reach the MDG target and universal coverage, WHO/HSE/WSH/12.01 (2012)
[12] Carbon Disclosure Project, From water risk to value creation, Global Water Report 2014.
[13] The EU Habitats and Water Framework Directives are key instruments for implementing measures to attain this target.
[14] Center for Environmental and Systems Research, Climate Adaptation – modelling water scenarios and sectoral impacts (2011)

There is sufficient water globally[15] to satisfy the water needs of human settlements, ecosystems, agriculture and industry, if the right measures are taken to manage water resources sustainably. That will ensure that water is fit for purpose, so that water of appropriate quality is available for different uses. This can only be achieved with very significant improvements of both water and energy efficiency, which will require substantial investments in the years to come. In the field of flood-risk reduction many measures and investments can also be taken to provide significant and cost-effective protection against floods[16]. However, the measures needed to provide water security are crucially dependent on investment and on appropriate governance to ensure that the right measures are taken and the right investments are made.

In view of the significant investments needed and the inherent uncertainties about future climatic and economic development, care needs to be taken when planning investment to implement solutions which are resilient to changing circumstances and, in this context, to avoid development lock-in and to maintain flexibility in respect to future developments. Where possible and appropriate, priority should therefore in many cases be given to resilience and to investment in scaleable solutions.

2.4 The EU and water security

The EU has been at the forefront of the development and implementation of sustainable water policies that contribute to water security, in particular through legislation on drinking water[17] and urban wastewater collection and treatment[18], the adoption (2000) and subsequent implementation of its Water Framework Directive[19] and its Floods Directive (2007).[20] The two latter Directives have introduced integrated water resources management in EU river basins, including in transboundary river basins.

The Water Framework and Floods Directives built on establishing governance for water resources[21] that will deliver water security through effectiveness, efficiency and trust in water management. The Directives build inter alia on the clear allocation of responsibilities and authorities having the necessary capacity, coherent policies, multi-stakeholder engagement and implementation of the user and polluter pays principles.

In Western Europe, significant additional measures, including investment in the maintenance and upgrade of sanitation services, agricultural water management and water management institutions, will be required to provide water security in the medium and long term[22] [23].

Analysis of EU River Basin Management Plans and associated Programmes of Measures show that European waters are subject to significant pressures originating in sectors outside the remit of water management authorities such as industry, agriculture, energy or transport. For example, more than 92% of EU River Basin Districts report that their waters are subject to significant pressure from agriculture – including diffuse pollution and over-abstraction of water.

In addition, EU climate change policy on mitigation and adaptation itself directly contributes to protecting against climate related risks to water security. Lending for climate related investment projects is however the key element in the EIB's Climate Strategy, with a commitment to allocate at least 25% of overall lending to climate related projects. Articles 7 and 8 of the 2015 "Paris Agreement"[24] of the UNFCCC sets out the internationally agreed framework for climate adaptation. In Article 9 developed countries

[15] "The fact is there is enough water available to meet the world's growing needs, but not without dramatically changing the way water is used, managed and shared", World Water Development Report 2015, Prologue by the World Water Assessment Programme , p. 7, Unesco 2015
[16] OECD, Securing Water – Sustaining Growth (2015)
[17] OJ, L 330, 5.12.98, p. 32
[18] OJ, L 135, 30.5.91, p. 40
[19] OJ, L 327, 22.12.2000, p. 1
[20] OJ, L 288, 6.11.2007, p. 27
[21] For a broader discussion of water governance issues, see e.g. OECD Principles on Water Governance (2015)
[22] In large parts of Western Europe where the Urban Waste Water Treatment Directive is practically 100% implemented projections show that unless measures are taken to improve sustainability, there will likely be severe water stress by 2050 – Center for Environmental Systems Research, op.cit. pp. 73-83
[23] OECD op.cit.
[24] REF

committed to support climate change mitigation and adaptation in developing countries. In the run up to this agreement, the EIB committed to increase its lending for climate action in developing countries to 35 percent of total lending by 2020.

In recognition of the importance of water security for economic development, the 2015 UN Sustainable Development Goals (SDGs)[25] go in the same direction and contain a dedicated goal related to water. In addition to the dedicated goal for water there are goals for a number of other issues such as energy and food security, health, ecosystems, cities, climate change and gender equality[26], which are critically dependent on tackling water security. The SDGs set several water-related targets for the period to 2030. These goals and targets reflect in spirit the latest developments of EU water policy.[27] SDGs include provision of adequate sanitation and access to safe drinking water for all and enhanced protection of water resources and related ecosystems, efficient use of water, resource efficient infrastructure and better use of nature's own capacity by using "green infrastructure" to retain water in order to attain similar water security objectives to those of the Water Framework Directive and the Floods Directive.

The Bank is committed to making a significant contribution to water security to underpin economic growth and proactively seek to extend support to areas where investment can contribute to significant progress.

3. REQUIREMENTS TO WATER-RELATED PROJECTS

3.1 General requirements

This section describes general requirements for water sector projects. Projects that do not comply with these requirements are normally not eligible for financing from the EIB. Requirements that apply to particular types of projects are set out in section 4.

All projects are required to meet the requirements contained in the EIB's Environmental and Social Handbook and Guide to Procurement. This means inter alia that projects in the EU must be fully compliant with EU and any additional national regulatory requirements with respect to environment and procurement, including compliance with relevant River Basin Management Plans. For EU enlargement countries, projects should comply with the basic tenets of EU requirements, including the use of best available techniques[28], and not implement solutions that would prevent subsequent full compliance with those requirements. For other non-EU countries, projects should be as close as possible to satisfying EU legislative requirements, especially with respect to developing and implementing an IWRM approach.

