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Critical Infrastructure impacts of the 2021 mid-July western European flood event

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Germany, Belgium and The Netherlands were hit by extreme precipitation and flooding in July 2021. The event not only caused major damages to residential and commercial structures, but also to critical infrastructure in particular. Not only vital functions in the first response were affected (e.g. hospitals, fire departments), but also railways, bridges and utility networks (e.g. water and electricity supply) were severely damaged, expecting to take months to years to fully rebuild. This study provides an overview of the impacts to large-scale critical infrastructure systems and how recovery has progressed during the first six months after the event. The results show that Germany and Belgium were particularly affected, with many infrastructure assets severely damaged or completely destroyed. Impacts range from completely destroyed bridges and sewage systems, to severely damaged schools and hospitals. While some of the infrastructure systems, such as electricity, were relatively quickly restored (e.g. several weeks to a month), are others still not fully rebuild six months after the event (e.g. several road and railway bridges).

We find that large-scale risk assessments, often focused on larger (river) flood events, do not find these local, but severe, impacts. On a local and regional level, the disruptions in daily lives and to the economy were enormous. Yet, zoomed out on a national scale, the impacts were relatively small. While large-scale studies are useful to identify potential hotspots and bottlenecks in the system, local-scale studies are essential to better understand the real impacts (and are also better able to do so). This may be the result of limited availability of validation material. As such, this study not only helps to better understand how critical infrastructure can be affected by flooding, but can also be used as validation material for future flood risk assessments that include critical infrastructure failure in their risk modelling framework.