



Ecosystem, Resilience and the Participatory GeoSM-NatE Tool

Prof. Mahua Mukherjee,

Department of Architecture and Planning, IIT Roorkee

28th October 2021

On pretext of development, controlling and disrupting nature and its biotic-abiotic nexus is one of the most popular growth model across globe. Early and continuous warning from spiraling frequency and intensity of disaster- and climate-change-induced extreme-events are felling to deaf ears and responded by grossly insufficient mitigation and adaptation efforts.

Discussion on Resilience may remind how “sustainable development” was brought in forefront leaving behind the “sustainability” in last half a century, to satisfy vested interest of selected group of ‘homo sapiens’ i.e. wise men. Again the question stays- are we using the ‘resilience’ as a shield to do whatever suits our immediate needs and greed? There is no stopping to the ecosystem-disruption.

From this context, we identify the newer urban risks of urban heat, urban flood, groundwater depletion and air pollution coupled with natural hazards and socio-economic vulnerability. Re-introduction and rejuvenation of natural elements as planned infrastructure service, i.e. blue-green infrastructure (BGI), is emerging as priority adaptation and mitigation strategy. The Geospatial Mapping of Natural Ecosystem (GeoSM-NatE) Tool developed, is based on innovative use of geo-spatial data for BGI-integrated Urban Risk Resilience.

BGI planning depends on feasibility study of geographical, geological and climate region, Land-use land-cover, presence of natural elements and risk parameters. Geo-spatial data has emerged as reliable tool to address inadequacy of data capture, share and analysis techniques. The technical inputs required for the GeoSM-NatE are geo-located area of interest on GIS platform, Satellite bands to process RS indices to monitor blue, green and impervious surface cover, Thermal imaging data for the Land Surface temperature trends, Satellite data on Aerosol for air pollution mapping, Radar data to generate the ‘bare earth’ topography as a Digital Terrain Model (DTM) or a Digital Elevation Model (DEM), Secondary data on Groundwater depth (GWT) and Air Pollution from monitoring stations, etc.

Success of the GeoSM-NatE-facilitated BGI project implementation depends on Community Participation. The union between technology and community can offer the most effective resilience measure. Innovative practices involving the community to develop sustainable practices that are contextualized to the local specific needs are the answers to create a holistic approach to resilience. Interdisciplinary knowledge co-production and its adaptation by community is the Participatory- Geospatial Mapping of Natural Ecosystem (Participatory- GeoSM-NatE) Tool. The socio-economic input from community to make use of the technical Output from the GeoSM-NatE Tool in terms of Ecological stress mapping and potential area identification for the BGI intervention. Evolution of the Participatory -GeoSM-NatE will be at the centre of the Talk.

Short CV:

Dr Mahua Mukherjee is Professor in the Department of Architecture and Planning, and Joint Faculty and Ex-Head of Centre of Excellence in Disaster Mitigation and Management (CoEDMM), IIT Roorkee, India. Her educational qualifications are B. Arch (Jadavpur University), M. Tech (Building Science and Technology) IIT Roorkee, and PhD in the field of sustainable urban development. She has pursued her career in Architecture Office and Academic think-tank NGO before joining Teaching.

Mahua is Secretary General to South Asia Alliance for Disaster Resilience Institutes (SAADRI). Currently she is member to UNDRR- APSTAG and GADRI Board of Directors. Her graduated research interest includes sustainable urban development to risk resilience, including urban climate and climate responsive campus and housing design. Association with international academia like Lund University, Sweden through SIDA Fellowship and Penn State University as a Fulbright Fellow among others, influenced her intellectual pursuit. She was Visiting Associate Professor and Researcher with DPRI, Kyoto University in 2016.

Mahua organizes/ attends courses, competitions, research seminars, conferences, and workshops in the field of risk resilience and sustainable development. She publishes in peer-reviewed international journals, conference proceedings and books. National and International collaborative research includes Non-structural elements' seismic safety, Climate responsive and earthquake resilient housing, blue-green infrastructure network, and building regulation for resilience. Few recent publications:

1. Mukherjee, M. and Shaw, R. (Book Ed.) (2021) *Ecosystem-Based Disaster and Climate Resilience: Integration of Blue-Green Infrastructure in Sustainable Development; Disaster and Risk Research: GADRI Book Series, Springer Nature Singapore*. <https://doi.org/10.1007/978-981-16-4815-1>
2. Mukherjee, M., Sangeeta, & Madapala, J. (2020). Sustainable Infrastructure Development, Risk Perception and Vulnerability Assessment in Indian Himalayan Region. IRDR Working Paper Series, 26 pages. doi: 10.24948/2020.07
3. Mukherjee, M., Chatterjee, R., Khanna, B. K., Dhillon, P. P. S., Kumar, A., Bajwa, S., Prakash, A. and Shaw, R., 2020. Ecosystem-centric business continuity planning (eco-centric BCP): A post COVID19 new normal, *Progress in Disaster Science*, Vol. 7, October 2020, 100-117.