In view of the nexus between water and a number of other sectors, the EIB recognises that a consistent cross-sectoral approach is needed. These requirements, as well as the requirements set out in section 4 below, in any case apply to financing of all water-related projects or water-related parts of projects in other sectors with significant impacts on water resources, even if their main purpose is not water-related (e.g. in sectors such as thermal or hydroelectric energy production, transport and agriculture). More detailed requirements to projects in other sectors are set out in specific EIB guidance documents.[29]

Given the diversity of regional and local components of water related risks, there is no "one-size-fits-all" solution that will deliver water security in all situations. The requirements for projects to be eligible for EIB financing mainly focus on the technical, economic, environmental, social and financial aspects.

Project promoters should ensure that projects are sustainable and document:

- that water utilities and water resources management projects, as a rule, are properly embedded in a long-term holistic planning framework for integrated water resources management (e.g. River

[25] United Nations, Sustainable Development Goals, 17 Goals to Transform our World (2015), see http://www.un.org/sustainabledevelopment/sustainable-development-goals/
[26] See UN Water 2016 – Water and sanitation interlinkages across the 2030 agenda for Sustainable Development
[27] see inter alia A Blueprint to Safeguard Europe's Water Resources, COM(2012) 673 final.
[28] As defined in EU legislation, e.g. in the Industrial Emissions Directive
[29] See e.g. the EIB's Environmental and Social Handbook and EIB's Energy Lending Criteria (www.eib.org)

Basin Management Plan) and, where appropriate, in relevant national, urban or regional planning frameworks;

- that water utilities and water resources management projects are compatible with cost-effective adaptation to climate change by carrying out appropriate risk assessments and identifying major uncertainties. These assessments should inter alia ensure that infrastructure resilience to pressures resulting from long term hydrological change and the avoidance of development lock-in is fully considered at all stages of the design of the project;[30]

- that water utilities and water resources management projects and important project components always include proper analysis of options for attaining their social, economic and environmental objectives. Such analyses of options are also required in Environmental Impact Assessments (EIA) and, in the EU, are compulsory under the EIA Directive and, for certain projects, also under the Water Framework and Habitats Directives;

- that where relevant, notably River Basin Management Plans, Flood Risk Management Plans and EIAs, all stakeholders, including affected and vulnerable communities, have been consulted and have been given opportunities to provide input from an early stage of project development;

- that water and energy efficiency options are fully considered in all water-related projects. Options analysis is a key recurring principle at various stages of project design, particularly at (pre-) feasibility stage and important, inter alia, to prevent financing projects resulting in stranded assets;

- that projects are financially sustainable and that a viable cost-recovery scheme is in place to pay for the investment and its operation and maintenance in accordance with section 3.2 below.

It should be noted that the analysis of options is also a key element of IWRM as well as a pre-requisite for any sound analysis of costs and benefits and of cost-effectiveness.

Finally, with respect to the project promoters, water efficiency is, in addition to its importance *per se*, an important indicator of their planning, operating, and asset management and renewal capacity, which in turn is an important parameter of project assessment in the Bank.

3.2 Financial sustainability

The EU applies the polluter pays and the user pays principles. Polluters and users of water should therefore normally not be provided grant support to meet legal obligations under EU law.

For all water projects, financial sustainability is a key issue. Water investments require financial flows that allow for capital expenditure repayment as well as payments for maintenance and operational expenditure and a credible institutional and management framework to underpin the revenue flows, in order that they deliver the benefits for which they were designed and ensure that their performance is not degraded over time.

While it needs to take affordability into account, tariff-setting policy is essential to ensure financial sustainability. Keeping tariffs low for all consumers may result in a vicious circle of underfunded service providers, insufficient investment, and deteriorating infrastructure and services that further reduce the benefits that users receive from them, thereby reducing their willingness to pay. Malfunctioning water and sanitation systems hurt lower-income users the most. Low tariffs prevent extensions of networks to poorer communities, forcing them to continue paying much higher prices for water from other sources, including informal providers, and obtaining water that may be of inferior quality to piped water [31].

The main rule for EIB-financed projects is that they should ideally be self-financing. They may therefore need to be accompanied by an equitable cost-recovery plan underpinned by a credible institutional and management framework showing the projected revenues associated with the project and how these

[30] Cfr. EIB Climate Strategy, paragraphs 61-63 (2015).
[31] OECD, (2009) Managing Water for All: An OECD Perspective on Pricing and Financing

revenues will be used to pay for the capital expenditure and for the operational costs associated with the investment.

Financing of projects through general taxation is not always best practice as, in many cases, it may lead to an undesirable type of redistribution of income, with scarce public funds disproportionately favouring the wealthier population segments. It also does not promote efficient use of the sometimes limited resources.

For projects with high positive externalities and when affordability is a general issue, revenue can come from a combination of tariffs, taxes and transfers (so-called "3Ts"). However, in all cases it is expected that revenues from beneficiaries should at least cover operational and maintenance expenditure.

However, for some projects, benefits may be so fragmented that cost recovery directly from the beneficiaries is impractical and other solutions to ensure financial sustainability need to be identified. In these cases and in cases where projects generate insufficient revenues, either because of the nature of the project (eg flood risk reduction), innovative characteristics or because of affordability issues, the EIB requires from the promoter a plan to ensure a viable financial sustainability of the project in the medium term.

4. STRATEGIC PROJECT AREAS

This section describes requirements to projects in addition to those set out in section 3.

