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1.The TRUST (TRansitions to the Urban Water Services of Tomorrow) project is supported by the European Union. See: http://www.trust-i.net/index.php

European Commission

Science for Environment Policy

Following the flow of urban water from source to tap and back

A new tool to increase the efficiency of water supply and distribution networks is presented by a new study. By using a framework which encompasses both water sources and demands, researchers have developed an integrated system that has showed promising results when applied to the complex urban water system of Athens.

Rising demand for water, as the global population increases, has led to concerns about the effects of over-use of water supplies on the environment. However, ensuring the most efficient and sustainable water-supply system, especially in complex urban situations, is far from simple.

In this study, funded by the EU TRUST project[1], researchers initially examined the two types of approach usually used to address the problem of increased water demands in urban areas. These include tools focused on supply and those focused on demand.

Tools focused on supply attempt to provide the best supply provision while keeping operational costs as low as possible. For example, pumping often improves supply but uses energy and so increases costs. Tools which focus on demand management assess the benefits of measures to increase efficiency and reduce water use per capita, such as introduction of low water-use toilets or rainwater harvesting.

Currently there are tools that have been developed for both approaches, but no integrated system which can allow investigation of the whole water system, from source to tap and back again. Researchers therefore developed a mathematical tool, the Urban Water Optioneering Tool (UWOT), which was able to simulate the water cycle at every stage. From reservoirs, distribution systems, use by households, treatment of waste water (including sewage), and finally release of treated water back into water bodies.

To test the tool, researchers used it to optimise a particularly complex urban water system, that of Athens which extends over 4000 km^2 and includes surface as well as groundwater sources. The results show that UWOT successfully optimised the system and resulted in more realistic and useful solutions than the current supply-only model currently used in Athens.

The researchers do concede that compared with the current tool in use UWOT does have the disadvantage that it is more complex, and takes more time to run on a computer. However, this is offset by the considerable advantage that it allows analysis of water demand as well as supply system. Furthermore, there is on-going development of the model to reduce the processing time needed. The UWOT also has an easy to use interface, making it widely accessible to decision-makers, and can be easily altered to suit different systems.