



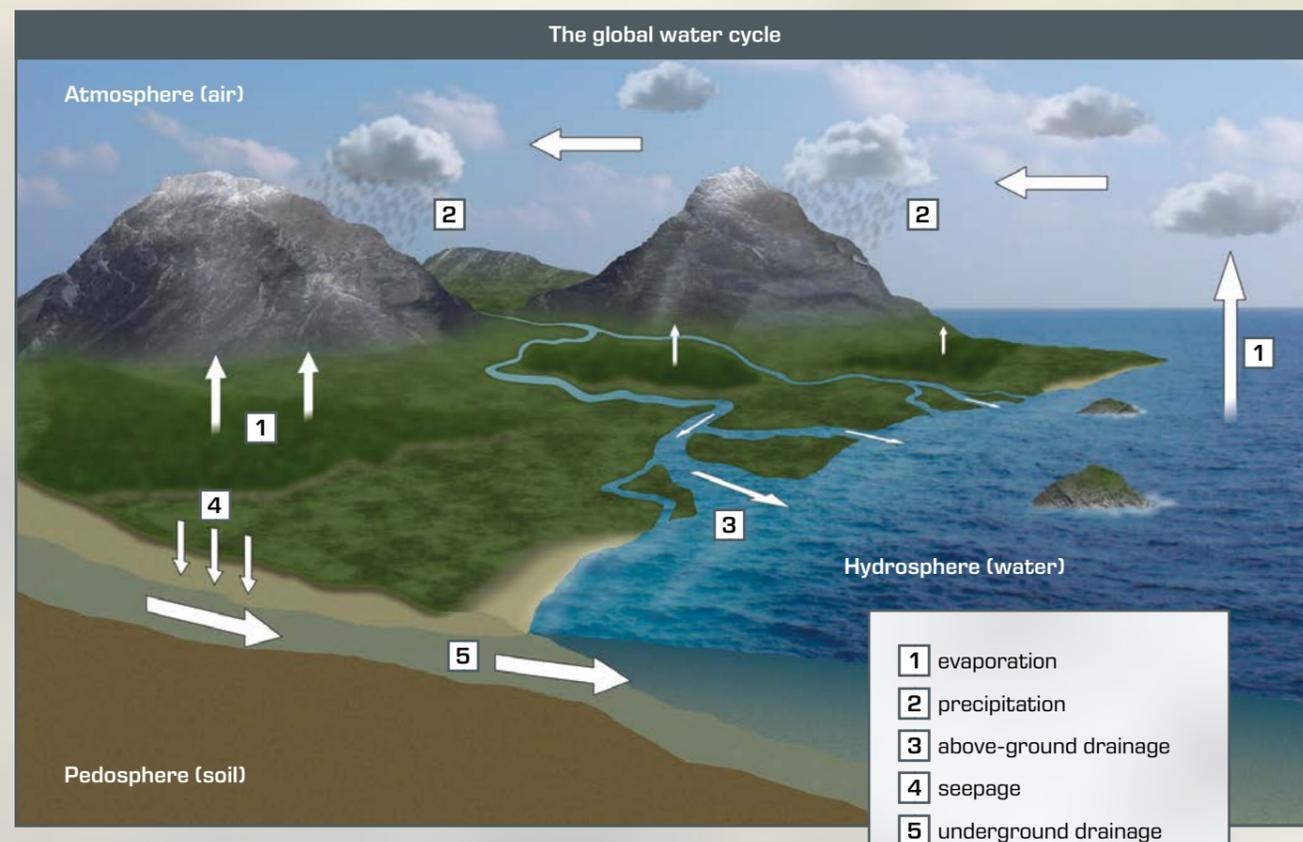
Basic Knowledge Sustainable Technology for Environmental Protection

The global water cycle: link between the environmental compartments

Approximately three quarters of the earth's surface is covered by water. The water on earth is part of a constant cycle, and passes through all aggregate states. The driving forces of this cycle are the sun and gravity. The water cycle connects the three environmental compartments of atmosphere (air), hydrosphere (water) and pedosphere (soil).

The solar radiation warms the water on the earth's surface and in the oceans. As a result, water evaporates and enters the atmosphere as water vapour, where eventually it forms clouds. The water returns to the earth's surface in the form of rain. About half of it then evaporates again. The vast majority of the remaining precipitation flows above the ground back into the oceans in the form of rivers. The remaining precipitation seeps into the ground, forming the groundwater. Most of the groundwater is returned to the oceans beneath the ground. The remainder exits the ground at above-ground sources and leads to the formation of rivers, which in turn flow back into the oceans above ground.