The priority responses to the water security challenges depend on local and regional circumstances, and should encompass a cost-effective set of measures that in combination will provide an outcome consistent with sustainable management and use of water resources. Many measures to strengthen water security require important investments in projects that can generally be classified into the following strategic areas: sanitation and water supply ("utilities") projects, water resources management projects, industrial water management projects and innovation projects.

While projects in the EU are required to comply with legislation as set out in Section 3, the main focus for projects outside the EU, in particular in developing countries with inadequate sanitation or without access to safe drinking water, is in the first instance on contributing to water security by financing the establishment of such basic services whilst taking the necessary water related measures to adapt to climate change. The priority is the support for investments, which contribute to lasting water security. This also requires taking an Integrated Water Resources Management approach to have a holistic view of possible risks that can affect primary project objectives.

4.1 Water Utilities

Water services are generally provided to both citizens and businesses. Many companies, especially in the SME segment, receive their water from and discharge their wastewater to water utilities.

Water utilities require very significant investments which have long payback times. A recent estimate (2013)[32] finds that water infrastructure globally would need investments of EUR 640 bn per year until 2030 to support economic development, or approximately 20% of the total infrastructure investment required. The needs are comparable to those of the power sector for which the needs are also estimated at about EUR 640 bn per year until 2030. Europe is no exception with respect to the investment needs in both water and energy.

Utilities are in some cases run directly by public authorities. In other cases, they are run by companies which are owned by one or more public authorities, or they may be private companies operating under a concession from a public authority. Independently of who offers these services, their assets may be privately or publically owned. In some cases, owners wish to merge several utilities in order to have economies of scale.

4.1.1 The importance of water utilities

[32] McKinsey Global Institute, Infrastructure, Productivity, How to save 1 trillion $ a year, 2013

Access to safe drinking water and adequate sanitation is of primary importance for the protection of public health, for growth and jobs, for ensuring universal access to good quality water and for maintaining ecosystems services for the wider economy. Access to sanitation and safe drinking water are now recognised as human rights[33].

The water industry plays a key role by establishing and operating resource-efficient water supply and wastewater treatment facilities. Water infrastructure, even when integrated with other infrastructures, remains a cornerstone of water policy without which water security cannot be attained, either in the EU or outside the EU. Due to the technical characteristics of the industry, there is generally only room for one service provider for drinking water or waste water in any given area and the industry is therefore subject to significant regulatory requirements to ensure adequate protection of consumers.

In the EU, investments to satisfy the requirements of the Urban Waste Water Treatment and the Drinking Water Directives are nearing completion. More than 99% of large drinking water supplies comply with Drinking Water Directive[34] and more than 90% of urban waste water is being collected and undergoes secondary treatment as required by the Urban Waste water Treatment Directive[35]. However, important gaps still remain in some regions and investment to establish compliance with EU legislation will still be required in the short and medium term, especially for small water supply systems and in the application of tertiary waste water treatment. The total remaining investment needed for the Urban Waste Water Treatment Directive is estimated to be EUR 22 bn.[36]

In addition, continued significant investment is also needed to replace, renovate or upgrade existing EU water utilities and improve their resource efficiency in order to provide water security in the future and remain compliant with EU directives. The European Commission estimates that the investment needed in the sector for this purpose is of the order of EUR 25 bn annually[37] in the EU alone. In this context, investments may be needed in order to benefit from real-time monitoring of water quality that can contribute also to “smart city” management and protection of water consumers.

Investments are needed in sustainable urban drainage systems addressing the risks related to changes in precipitation patterns. They should be integrated into a “smart cities” concept that addresses also issues related to resource efficiency, decarbonised energy production and sustainable waste management. This will help ensure that water is not lost but, to the extent possible, reabsorbed into natural systems helping conserve aquatic ecosystems and promoting re-use of water for the purposes for which it is safe. Integrated water resources management (see section 4.3) will assist in identifying such “smart city” solutions.

Outside the EU, rapidly expanding urban communities in developing countries need to redouble efforts to invest in water infrastructure to meet the target of adequate sanitation and access to safe drinking water for all by 2030 and achieve their potential for development. The level of annual global investment in water utility infrastructure in 2014 was close to EUR 190 bn and rising.[38]

4.1.2 How the EIB supports water utilities

In view of the investment needs of the sector, the Bank is committed to continue contributing to financing new economically viable and environmentally friendly water infrastructure where needed, as well as the

[33] UN General Assembly Resolution A/RES/64/292 of 28 July 2010 and UN Human Rights Council Resolution A/HRC/RES/15/9 of 30 September 2010 recognise the rights to water and sanitation and affirm that that they are part of existing international law and legally binding on States. There is no requirement that States should provide these rights for free. By establishing an implementation deadline for the provision of access to safe drinking water and sanitation of 2030, the UN’s Sustainable Development Goals (SDGs) establish a timetable for the implementation of these rights.

[34] European Commission, Synthesis Report on the Quality of Drinking Water in the EU examining the Member States' reports for the period 2008-2010 under Directive 98/83/EC

[35] European Commission, Eighth Report on the Implementation Status and the Programmes for Implementation of Council Directive 91/271/EC concerning urban waste water treatment (2016)

[36] European Commission, ibid.

[37] European Commission, ibid.

[38] Global Water Intelligence, Global Water Market 2015, vol. 1, p. 90

replacement, renovation or upgrading of existing outdated or inefficient water supply and sewage infrastructure to resource efficient and climate-resilient standards, inside and outside the EU.

