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Beyond the limits of adaptation: Social networks and the decision-making of relocation

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Climate change and an increase in settlement activities already increased flood risk exposure and will further do so in the future. A strong need for adaptation emerged. While ongoing efforts primarily focus on the reduction of vulnerability, some areas might reach their adaptive capacity after which further activities are either no longer economically feasible or simply limited by natural boundaries. One possible measure beyond these limits of adaptation is relocation into safe areas as a transformative process to reduce flood risk exposure. In the past, efforts of forced relocation were perceived extremely negative and today such top-down approaches are often bound by legal restrictions. As an alternative, bottom-up approach, voluntary compensation schemes for residents in high flood risk areas are set-up to encourage people to move into safer areas. The successfulness of such measures depends on a high willingness to move of affected households and a larger societal benefit of the relocation.

Classical risk assessment models struggle to model these relocations, since the decision to relocate is the outcome of a complex and very individual process. One difficulty are network effects between households who communicate and influence each others decision. With strong community ties, it is sometimes easier to relocate a whole community rather than individual households. To model such individual differences and study the effects of different social networks, we have built an agent-based model based on the theory of planned behavior. In our model, the intention to move is the result of each households attitude, social norm and perceived behavioral control. We focus on attitude with an evaluation of relocation based on prospect theory. Individual intentions are then exchanged via opinion dynamics. Our results indicate that different community structures can lead to a large deviance in the distribution of relocation motivation. For each network a different approach for the compensation schemes maximizes the individual households intention to move. Our research provides insights into network effects and might help to develop better relocation schemes for areas that exceed their adaptive capacity.