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Urban design contribution in reducing hydrological risks: The French experience

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Water management enhances the value of a strategic approach where a definition must be made of territories that are a priority for intervention and where water is characterized in different ways. As a result, management is different for rainwater, waste water, river water, etc. As far as drainage networks are concerned, drains appeared in Paris in 1850 to replace the surface run-offs that were located in the middle of the street.Since that time, structures and techniques have considerably improved health levels in urban areas. But by directing water away from urban areas, extra territorialisation has appeared in drain water management However, the increase in dysfunctions, the increasing age of technical networks and the increase in damage due to rainwater flooding has revealed the limits of traditional methods used in urban hydrology. This increase in risk is not unrelated to urban pressure which is increasing regularly. It is often related to the increase in the size of towns and cities and to climate changes in the context of a continuously increasing demand for safety for land whose vulnerability has also increased.

Faced with these challenges, different urban players suggest that the relationship between rainwater and territory should be re-examined. Different leads are being explored by researchers in urban engineering. They mainly concern studies on alternative drainage systems, acceptance of these types of structure, the resilience of rainwater drainage systems faced with changes in climate or even fragmented management of water. In their work, researchers can count on proposals made by town planners and developers. The present trend in innovative approaches made by urban design professionals is veering towards a naturalist view that is trying to reconcile water cycles with territory, urban restrictions and existing networks.

In French the regulations point of view, networks are still being sized in accordance with technical instruction of 1977, which stipulates that networks must at least provide protection against ten-year storms. In certain cases, if some territories are more vulnerable than others, the level of protection may be increased. The calculation example given in the circular only concerns sizing networks for ten-year storms and does not encourage studies and network sizing for longer return times. Moreover, assessing the vulnerability of urban territory remains difficult due to the absence of any recognized methods.

The present document aims at presenting relevant examples where rainwater management systems have been integrated into an urban environment by modulating between surface runoff and buried network management systems. The three projects presented in this document provide a well-balanced articulation with the different scales of existing infrastructure. Each project is a response to a different problem in terms of rainwater management and flooding, but they all incorporates rainwater as being an added value in development and managing the environment.

After providing a reminder of the different contextual elements, the document focuses itself on the projects in order to analyse how urban design can minimize risks related to Cevennes-type storms. How can urban design provide a temporary storage area should the rainwater drainage system fail? And lastly, how can non-built areas become a support for managing flood risk and for keeping pollution in run-off water under control on polluted-land sites?