In addition to the general requirements from projects, the EIB requires that utilities contribute to attaining objectives for energy efficiency and reduction of greenhouse gas emissions.

Many countries still provide water and wastewater services as a municipal service. There are many efficiencies and economies of scale to be gained by municipalities merging their service areas and awarding responsibility for the service provision to a dedicated utility. Countries that have moved in this direction have typically had significant rewards, including easier access to finance. In line with the EU Cohesion Policy's Integrated Territorial Investment Strategy, the EIB continues to support the formation and strengthening of viable utilities and regional water service providers or other institutional structures that foster inter-municipal cooperation and to explore ways to provide appropriate lending terms to such structures. Similarly, the EIB supports the establishment of dedicated facilities dealing with such services in areas comprising multiple industries, cfr. section 4.3.2.

For water utility projects, the EIB additionally requires that measures are taken to ensure the economic viability of projects, inter alia to address water efficiency at the level of the utility. This includes the efficiency of the water supply system as such and the efficiency of the operator in managing it and/or the efficiency of water use by its consumers (i.e. households, industry, agriculture or hydropower facilities). The requirement ensures that water can be delivered to more users and thus help improve the viability of service providers and the efficiency of service provision. Thus the Bank requires, for example, that, at the level of the utility, leakage and commercial losses (non-revenue water) are reduced to sustainable levels. Further, the utility must support water efficiency by metering and, where appropriate, give full consideration to inducing behavioural change in consumers (e.g. through sensitisation campaigns or regulation). It should be noted that most water efficiency measures and implementation of "smart" measures can defer the need for investment in new facilities as well as support the phasing of future investments.

For projects outside the EU, the EIB requires promoters to demonstrate that projects contribute to achieving adequate sanitation and access to safe drinking water and that, as appropriate, they are brought as close as possible to EU standards of quality and efficiency

4.2 Integrated Water Resources Management (IWRM)

4.2.1 The importance of IWRM

Although the IWRM considerations are to be followed universally, including for traditional Utilities' projects, in terms of strategic project area, this section focuses particularly at opportunities in the basin wide context beyond the traditional water utility scope.

IWRM is the internationally accepted overarching approach for addressing water issues, It includes the protection of the resource and the environment that provides it, prevention and management of risks associated with water resources, as well as all aspects of the management of the use of the resource, including establishment of related infrastructure.

As a result of global developments, societies are exposed to a significant increase in water-related risks. These developments affect not only our ability to provide access to safe drinking water and affordable sanitation services, but more generally the sustainability of our water resources and thus our water security. If no action is taken to reduce these risks, it may have severe impacts on our economies, including on growth and jobs. Beyond waste water discharges from sewage treatment plants and industrial plants, which are generally controlled, the main risks concern diffuse pollution from, e.g., agriculture, risk of floods, droughts, water scarcity and loss of ecosystems and biodiversity. A key task of IWRM is to ensure that water is fit for purpose and available for all legitimate water uses, and that it is managed in a way which will ensure the sustainability of water-related ecosystems while providing for a sustainable economic and social development.

A clear policy framework, strong governance and good management is essential to plan and monitor developments at basin level, identify relevant risks and mitigate these to the extent possible and, in so doing, ensure water security.

IWRM is an internationally recognised framework for good water management. It is embedded in EU[39] and international[40] law. In many non-EU countries it is implemented in national law and/or in international treaties for the management of transboundary waters. However, although it is implemented in European law, much still needs to be done in terms of practical implementation in Europe. [41] Annex 1 of this document contains further information about IWRM and the challenges faced in implementing its principles, including on the use of nature-based water management solutions.

Depending on regional specificities, Europe faces significant challenges in ensuring that IWRM tackles widespread issues of pollution with nitrates and pesticides, over abstraction of water resources and changes to the physical (hydromorphological) structure of its water bodies.

4.2.2 How the EIB supports Flood-Risk Reduction and Water Resources Management Projects

The Bank is committed to providing finance for measures in support of integrated water resources management and flood risk management. The EU is committed to integrated water management (IWRM) and water ecosystem protection through its policies and legislation and, States worldwide have committed to this objective in the UN's Sustainable Development Goals adopted in 2015.

Financing water resources management projects involves working with River Basin or Flood-Risk Management Authorities, regional and local authorities with water management or risk related competencies. In many cases these authorities are able to impose charges on water users and/or polluters and have access to the funds thus collected which can often be used for water-related purposes.

EIB works with international and national/local River Basin authorities in the EU in order to support projects in sectors with a significant potential for improving the sustainability of water resources, including upgrading of existing water-related structures and activities that have significant negative impacts.

In this context, the EIB supports improved coordination between development of water utilities investment programmes and measures taken as part of River Basin Management Planning, including promotion of schemes to promote Payment for Ecosystem Services.

Potential projects eligible for finance include a large variety of different project types, including flood risk reduction measures, flood reconstruction measures, re-use of treated wastewater, retention and storage of water, controlling diffuse pollution, restoring and protecting water-related ecosystems, and water and energy efficiency improvements in the basin.

Apart from big public or industrial infrastructure projects, where financing typically takes place through lending directly to those having to take the measures, many potential cost-effective water and flood risk management projects typically involve concerted action taken by a number of property/landowners and investments are thus split up in many smaller amounts. In addition, many such investments do not generate revenues, as they typically generate multiple, fragmented benefits. In cases where such actions cannot be paid for directly by sovereign funds, loans taken by competent authorities can be amortised through the income from water-related charges collected by the authorities ("Payment for Ecosystem Services"). Such loans may, as appropriate, include financing of "soft infrastructure", e.g. information systems, as part of a larger package of measures. The Bank also has the ability to deploy novel financing instruments, including for the financing of ecosystem protection and restoration and to the application of natural water-retention measures.