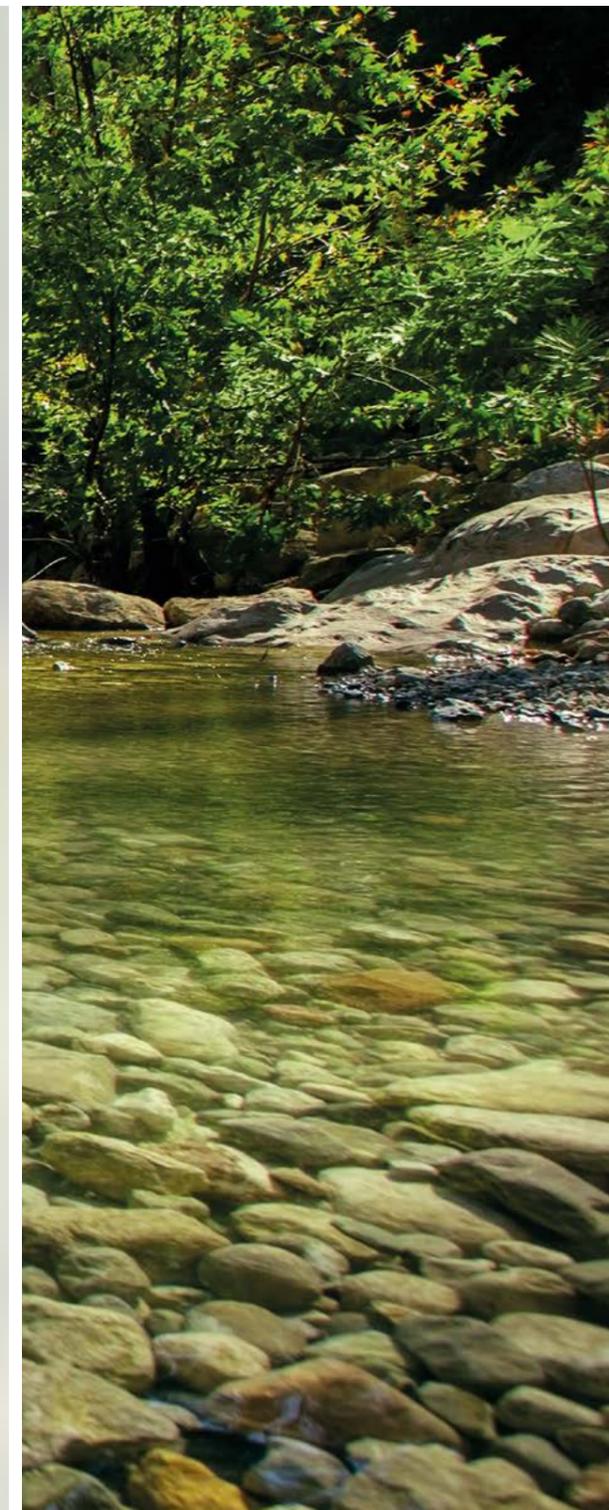
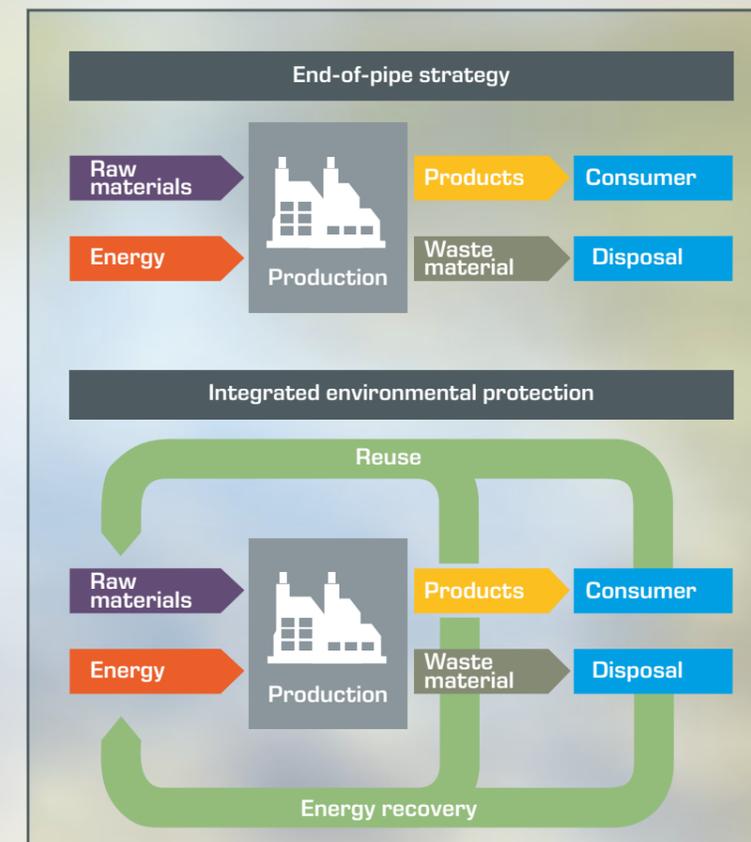
Humans withdraw water from the water cycle for different purposes, and return it to the cycle after use. Often the water is loaded with many contaminants when it is returned. As a result, the natural balance of the water cycle has been noticeably disturbed. For example, in many places the water seeping into the ground is no longer cleaned, but rather contaminated. The soil can no longer fulfil its natural cleaning function. Other examples of a negative influence on the global water balance include sealing formerly porous surfaces, deforestation and the depositing of hazardous waste in landfills.



