Risk Assessment of Natural Hazards using Fuzzy Comprehensive Assessment

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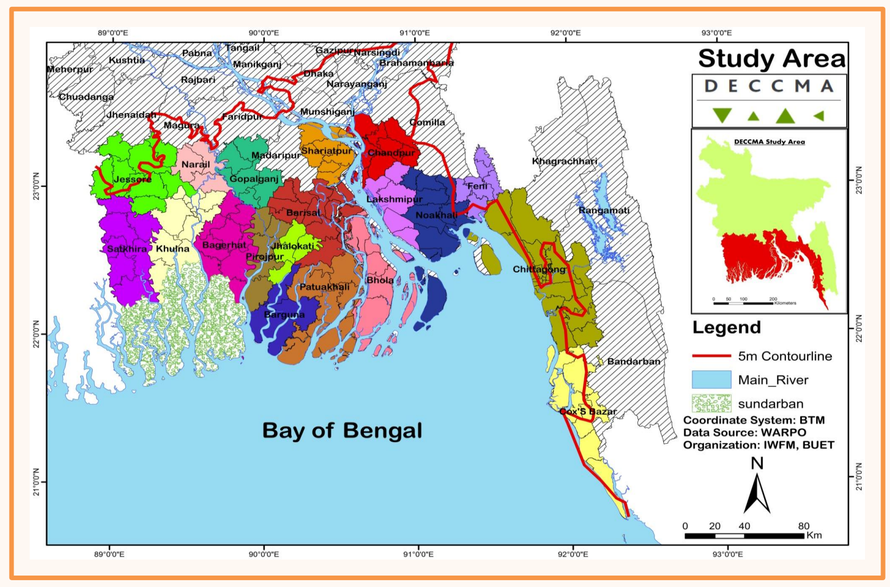
BACKGROUND

Fuzzy Comprehensive Assessment (FCA) method is used to quantify indicators combined with nonlinear characteristics in the evaluation process, obtaining quantifiable assessment result. Based on the theory of fuzzy mathematics, this method makes fuzzy mapping and fuzzy transformation by mathematical methods. According to the process of defining factors set, evaluation set, weight set and so on, it carries on fuzzy comprehensive evaluation. And the risk map is prepared using the results based on membership degree of indicators from FCA. In this study, risk map prepared by using IPCC AR4 approach is compared with the risk map prepared by using FCA.

STUDY AREA



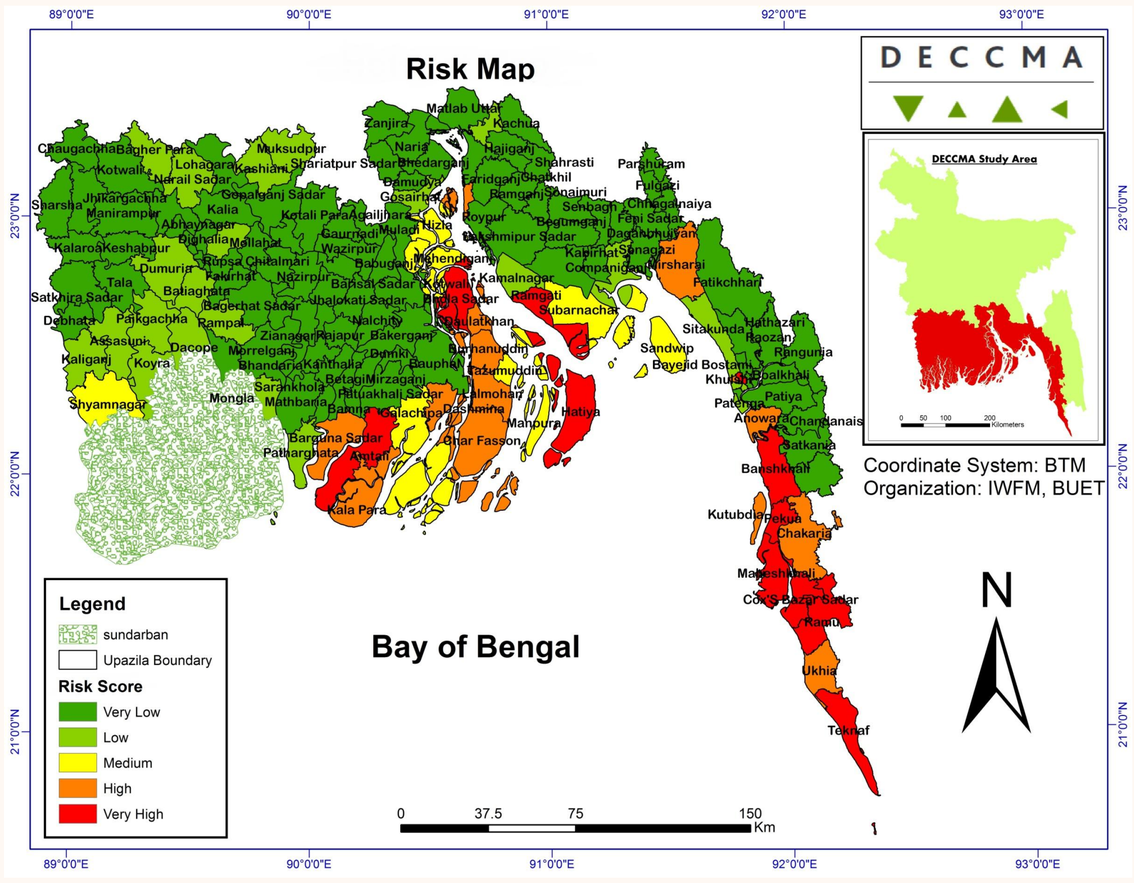
RISK MAP (AR4)

