



## **Putting the “socio” in socio-hydro(geo)logy via existing psychological models: Health-related flood risk perception in the Republic of Ireland**

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Significant flooding events have the potential to inflict major societal losses, in addition to both infrastructural and environmental damage. However, to date, the human gastrointestinal health implications (and associated costs) of these events, have received far less attention, particularly within the socio-hydrogeological context. Flooding can mobilize environmental pathogens via short circuiting of hydrogeological (subsurface, GUDI) pathways and/or negation of natural attenuation processes. While both surface and groundwater contamination represent global public health issues, the latter poses more complex challenges, both in terms of Top Down management and Bottom Up communication, due to the inherent “out of sight, out of mind” nature of the resource. In many regions, access to groundwater resources are limited, boundaries are difficult to establish, and exploitation occurs in the absence of regulation, with the coupled human-water system operating at the micro-level (e.g. private well owners). Moreover, and perhaps more critically, groundwater occurrence, transport and contamination remain poorly understood processes among non-expert users. Accordingly, an enhanced understanding of human-groundwater interactions is required, including the effects of awareness and attitudes on user behaviours, with the emergent science of socio-hydro(geo)logy representing an ideal sphere within which to base these investigations. To date, however, attempts to broaden, model and apply socio-hydrogeology have been infrequent and inconsistent owing to traditional pedagogies. To move towards development of feasible, holistic socio-hydrogeological frameworks, greater acknowledgement of the social dynamics and determinants governing groundwater stewardship at the individual and household level is vital. Within the context of flood-related risks to groundwater for human consumption, Ireland presents a highly pertinent case-study, with high levels of precipitation, increasing flooding occurrence, a burgeoning livestock-based agri-economy, high domestic wastewater treatment rates, and >720,000 private well-users nationally.

A novel online surveying tool was developed using two existing psychological models, namely, the “Risk-Attitude-Norms-Ability-Self-regulation” (RANAS) and Health Belief (H-B) models. In combination, acquired responses are being employed to develop demographically-framed interventions specific to the groundwater-reliant population, using multiple latent factors including perceived severity, personal ability, and individual motivators. Preliminary results (n = 247), demonstrate the complexity of risk-based human-water interactions; for example, among well owners that had not experienced local flooding, 29% indicate that well water testing would be the most important post-event action. Conversely, no respondents that had experienced flooding (n = 45), proceeded to have their water tested, while 62% took no post-event action of any kind. Findings also suggest that optimism bias represents a significant impediment to healthy behaviours; approximately half of respondents agreed (Likert scale) that “compared to other wells in my local area, my well is less likely to become contaminated if flooding occurs nearby”. Moreover, social characteristics (e.g. property ownership, presence of vulnerable populations in the household, etc.) are predictive of post-event actions. Results from the RANAS and H-B psychological models provide a promising two-pronged framework for applied socio-hydrogeology, and may be used to develop increasingly successful, spatially and demographically bespoke interventions. Moreover, findings will be integrated within hydro(geo)logical models enhancing well user/owner parameters and creating a symbiosis between psychological and natural sciences.