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Geomorphological and river management issues of dam removal : lessons from low order and low gradient streams

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Until today, scientists have mainly studied morphological processes, channel adjustment and river restoration plans on large rivers or mountain streams. These orientations answered society's needs, especially about risk management such as bank erosion or river floods. Since the European Water Framework Directive (2001) and the obligation to reach the good ecological status for freshwater systems, the operations of river restoration refocus social demand on smaller and lower gradient streams. To reach this "good ecological status", managers of French rivers increase actions to restore ecological and sediment continuity by removing dams and weirs. In most cases these operations are not subjected to morphological monitoring because they not consist in "emblematic" removals. In this context, we observe a lack of knowledge about the functioning of low order streams and their response to such operations. The objective of this presentation is to illustrate questions arising from these operations in order to initiate a global discussion of the relevance of current practices. Thus, three different issues will be discussed. Firstly, we will suggest an interrogation about the geomorphologic specificities of the low order streams and the accuracy of current knowledge to forecast their adjustments after dam or weir removals: what are the main morphological drivers in a context of low streampower ? How long does the morphological adjustment take? If these removals do not concern large structures, what could be expected about cumulative effects of small weir removal? Secondly, we will study the contribution of the long term historical approach of the morphological structure of such systems, especially to establish their resiliency and the range of channel adjustment we can expect after historic dam removal. Finally, these previous points will lead us to discuss more widely the relevance of dam removal intervention for the development of river restoration strategies. Our reflections will rely on our experiences in Normandy (France) where most of the rivers are low order streams, very formerly and highly impacted by human settlements and on literature reviews.