Exposure (E)
Population Density
Water Supply
Number of Household

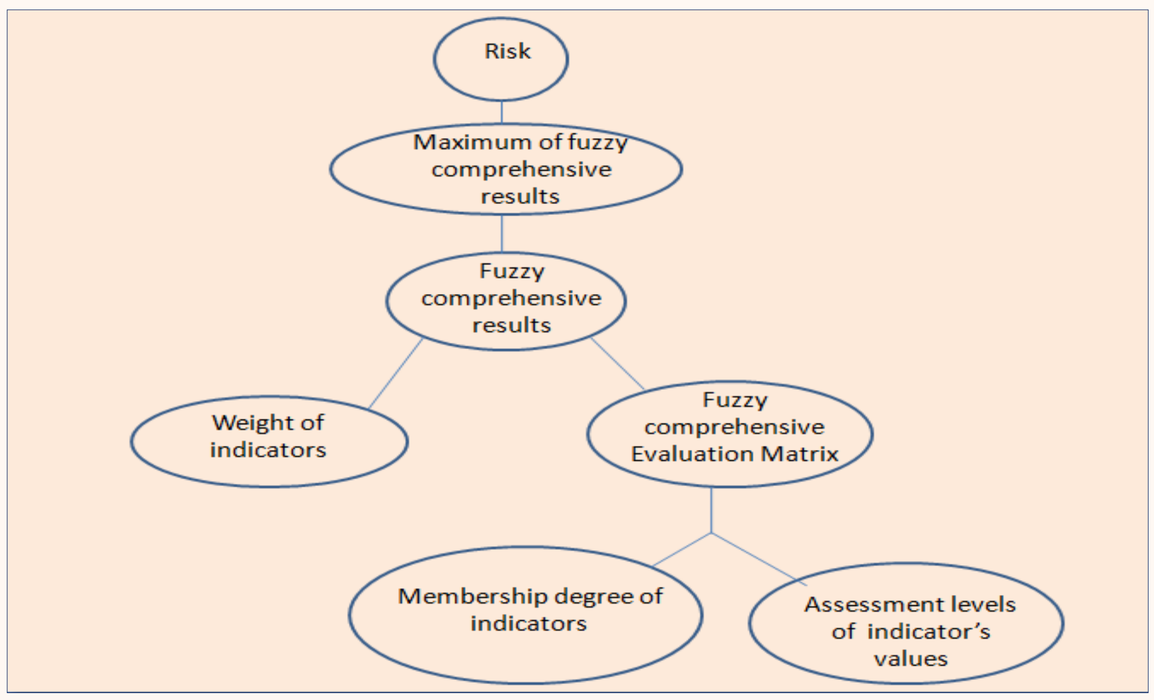
Sensitivity (S)
Proportion of Crop Land
Type of Household
Women, Children and Elderly Population

