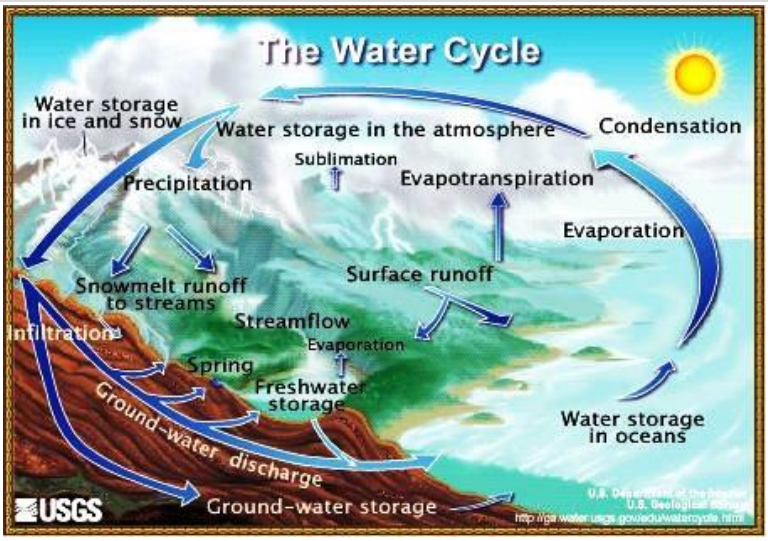
EC-LINK 中欧生态城
Europe-China Eco-Cities Link
中欧低碳生态城市合作项目

Standards

Water Management

WM Standards

The basic and essential requirements to ensure the safety of drinking-water are a "framework" for safe drinking-water; comprising health-based targets established by a competent health authority, adequate and properly managed systems (adequate infrastructure, proper monitoring and effective planning and management) and a system of independent surveillance. A holistic approach to the risk assessment and risk management of a drinking water supply increases confidence in the safety of the drinking-water. This approach entails systematic assessment of risks throughout a drinking-water supply—from the catchment and its source water through to the consumer—and identification of the ways in which these risks can be managed, including methods to ensure that control measures are working effectively. It incorporates strategies to deal with day-to-day management of water quality, including upsets and failures. In this respect, climate change in the form of increased and more severe periods of drought or more intense rainfall events leading to flooding—can have an impact on both the quality and the quantity of water and will require planning and management to minimize adverse impacts on drinking-water supplies. Climate change also needs to be considered in the light of demographic change, such as the continuing growth of cities, which itself brings significant challenges for drinking-water supply.



The Water Cycle. *Source: USGS*[i]

Water is essential to sustain life, and a satisfactory (adequate, safe and accessible) supply must be available to all. Improving access to safe drinking-water can result in tangible benefits to health. Every effort should be made to achieve drinking-water that is as safe as practicable[ii].

The primary aim of water supply networks is public health. The World Health Organization (WHO) and the EU defend the principle of access to safe drinking-water, which is essential to health, being a basic human right and a component of public health protection. As shown in the picture above, the water cycle includes three principal instances: Fresh Water Supply, Sanitation and Drainage – with an additional concern about the Water Quality for Bathing and Swimming which related to the other ones.

Standards – Drinking Water Quality

The WHO and also the EU[iii] set standards for Drinking Water Quality[iv] that are followed in Europe. Equivalent or tighter standards are applied through national State laws and regulations. Generally, the Drinking Water Aims are: *High quality, safe and sufficient drinking water is essential for our daily life, for drinking and food preparation. We also use it for many other purposes, such as washing, cleaning, hygiene or watering our plants. The main pillars of the policy are to:*

- *Ensure that drinking water quality is controlled through standards based on the latest scientific evidence;*
- *Secure an efficient and effective monitoring, assessment and enforcement of drinking water quality;*
- *Provide the consumers with adequate, timely and appropriately information;*
- *Contribute to the broader EU water and health policy.* [v]

Within these Drinking Water Guidelines, standards are set for a range of essential parameters deemed necessary to ensure minimal risks for society. The UK Drinking Water Inspectorate[vi] regulates the quality of drinking water in the UK, which is supplied by the UK privatized water companies. The legal standards in the UK are consistent those which are set in Europe in the Drinking Water Directive 1998 together with national standards set to maintain the high quality of water already achieved. The standards are strict and include wide safety margins. They cover:

- micro-organisms[vii]
- chemicals such as nitrate and pesticides
- metals such as lead and copper
- the way water looks and how it tastes**.**

The quality of water abstracted from the source, either surface water or groundwater, impacts on the level of risk and the levels of treatment required. The EU seeks to control this through the Drinking Water, Abstraction Directive and the Groundwater Directive. Both are being updated by the EU Water Framework Directive.

