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Resilience of sewage services to climate change uncertainty: analysis of the management of sewer overflows in two Parisian suburban areas.

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This paper considers the resilience perspective as an approach for understanding social and political vulnerabilities of urban services. The authors examine to what extend uncertainty due to climate change may affect the resilience of these urban services.

The resilience perspective is increasingly used for analysing social groups' capacities to adapt to and live with disturbances. A lot of work on resilience has focused on the capacity to absorb shocks and still maintain functions. But there is also another aspect of resilience, which leads to take into account systems vulnerabilities and to aim at understanding their equilibrium and re-organization capacity. The purpose with this paper is to assess sewage systems capacities to adapt to climate change. Indeed, climate change could cause an increase of extreme rain events and, as a matter of consequence, an increase of sewer overflows and flooding of urbanised areas. Sewer systems have to cope with this change that may gravely affect urban planning.

In recent studies of political science, risk management has been considered as a public policy involving and resulting from complex social, political and technical processes (Gilbert et al. 2003). From this point of view, the management of wastewaters and storm waters has to be considered not only as a technical but also as a political and a social system. Therefore, political science can be a fruitful perspective to understand the stakeholders perceptions of uncertainty and the way they are going to integrate this issue in their practices.

The authors analyse the adaptive capacities of two sewer systems located in the Parisian suburban area. The chosen areas are highly populated. Each network is managed within a political and administrative unit called "Département". Both authorities of these "Départements" implement a public sewage service. Nonetheless these networks are connected and part of the greater Paris sewage policy. In both areas a real time control of urban wastewater systems has been developed. At last, both sewage services have make flood management their prior objective. Both "Départements" have developed retention capacities. One of them has implemented a source control strategy including daywatering while the other one has intent on building up a "culture of risk" on the territory. In this paper we compare how these social and technical systems cope with risks and face to climate change.

Relying on interviews conducted with engineers and technical agents of water and sewage services and with a few residents in the concerned areas, we define three types of actors who take part to the social and technical systems. There are, on the one hand, the technical actors, including the agents currently managing the sewer network. On the other hand, there are the political actors in charge of elaborating and implementing a policy of risk prevention and managing the security force. Last but not least, there are the inhabitants who take an important part in the crisis management and in the mobilisations against the existing risk policy.

The first part of the paper describes the sewage systems while there is no crisis. We explicit the actors' perceptions of risk and the risk management strategies they develop. The risk perceptions of technicians are truly different than the citizens' ones. For the technicians, floods, and their possible worsening, could be controlled. The problem is generated by the increasing impervious areas but it can be solved with technologies (real time control,

best management practices and compensatory measures). In the technicians' perceptions, the risk is inherent to technical failures and can be reduced. For citizens, the concern is more for economics and personal goods losses. However both types of actors deal with the matter of submerged territories as a problem of institutional inertia (lack of financial resource, problem of governance).

The second part presents the crisis management in these areas. We explain how various actors cope with flood when the risk occurs. The analysis of the actors' reaction to the flood event contributes (1) to further characterise the social and political system dealing with the flooding risk and, (2) to assess the adaptive capacities of the technicians to the risk. The crisis moment gives a specific role for each actor of the social, political and technical systems. Technical actors manage natural hazard through the remote control system and their major concern is for network disruption. Once flood has occurred, they may assist residents cleaning out public space. Nonetheless, after the crisis, the technical actors are seen by the others as the responsible for the flood. They are considered as the ones in charge of preventing the future flood event, even if they claim that they cannot protect urban areas and population up to a determined risk threshold. Neither technicians nor other actor settle the question of urban planning or existing vulnerability of the flooded areas.