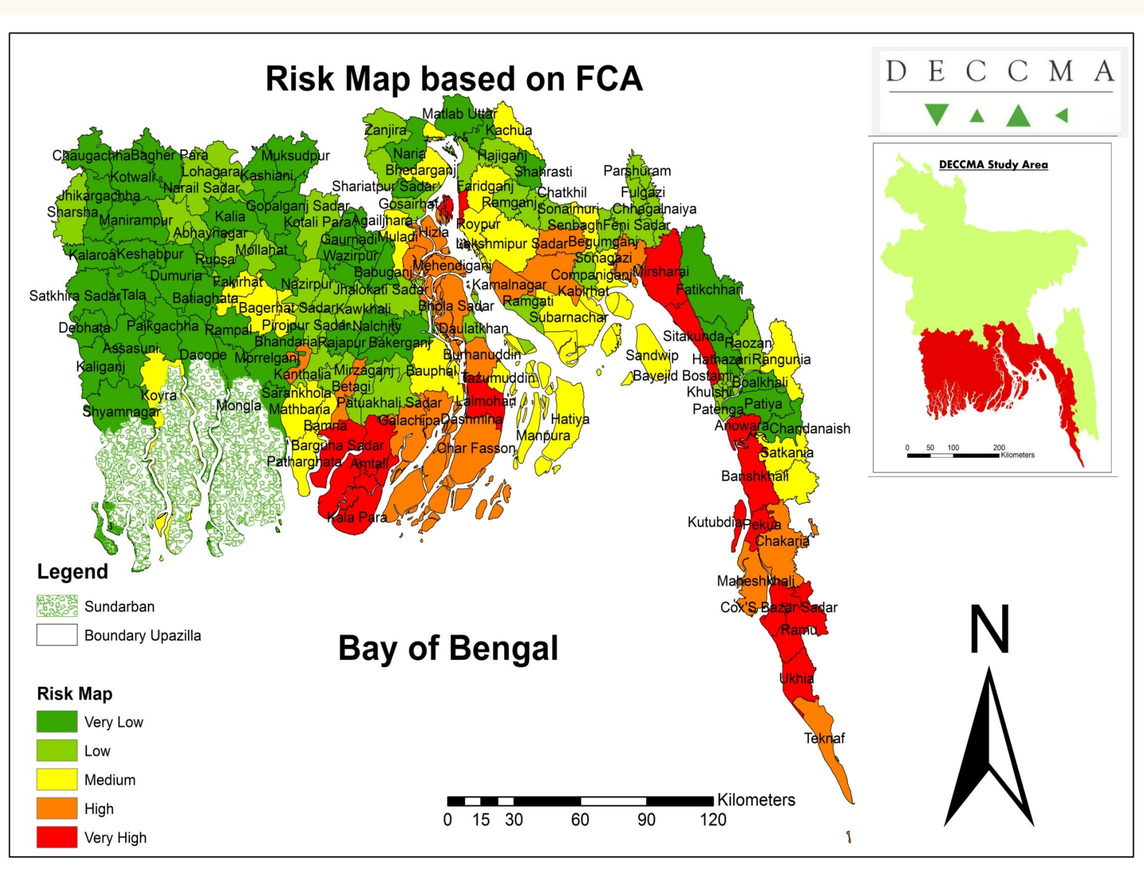
Adaptive Capacity (AC)
Road Density
Literacy Rate
Cropping Intensity
Cyclone Shelter
Polder
Land Accretion

Multi-hazard= ∑Hazards
Risk = Probability * Hazard * Vulnerability
Vulnerability= ∫ (E, S, AC)



RISK MAP (FCA)





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CONCLUSION

- According to fuzzy comprehensive assessment process, five fuzzy membership functions are defined based on five assessment classifications correspond to it's indicators. These membership functions calculate the membership degree of its indicator correspond to level of classification.
- Due to the lack of available field data for risk maps, IPCC AR4 approach and FCA approach are used to compare the risk zones.
- FCA can be used to validate integrated risk assessment of natural hazards from which an optimum method can be determined.