[39] In particular by the Water Framework Directive (2000) and the Flood Risk Assessment and Management Directive (2007)

[40] UN Convention on the Law of Non-navigational Uses of International Watercourses (1997) and UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes (1992)

[41] See e.g. "A Blueprint to Safeguard Europe's Water Resources", COM(2012) 673 final and "The Water Framework Directive and the Floods Directive: Actions towards the 'good status' of EU water and to reduce flood risks", COM(2015) 0120 final.

EXAMPLE OF JOINED-UP FINANCING OF MANY SMALL- SCALE GREEN INFRASTRUCTURE MEASURES TO ENHANCE WATER RESOURCES AND IMPROVE WATER SECURITY

A River Basin Authority has identified cost-effective measures to restore or maintain good status of water and aquatic ecosystems, ensuring affordable water supply for citizens and other water users, and providing flood-risk reduction in the basin through investment in small-scale measures by a large number of landowners in rural parts of the basin.

These measures include, among others,

- afforestation measures around water abstraction wells and in buffer zones along water bodies
- re-establishment of abandoned flood plains and wetland
- re-wetting peatlands
- re-naturalisation of canalised water bodies; and
- removal of a number of weirs in water bodies.

The Basin Authority wishes to include this investment in the form of requirements to landowners in its River Basin and Flood Risk Management Plans. However, as the benefits of these measures do not accrue to a single user but to the collective across the basin, the Basin Authority decides that it would not be reasonable that the costs should be borne by the rural landowners alone.

In exchange for the benefits that the actions would accomplish, the Authority therefore offers to pay for land-use change in the form of a lump sum, calculated for each landowner according to the nature and extent of the expected benefits and the potential losses that actions will entail for the users' activity, as well as a management fee associated with a contract specifying how the areas are to be managed.

Landowners, as other users, contribute to the recovery of environmental costs through pricing instruments which ensure a regular flow of income to the River Basin Authority. Parts of these revenues are used to invest in such cost-effective measures.

The Basin Authority decides to apply to the EIB for a bank loan to finance the initial investment. It explains in the application how the water charging scheme of the Basin will be used to ensure the recovery of the costs of the initial investment, as well as any management fees related to the investment.

Nature-based solutions, as an alternative to traditional civil engineering solutions, can in many cases bring important advantages to water management and water security by combining improvements of water quality, protection against the impacts of floods and droughts and prevention of water scarcity with sustainable conservation of water resources and good quality aquatic ecosystems.[42] [43] [44] In view of their contribution to reducing water-related vulnerability to climate change and ecosystem preservation, the EIB aims, where appropriate, to give priority to nature-based solutions such as the use of natural water retention methods, groundwater reinjection of appropriately treated wastewater, ecosystem conservation and restoration, and green infrastructure in flood-risk reduction and water resource conservation projects[45].

[42] See e.g. A guide to support the selection, design and implementation of Natural Water Retention Methods in Europe, European Commission 2014

[43] The effectiveness of natural water-retention methods has e.g. been shown in Peter Burek et al, Evaluation of the effectiveness of Natural Water Retention Methods, JRC Scientific and Policy Reports, 2012 (http://publications.jrc.ec.europa.eu/repository/handle/JRC75938)

[44] CIS Working Group on Programmes of Measures, Technical Report 2014-082, EU Policy Document on Natural Water Retention Methods (https://circabc.europa.eu/sd/a/2457165b-3f12-4935-819a-c40324d22ad3/Policy%20Document%20on%20Natural%20Water%20Retention%20Measures_Final.pdf)

[45] The EIB's Natural Capital Finance Facility (NCFF) is a financing instrument which, inter alia, specifically supports nature-based solutions in the water sector.

The EIB also supports projects that aim to exploit alternative sources such as appropriately treated wastewater or harvested rainwater for sectors such as agriculture and industry, provided promoters can demonstrate that all the associated risks are adequately addressed.

Projects to develop new water resources (including economically viable desalination of coastal or brackish water and inter-basin water transfers) are only supported provided that all demand side measures, including measures to improve water efficiency and reduce network losses and other non-revenue water, have been fully considered and found to be insufficient to address the gap between supply and demand, and that no environmentally better alternatives are available. Such projects may include the establishment of multipurpose reservoirs.

With the exception of emergency reconstruction measures, flood reconstruction projects are only financed provided an IWRM framework is in place, including coordinated flood risk and river basin management plans.

4.3 Industrial Water Management

4.3.1 The importance of industrial water management

Industry can provide a substantial contribution to water security by developing, promoting and implementing cost-effective and resource-efficient methods of sourcing, (re-)using and treating water.

In the EU, industry is required to control water consumption and waste-water discharge by applying Best Available Techniques as required under the Industrial Emissions Directive[46] and any supplementary requirements established in the implementation of the Water Framework Directive. Outside the EU, requirements are set in national legislation. Globally, the need to protect water resources and drinking water supply are expected to increasingly require controls on industrial wastewater discharges.

With large potential losses in case of water system failure, industrial water management is an area where many novel technologies are being developed and implemented. Examples of this are use of non-conventional water resources for process purposes and the use of new, more effective and energy-efficient concepts for industrial processes and for advanced water and wastewater treatment that can contribute to the circular economy, e.g. by making treated wastewater directly available for economic uses – either by reusing water in the company/plant where it is produced or by ensuring that after appropriate treatment it can be used as process water in other industries. Many industries have knowledge and competences in this respect which could contribute more widely in responding to the water security challenge.