From “end-of-pipe” strategy to integrated environmental protection

For a long time people have been pursuing “end-of-pipe” strategies in order to counteract increasing environmental pollution. These strategies add downstream environmental protection measures to production processes, without involving the production processes themselves. Furthermore, water, air and soil were largely considered separately. However, it has been shown that this one-dimensional approach was inadequate considering the complexity of environmental sustainability. So for example, the fields of water and air often simply delayed the problem to the field of waste, such as the disposal of sludge from wastewater treatment.

Modern environmental protection concepts, however, adopt a holistic approach that includes all environmental sectors. Another goal today is to address the problems at an earlier stage of their development. Consequently, measures for environmental protection are now integrated into many production processes. The reuse of materials and the environmentally friendly use of energy play a central role here.





Subject Areas

Sustainable Technology for Environmental Protection

Water, air and soil: central components of teaching curricula

One of the biggest challenges is maintaining a clean environment. Once contaminants enter the environment, they do not necessarily remain at the site of contamination. Instead, the water cycle and winds mean these contaminants are transported worldwide. Contaminants can be transported and transformed in the atmosphere (air), hydrosphere (water) and pedosphere (soil). Understanding the complex processes in these three environmental compartments is essential for the development of modern environmental protection technologies.

Accordingly, sound knowledge of the basic relationships in the three environmental compartments of water, air and soil forms the foundation of environmental engineering professions. Since sustainable environmental protection also requires specialised and careful handling of waste, problems from the field of waste management are additional indispensable components of curricula in the field of environmental engineering.

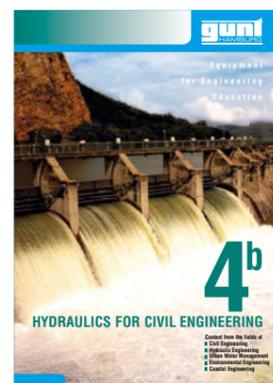
Interdisciplinary thinking for holistic environmental protection

Our range of devices is generally structured in line with the generally accepted curricula in the field of environmental engineering. The devices have been developed by experienced engineers who have well-founded expertise thanks to their education, especially in the field of environmental engineering.

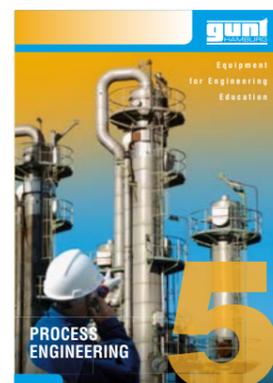
Environmental engineering is a relatively new engineering discipline. Many of the methods used in this area to protect the environment have their origins in other engineering disciplines. Thus, the methods used in water treatment and air pollution control are based on conventional process engineering. Similarly, groundwater flows in soils are also of course an integral part of hydraulics and hydraulic engineering.

This highlights the need for interdisciplinary thinking and action by aspiring engineers in the field of environmental engineering in order to face up to the complex challenges.

The devices presented in this catalogue represent a selection of teaching systems, which are a perfect complement to the theoretical basis for education in the field of environmental engineering. Most of these devices have their origins in other traditional fields of engineering. Similarly, you can find further, subject-related devices in our catalogue 4b "Hydraulics for Civil Engineering" and catalogue 5 "Process Engineering".



Catalogue 4b
Hydraulics for Civil Engineering



Catalogue 5
Process Engineering