Increasingly concern is being raised about new and emerging micro-pollutants. Some are known as endocrine disruptors and derive from synthetic estrogens used for birth control and others from industrial chemicals and plastics. Other pharmaceutical products excreted from humans are also being detected. Research continues into the risks posed by these substances and steps are being made to reduce risk, such as installing activated carbon filters on drinking water treatment plants. Risks are higher in low-flow river situations and in contaminated groundwater, where water is recycled and reused to varying degrees.

Standards – Waste Water Treatment

Since waste water is released into the natural ecosystem and because it also impact on the quality of drinking water from the same, the quality of water effluents need also be controlled and brought to certain minimum standards. Within the EU, those standards are established within

The Urban Waste Water Treatment Directive[viii]. It distinguishes waste water between 3 types according to its origin:

- Domestic waste water
- Mixture of waste water
- Waste water from certain industrial sectors

EU Member states increasingly set emission standards that are tighter than these minimum standards. For example, additional requirements to reduce the concentrations of nitrates and phosphates in the environment are driving the progressive removal of these from sewage treatment processes. Chemical and biological removal techniques are being developed and are in use in most large treatment plants. Increasingly phosphate removal and reclamation is being used and innovative methods such as struvite concentration and recovery enables scarce phosphate to be recovered commercially.

Sewage sludge is a by-product from sewage treatment. In the past sludge was seen as a waste product that needed disposal, often in landfill. However the value of the sludge as an agricultural fertilizer or soil conditioner is now recognized. But microbiological content is also critical and sludge must be treated to remove any potential pathogens that could enter the food chain. The UK utilises a Safe Sludge Matrix[ix] to control use and ensure quality.

Standards - Microbiological and bathing water

Microbiological standards from sewage treatment works are often specified especially to protect bathing waters. The EU Bathing Waters Directive[x] and its more recent revisions, set microbiological standards for the bathing waters themselves, and by direct link, standards for treatment plants discharging to bathing waters. Most bathing waters are for marine waters with touristic bathing. However, these are increasingly being set for urban areas where citizens like to swim and take water borne recreational activities. The city bathing areas in Copenhagen and Munich are good examples. They were very expensive to build and have high operational costs; however city mayors believe that the benefits to citizens and to tourist economy exceed the cost.

Monitoring is an essential component of setting and assessing standards. Water quality and microbiological assessments are displayed on bathing water beaches. This has become an expected requirement of holiday beaches, alongside lifeguard and amenity instructions. Box 4 below gives an indication of monitoring requirements.

Standards – Surface Water Drainage and Flood Control.

Dependent on geographical location, flooding from excessive Rainwater or coastal inundations can be a serious threat to health or even personal survival. But in moderate climates, like Europe, rain water fall was not excessive and could be kept under control with the conventional sewer system. But due to climate change, floods occurred more frequently and in a

higher dimension. Hence, Drainage and flood control is becoming an important element in the water sector. [xi]

But so far, no fixed standards for the design, development, construction and maintenance of SUDS are available. Only for natural water bodies, there exists the EU Floods[xii] Directive which provides a common approach to flood risk and applies to inland waters as well as all coastal waters across the EU. Member States shall in take into consideration long term developments, including climate change, as well as sustainable land use practices in the flood risk management cycle addressed in this Directive.

However, there are a number of best practice guides that set out voluntary guidance and act current best practice standards, like the CIRIA (the British Construction Industry Research and Information Association) Site Handbook for the Construction of SUDS[xiii] which provides invaluable advice to reduce risk.

Many failures of SUDS have been because of lack of maintenance, or concerns over operational costs and liabilities. Simple issues like outflows blocking with plastic bottles and litter can cause significant failure. SUDS need a different approach to the conventional concrete engineering. Therefore a Maintenance Plan represents an important part of flooding prevention.

With increasing sizes of centres, growing industries and climate change, also the Chinese authorities are being obliged to worry about water quality and flood control. The “Regulation on Urban Drainage and Sewage Treatment (OSC No. 641), came into force in 2014 standardizes the planning, construction, maintenance and protection of urban drainage and sewage treatment facilities and defines the legal responsibilities. The Regulation proposes that urban drainage and wastewater treatment should follow the principles of respecting the nature, overall planning, construction of supporting facilities, safety, and comprehensive utilization, to embody the concept of ecological civilization and sustainable development. A number of Water Safety Plans[xiv] have been drawn up with assistance of the Asian Development Bank

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