Non-Coastal Retreat: From Wildfires to Mountain Regions

Wildfire Risks and Decision Support Tools for Communities

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Wildfire risks are increasing alongside ongoing development in wildfire-prone lands. Climate change and decades of wildfire suppression further exacerbate wildfire threats. Similar to other natural disasters, wildfire disproportionately affects some populations. Understanding where wildfire risks are highest, who is most impacted, and which communities are most likely to experience wildfires is critical for effective mitigation efforts. This session will showcase interactive tools that allow cities, counties, and organizations to easily identify and explore wildfire and other climate hazard data to inform decisions, prioritize resources, and help communities better adapt to increasing risks.

Wildfire in the American West: Is Managed Retreat an Option?

Lisa Dale (The Earth Institute, Columbia University)

Wildfire Management in the American West: Is Managed Retreat an Option? Across the American West, climate change has contributed to increased risk from wildfire. Compared with historical patterns, wildfires are now more frequent, larger, more intense, and occur over a longer seasonal time span. Perhaps counter-intuitively, the Wildland Urban Interface – the highest risk zone where private property abuts forested landscapes – continues to attract new development and new residents. Should people be prohibited from settling in wildfire risk zones? Should existing residents be encouraged to relocate? Is there a place for managed retreat in wildfire management in the U.S.? To answer these questions, this talk will provide an analysis of existing policies to manage wildfire risk, and a consideration of where and how managed retreat might be integrated into the wildfire risk reduction toolkit.

(Un) managed retreat in mountain regions facing climate related risks

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Mountains are frontier regions, where people advance and retreat, and specific efforts are required to establish permanent settlements and secure acceptable livelihood conditions. Historically and in many regions to date, retreat has been an option and consequence when environmental conditions deteriorate, or economic or social circumstances no longer permit living there. With climate change mountains communities face additional challenges; for instance when higher frequency and/or magnitude of extreme events (floods, avalanches, landslides) make their place uninhabitable, or when declining water resources from loss of glaciers and snow jeopardize food production and livelihoods. Autonomous, planned and unplanned retreat and relocation have been experienced over decades and centuries but are projected to reach an unprecedented scale in many mountain regions. Despite the rich

experiences, retreat and relocation in mountains has entered the debate about retreat in the face of climate change only in a limited way. As in lowland and coastal regions a systematic analysis of historical and contemporary retreat and relocation patterns is so far missing. Here we present results of a case-study based, global analysis of current and past retreat and relocation in mountain regions. We study cases of different climatic, environmental, economic, social, political and cultural context. We broadly adopt a risk perspective and analyze how different risk components (physical hazards, exposure and vulnerabilities) and their perception dynamically change over time and interact with dimensions of well-being and habitability to eventually lead to planned and unplanned, managed and unmanaged, voluntary or forced retreat and relocation. We're also looking at how the option and solution space, as perceived or defined by different actors, influences retreat decisions. Finally, we evaluate which conclusions from the mountain experiences are relevant for the debate of retreat in other regions such as coastal areas, and present recommendations for a more engaged exchange and debate.

Retreat as Part of a Hybrid Design Approach to Reduce Riverine Flooding in an Urban Watershed

Diane Mas (Fuss & O'Neill, Inc.), Dean Audet (Fuss & O'Neill, Inc.)

The Pocasset River is located within a 26-square mile urban watershed in Rhode Island, located to the immediate south of Providence. The watershed contains environmental justice communities identified on the basis of minority status and poverty, as well as vulnerable populations based on age, and to a lesser extent, English language proficiency. The neighborhoods around this river are challenged with major flooding problems. The floodplain along this river has been largely developed with multi-family and single family residential development, as well as some industrial and commercial development. In addition, this watershed has been largely built out resulting in major flood risks in these low lying neighborhoods. The USDA Natural Resources Conservation Service (NRCS) is leading and funding a project that combines retreat, along with restoration of historic floodplains and limited use of floodwalls and pump stations. NRCS is funding this $50 million project through their PL-566 Watershed Program. This presentation will review the different elements of that hybrid plan that combines strategic retreat with nature-based and traditional "gray" flood control systems.

Societal resistance to and acceptance of planned dike relocations: a systematic review

Teun Terpstra (HZ University of Applied Sciences), Vincent Bax (HZ University of Applied Sciences), Lukas Papenborg (HZ University of Applied Sciences), Jean-Marie Buijs (HZ University of Applied Sciences), Wietse Van de Lageweg (HZ University of Applied Sciences)

Throughout history people have inhabited coastal zones and river flood plains. As natural assets and resources are readily available in these water-rich areas, they are opportune places for economic activities like agriculture, fisheries, navigation and leisure. However, the continued expansion of these economic activities is disrupting the natural coastal system and processes, leading to detrimental impacts on biodiversity. Meanwhile, many coastal areas are low-lying, and ongoing soil subsidence and sea level rise will further contribute to increasing flood risk. To restore natural processes and increase flood safety, managed realignment or dike relocation is a well-known strategy. The major landscape changes induced by dike relocation often invoke strong sentiments of disapproval among the local community. First, because local economic sectors partly depend on the current use of the landscape, and second, because populations that have lived in these areas for generations have become emotionally

attached to the landscape as they know it. These two factors constitute ‘place attachment’. Although quite some studies on social support for and resistance against managed realignment have been published, systematic insights are still missing. Consequently, a systematic literature review, aiming to gain insights in drivers and barriers of landscape perceptions and attitudes towards managed realignment and dike relocation is needed. We conducted such a review resulting in the identification of roughly 100 empirical peer reviewed journal papers. The review provides a descriptive analysis of the physical context (e.g., country, river/coast), the theoretical concepts and methods used including a description of social and psychological variables and their relations with social resistance and acceptance. Our presentation will highlight the results and provide an opportunity for discussion with academics and practitioners.

Mitigation and Adaptation Emissions Embedded in the Transition to a Stable Climate

Corey Lesk (Columbia University)

In the coming decades, climate change will require a massive global effort to replace fossil fuels with renewable energy while adapting to the climate risks caused by historical emissions. Installation of solar and wind capacity, coastal protection and retreat due to sea-level rise, and enhanced demand for cooling energy due to warming will result in CO2 emissions from energy and materials use. Yet, the magnitude of these emissions remains largely unconstrained. In this study, we bring together a suite of sectoral models to estimate the CO2 emissions embedded in the transition to a stable climate not exceeding 2°C of warming. We estimate that coastal retreat and protection and additional cooling demand will emit a total of a few GtCO2 through 2100. Emissions from energy investment into renewable capacity are much larger at ~80GtCO2, or roughly two years of global emissions. We argue that these emissions are of sufficient magnitude to compel greater integration of adaptation and mitigation in the realms of both climate science and policy.