Industrial water management, including water re-use, is a rapidly expanding area where the estimated global capital expenditure in 2017 was around EUR 20 bn[47].

Water efficiency, as well as prevention and removal of industrial water pollution are important to ensure the sustainability of water supply for human and economic purposes and of the provision of a variety of ecosystem services. Industries can have very significant volume requirements or produce very specific pollutants that could have significant local and basin-wide impacts if mismanaged. Resource efficiency and control of industrial discharges and losses are key factors contributing to water security by helping protect water quality and the conservation of biodiversity.

In terms of organisational approach, the concentration of industries in dedicated industrial parks facilitates efficient water and wastewater management, as well as other services such as energy, cooling and solid waste management, thus contributing to EU objectives. Opportunities hence lie not only with the individual larger industries, but also with collective approaches at industrial park level.

[46] OJ, L334, 17.12.2010, p. 17
[47] Global Water Intelligence

4.3.2 How the EIB supports industrial water management

In many parts of the world, including parts of the EU, intensive water use and industrial pollution are still some of the main factors with an impact on water quality. The Bank aims to provide finance to industrial water projects, inside and outside the EU.

In doing so, the Bank requires that, in addition to satisfying the requirements set out in section 3.1, the promoter ensures that:

- projects respond either to concrete water security challenges on the location where they are to be implemented or have a significant commercial potential which could contribute in a cost-effective manner to water security;
- the technologies are beneficial from a socio-economic point of view;
- projects take into account all relevant actors, and in particular that they are compatible with the needs for water and ecosystem services of other stakeholders in the hydrographic basin concerned and with the provision of essential public services.

4.4 Innovation

4.4.1 The importance of innovation for Water Security

Innovation constantly opens up new avenues and opportunities, and water management should be no exception from the rule that new opportunities should be explored when considering how to adapt the sector to new social and economic realities. The need for innovation goes well beyond the need for developing industrial water technologies and extends also to water management tools.

Water challenges are at a different scale than they were in past decades, and are set to increase as set out above. With more challenging issues to be tackled, the usual solutions may no longer be cost-effective – and technological and organisational developments may open up new and better possibilities. Previously established solutions are therefore not necessarily the solutions that are needed to solve tomorrow's challenge of water security.

The cycle of water innovation builds on basic knowledge, research and experience to develop solutions to resolve problems for which there is either no existing solution or where existing solutions can be significantly improved. Resources are needed to test their potential, their suitability under real-life conditions, and where appropriate demonstration plants and other measures are needed to speed up diffusion and commercialisation, as appropriate.

It is likely that with increasing lack of water security, a significant global market for industrial water-management tools will develop. Support for such technologies can catalyse the development of the necessary know-how in this area.

4.4.2 How the EIB supports water sector innovation

The Bank provides support to investments in research & innovation (R&I) as well as for the commercialisation and deployment of novel water technologies to both private and public sector companies or entities, or public-private partnerships, including through financial instruments supported by European Fund for Strategic Investments (EFSI) and InnovFin. EIB Group's financial offering covers both direct loans as well as guarantees to and equity investment via financial intermediaries and is complemented by the provision of advisory services.

In addition, the Bank engages with several initiatives aiming at strengthening innovation in water technology and water management. [48]

In supporting innovation, the Bank aims to ensure that projects have the potential to provide a significant and cost-effective contribution to water security, and that they have appropriate consideration of the interests of all relevant parties.

[48] Pan-European initiatives in this area include the European Commission's European Innovation Partnership on Water (EIP Water) established in 2012 and the Water Supply and Sanitation Technology Platform (WSSTP)

ANNEX 1

CHALLENGES OF INTEGRATED WATER RESOURCES MANAGEMENT

What is IWRM?

According to the Global Water Partnership "Integrated Water Resources Management (IWRM) is a process which promotes the coordinated development and management of water, land and related resources in order to maximise economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems…
[It] is a cross-sectoral policy approach, designed to replace the traditional, fragmented sectoral approach to water resources and management that has led to poor services and unsustainable resource use. IWRM is based on the understanding that water resources are an integral component of the ecosystem, a natural resource, and a social and economic good."[49]

In the past, it was often both physically and economically possible to manage separately issues such as water pollution, water resource availability, water related ecosystems, erosion, water scarcity and flood and drought risks. However, given the fact that these issues share a common pool of drivers (including, in particular, demographic factors, economic development, land use and land management, and climate change) and that measures taken to alleviate one of the issues may lead to exacerbation of other issues, a single isuue approach is no longer appropriate when pressure on water resources increases significantly.

IWRM is therefore a necessary tool to ensure that water and water-related risks are managed in a joined-up manner, that water is used sustainably and that solutions to one water related problem do not spill over into other equally significant problems. IWRM thus helps protect the environment, foster sustainable economic development and growth, promote and improve human health.

To be effective, IWRM should address hydrologically consistent units (river basins) and requires a dedicated governance and regulatory framework, appropriate regulatory and economic tools, strong coordination with other sector policies and a significant participation of the public and stakeholders in the management process.

By considering measures in all sectors concerned, IWRM makes it possible to identify the most cost-effective improvements of sustainability of water resources, reducing risks and simplifying allocation of resources to sectors where it is most beneficial. IWRM can help ensure the best use of water resources and protect public health and the environment while growing the economy and creating more jobs and improving coherence between different sector policies. Thus, e.g., in water scarce regions, implementation of cost-effective measures and economic incentives to save water in all relevant sectors can allow further growth without prejudicing water security by liberating water resources for purposes for which they would otherwise not be available.

