

Abstract

Flooding is one of the most pressing and recurring issues threatening urban populations worldwide. Nepal, the fourth most vulnerable country to climate change that constantly suffers from unplanned urbanization, is also experiencing an increase in the severity of flooding. The crisis is most prominent in the largest urban agglomeration of the country, Kathmandu Valley, where lack of prudence in urban planning, rapid urban growth, and change in rainfall patterns have led to irreversible ecological damages, strained stormwater drainage systems, and unprecedented climate-related hazards that are endangering public safety and well-being. Even the traditional flood risk mitigating strategy, grey infrastructures, have been proven insufficient because of their reliance on historical climate data, limited dynamic adaptability, and a tendency to transfer risks instead of source mitigation.

In recent years, Ecosystem-based Adaptation (EbA) is gaining traction as a promising strategy that anchors on ecosystem services to enhance urban resilience, curb disaster risks, and offer multiple co-benefits. However, EbA is still a novel concept in Nepal, especially in the urban context. There is a lack of comprehensive assessment of EbA across policy, science, and practice domains to facilitate its uptake that is underpinned by well-established theoretical models. This study aims to investigate EbA's policy integration status quo, its scientifically-backed professional perspectives, and socially-constructed public perceptions as a flood risk mitigation strategy in Kathmandu Valley. A mixed-methods approach was adopted: EbA policy integration was assessed using a qualitative scoring protocol, experts' perceptions were explored through interviews grounded on the hybrid framework of two socio-psychological models, Protection Motivation Theory (PMT) and Protective Action Decision Model (PADM), and cognitive factors governing public perceptions were quantitatively analyzed using structural equation modeling within the same framework.

The findings signaled that while Nepal acknowledges ecosystems' intrinsic and utilitarian values, EbA integration in policy is limited and inconsistent, with inadequate implementation provisions and a lack of focus on urban ecosystems. This underscores the need for coherent policies and robust legislative frameworks to mainstream EbA. Experts, on the other hand, recognized EbA's potential but identified barriers to its uptake, including high perceived costs, lack of political prioritization, biased preference for engineering practices, and insufficient understanding. These challenges highlight that innovative institutional efforts and supportive mechanisms are essential. The public perception analysis disclosed that higher flood risk heightened fear but did not directly influence adoption intentions. In contrary, response efficacy, response cost, and perceived co-benefits were significant influencing factors alongside socio-economic and perceptual factors, emphasizing the importance of tailored communication and interventions to promote EbA adoption. In conclusion, these findings imply that collective actions are needed to address policy gaps, foster multi-level support and diverse stakeholder engagement, and align resources and political interests to facilitate EbA uptake in Nepal.

Keywords: *ecosystem-based adaptation; urban; climate change; ecosystem services; policy; perception; Nepal*