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# Assessment of the costs, risks and benefits of selected integrated policy options to adapt to flood and drought in the water and agricultural sectors of the Warta River Basin

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Historically large reservoirs have been the dominant strategy to counter flood and drought risk in Europe. However, a number of smaller-scale approaches have emerged as alternative strategies. To compare the cost effectiveness of reservoirs and these alternatives, we calculated the Investment & maintenance costs in terms of (euros) /m3 water stored or annual runoff reduced for five different strategies: large reservoirs (1.68 euros), large on-farm ponds (5.88 euros), small on-farm ponds (558.00 euros), shelterbelts (6.86 euros), switching to conservation tillage (-9.20 euros). The most cost effective measure for reducing runoff is switching to conservation tillage practices because this switch reduces machinery and labor costs in addition to reducing water runoff. Although shelterbelts that reduce annual runoff cannot be directly compared to ponds and reservoirs that store water, our estimates show that they likely compare favorably as a natural water retention measure, especially when taking account of their co-benefits in terms of erosion control, biodiversity and pollination. Another useful result is our demonstration of the economies of scale among reservoirs and ponds for storing water. Small ponds are two orders of magnitude more costly to construct and maintain as a flood and drought prevention measure than large reservoirs. Here, again, there are large co-benefits that should be factored into the cost-benefit equation, including especially the value of small ponds in promoting corridors for migration. This analysis shows the importance of carrying out more extensive cost-benefit estimates across on-farm and off-farm measures for tackling drought and flood risk in the context of a changing climate. While concrete recommendations for supporting water retention measures will depend on a more detailed investigation of their costs and benefits, this research highlights the potential of natural water retention measures as a complement to conventional investments in large reservoirs.