In the EU, IWRM was introduced into the legislation with the 2000 Water Framework Directive establishing a Union-wide framework to establish a joined-up management of water resources at river basin level, by River Basin Management Authorities designated by the Member States, including in transboundary basins. For flood risk, a similar system was introduced with the 2007 Flood Risk Assessment and Management Directive.

Importance of IWRM in addressing risks

Traditional policies to control water pollution by establishing limits on discharges on industrial and urban wastewater are no longer sufficient to ensure the sustainability of water resources. Land use change and climate change are contributing to dramatic increases of flood risks for lives and property. Demographic and land-use change and economic growth are causing ever more regions to experience water scarcity. The increasing use of chemicals in agriculture industry and households are causing significant issues of diffuse water pollution and of emerging pollutants in urban and industrial waste water. Climate change is causing increased frequency and intensity of extreme meteorological events, giving rise to increased risks of floods and droughts.

[49] http://www.gwp.org/the-challenge/what-is-iwrm/

The boxes below provide examples of likely risks if no additional measures are taken to curb them and, thus, the challenges which IWRM will have to address to provide provide water security.

FLOOD, DROUGHT AND WATER SCARCITY

Risk of **flooding** and reduced water availability is increasing globally and will need to be addressed. In the EU, annual average flood damage is projected to rise from EUR 5 bn per year in 2020 to EUR 20-40 bn per year by 2050 and to EUR 30-100 bn per year by 2080. In any case floods are set to cause major economic losses. With the largest number of people affected by flooding, flood risk in Asia is set to overtake that of Europe and North America.
Water scarcity, which causes a range of risks to human health, energy and agricultural production, ecosystems and biodiversity, is set to increase significantly, especially in Southern and Western Europe, impacting growth and jobs. Most developing countries are expected to experience significant issues of either physical or economic water scarcity if no measures are taken.
Drought risks are set to increase in Europe[2] with a five-fold increase in the frequency of 50-year droughts (2010-levels). Many developing countries, especially at intermediate latitudes, are expected to experience severe droughts. Drought risks may be mitigated by improved water availability.

[1] Lorenzo Alfieri et.al., Ensemble risk assessment in Europe under high end climate scenarios, Global Environment Change 35 (2015) 199-212 ; see also https://ec.europa.eu/jrc/en/news/annual-flood-damages-100-billion-eur-2080
[2] Center for Environmental Systems Research, op.cit., p. 86 ff.

DIFFUSE POLLUTION

Diffuse pollution significantly affects 90% of the EU's river basin districts, 50% of surface water and 33% of groundwater. Agriculture is the primary source of diffuse pollution.
The International Panel on Climate Change (IPCC) has shown that rising water temperatures, due to global warming, will worsen water quality problems, especially in systems experiencing high anthropogenic loading of nutrients. The IPCC reports that the interaction of increased temperature with increased nutrient loadings washed into water bodies during heavy rainfall will diminish raw water quality and pose risks to drinking water quality.
Food production is set to increase by 60-70% by 2050 compared with 2010, to a large extent through intensification of production. Unless additional measures are taken to limit nutrient losses, it is likely diffuse nutrient pollution problems will increase.

[1] The Water Framework Directive and the Floods Directive: Actions towards the 'good status' of EU water and to reduce flood risks, COM(2015) 120 final
[2] 5th Assessment Report, International Panel on Climate Change, WG II, Impacts, Adaptation and Vulnerabilities (2014)

RISK FOR ECOSYSTEMS

Water ecosystems depend on clean water and provide a series of beneficial ecosystem services, when they function well. These services include contributing to biological diversity, prevention of erosion, the capacity of ecosystems to remove pollution (known as water self-purification), natural water storage, drainage and flood prevention. Ecosystem services help make good quality raw water available for elementary human needs, leisure, urban settlements, production of food and energy, manufacturing and service industries such as tourism. Properly functioning ecosystems and clean water resources reduce the amount and the cost of the treatment needed to render water usable for these purposes. However, they are impaired by:

- Water pollution (diffuse or from point sources) originating from industrial processes, disposal of waste, combustion processes, and agriculture and other land management.
- Alterations of the water ecosystems caused by physical interventions directly in the water environment. This includes changes in the flow regimes or changes in ecosystem biological continuity caused by hydraulic works, or infrastructure, or removal of natural riparian vegetation.
- Land-use change reducing the capacity of soil to absorb and retain water, such as deforestation, soil sealing (e.g. road paving) and urban drainage systems and rural land management which have an indirect impact on water ecosystems by changing their flow patterns.

Challenges to be tackled and options to be considered

The risks set out above can all be addressed through IWRM.

Issues that IWRM will have to deal with in this respect include water availability, water abstraction and allocation, water use efficiency, water pollution from point and diffuse sources, morphological issues, biological quality and protection of public health and water-related ecosystems, flood and erosion protection and drought resilience. Solutions will have to take into account the impacts on resilience to climate change and that, over time, hydrological conditions in a given basin may change radically as a result of development and of climate change.

