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Exploring the consequences of changes in water resource availability on human health and well-being

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The relevance of global change for society manifests itself through the manifold direct and indirect impacts that affect human well-being. Well-being can be seen as the result of a situation where the basic requirements of the population are fulfilled. Thereby human health plays a central role. The impacts of global change on health are manifold, some of them direct, but many others indirectly impact several system components. Health is the product of beneficial conditions in several domains of well-being. In this context, water resources are essential for well-being directly, but also indirectly affect several system components. The human body critically depends on sufficient water provision, for example, as dehydration can cause severe health impairment. Available calories as another critical physiological need are directly influenced by available water for irrigation. The functioning of basic sanitation as an essential infrastructure to guarantee a healthy environment and reduce the potential for pathogens can be challenged water scarcity (as well as a surplus).
To assess health in an outcome oriented way, where the target measure is human well-being, the full burden of disease is relevant, as impaired health irrespective of the cause lowers well-being. Health is not only the absence of actual disease, but has to be seen as a situation where basic needs are fulfilled. Thus, human health is determined at the interface of several living conditions. Additionally, the regional exposure to pathogens plays an important role, while a functioning health care infrastructure can mitigate negative effects of the prevailing conditions. The cumulative influences thus determine population health and the burden of disease.
In order to approach these complex inter-linkages and feedback processes, we propose to take a systems analysis approach to outline the essential components for human well-being. We distinguish components of well-being into a vital core, which comprises physiological needs as well as very basic infrastructure such as shelter and health. Further components describe the system state in domains of political, social and economic stability and security. The qualitative outline of the system of well-being will be further elaborated from the perspective of water resources, specifically focusing on the vital core components. We explore the consequences of climate change induced shifts in water availability for the system as a whole as well as for the subsystem of human health. Our results shed light on the complex consequences that changes in water availability may entail for human well-being and human health. Rather than taking a sectoral approach, we present an approach that captures feedback mechanisms between the components that contribute to human well-being.