Some of the most important technical challenges that should be tackled are:

- ensuring that abstractions (ground- and surface water) and water allocation do not exceed sustainable levels after considering the environmental needs;
- that obligations to provide access to safe drinking water and adequate sanitation can be satisfied;
- that water is used efficiently to maximise resource efficiency and the benefits from water, while ensuring an equitable distribution of these;
- that point source and diffuse pollution of ground- and surface water are controlled in both urban and rural areas to ensure that water is of good quality and appropriate both for ecosystems and for human and economic use of the water;
- that water body morphology and ecosystems are restored and protected, e.g. by protection and restoration of flow regimes, wetlands, flood plains and riparian areas, and reestablishment of biological continuity in water bodies (cfr EU Biodiversity Strategy commitments);
- that land use, land management and infrastructure is established and managed to ensure that flood and erosion risks are reduced to sustainable levels and drought resilience is optimised;
- that water related infrastructure is compatible with tackling these issues.

In technical terms, there are two important impacts of the changing scales of the challenges that have a significant impact on the best choice of technical solutions:

1) It can no longer be assumed that the technical solutions successfully implemented in the past are or will be, over time, the optimal solutions to the individual challenges; and
2) A given water-related challenge can, as a rule, no longer be treated in isolation from other such challenges and multiple impacts (synergistic or antagonistic) on other related challenges have to be considered when selecting options.

Some examples of measures that can be taken, their potential impact and their wider impacts on water challenges are provided in the boxes below.

In addition, given the impact of decisions regarding water on social equity and poverty issues, socio-economic and distributional impacts, and environmental quality need to be fully considered.

Consideration of all relevant options at an early stage of project development, ensuring the early integration of projects into an IWRM framework and coordination with the likely economic, spatial and climatic developments and the uncertainties in this respect, are therefore essential to secure successful outcomes.

HYDRAULIC INFRASTRUCTURE – GREEN OR GREY?

Water retention is key to water security through flood prevention and by boosting availability during periods of drought or scarcity.
The traditional approach to flood risk reduction and improvement of water availability includes construction of dams, reservoirs, dykes, embankments or canals to retain, store and divert water. Such infrastructure has historically been effective in providing water supply for people and for economic activity, hydroelectric energy as well as protection against floods. It is, due to its longevity, particularly suitable for situations with high hydrological predictability and, with respect to collection and storage of water, to situations where water is relatively abundant and retention of water is not a significant impediment for economic activity and/or the maintenance and development of ecosystems. It may, however, also have significant costs to society due to impacts on ecosystems and erosion . It is associated with risks of major accidents (like dam bursts).
With increasing water demand and hydrological uncertainties, the net cost of effective protection through traditional hydrological engineering against water scarcity, flood and drought risks may rise significantly, and, in some cases, disproportionately. It is therefore relevant to compare these solutions with alternatives when choosing water management methods.
Other (nature based) solutions and land-use change with beneficial impacts on flow regimes are gaining prominence due to their cost-effectiveness, especially for more frequent flooding events.[1] This “green infrastructure” includes changes in land-use to promote absorption and retention of water (e.g. through afforestation), changes in drainage arrangements, re-establishment of flood plains and riverbank vegetation, reinjection of treated wastewater into aquifers, revitalisation of rivers, establishment of small scale reservoirs, green roofs on urban buildings, and use of permeable urban paving materials. They will often provide additional benefits with fewer negative impacts on ecosystem service delivery than traditional solutions and will not lock in development paths in the same way as long-term civil engineering infrastructure often does. However, they may not always be as effective as traditional infrastructures in tackling the most extreme events, such as very rare floods or droughts.
It is therefore important to consider fully both green and grey infrastructure options at an early stage of project development.

[1] A case in point is the Netherlands’ “Delta Plan” which introduces the concept of “room for the river” to avoid the need for constructing ever higher dykes with exponentially rising costs.

ENHANCING WATER AVAILABILITY – INCREASING SUPPLY

The traditional water management approaches for situations where demand exceeds supply is to increase abstraction from existing water resources or introduce “new” water into the supply systems.
Increased abstraction is a viable solution in regions with no water scarcity, but it brings with it increased use of resources, including energy, to treat it and to establish and operate infrastructure for its distribution and subsequent collection and treatment. Water consumption is often positively correlated with energy consumption. Water efficiency therefore contributes to energy efficiency and, more generally, to resource efficiency and to developing a circular economy. In addition to alleviating a supply shortage and making water available for new activities, water efficiency measures reduce dependence on water and therefore tend to contribute to adaptation to climate change in areas where water scarcity is likely to prevail or where water availability may become more erratic.
That is why improved water efficiency is the solution of choice when dealing with supply shortages in all regions.

CONTROLLING DIFFUSE POLLUTION – USE OF BUFFER ZONES

Buffer zones where the application of fertilizers, manure or pesticides is banned along the shores of water bodies or in areas where surface or groundwater is abstracted is a well-known and effective means of reducing contamination of water resources by diffuse pollution from nutrients or pesticides. This reduces the need to treat abstracted water to remove these contaminants and reduces the risk of excessive algal growth in waters as a result of eutrophication.

The benefits are:

- access to safe drinking water;
- improved public health and/or reduced treatment costs for water consumers;
- improved ecosystem health and biological diversity,. Depending on the way they are implemented;
- reestablishment of natural river bank vegetation, which contributes to drainage, flow regulation in water courses and erosion prevention.

As both the costs and many of the benefits of such measures are highly dispersed throughout a river basin, the issue arises of how to ensure the concerted financing of the costs of many such measures. One possibility is for the competent authority to assume responsibility as intermediary for the financing while levying a charge throughout the basin or sub-basin.

European Investment Bank

The EU bank

Information Desk
+352 4379-22000
+352 4379-62000
info@eib.org

European Investment Bank
98-100, boulevard Konrad Adenauer
L-2950 Luxembourg
+352 4379-1
+352 437704
www.eib.org

 EN