

Risk to resilience: analysing barriers to cyclone vulnerability in coastal Odisha

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Odisha state is situated in eastern India and has a 480 km long coastline. The coastal belt is one of the most cyclone-vulnerable regions in India. It consists of 22 community development blocks spread across six districts. Nearly one-third of the state's total population lives in this region. Between 1891 and 2021, the state has been hit by 110 cyclones. Therefore, there is a need for a detailed assessment at the micro-level to identify cyclone vulnerability and risk. Such an assessment would help not only in planning for enhancing resilience to cyclone disasters but also in devising better strategies and adaptive measures. The major objectives of the study are (i) to identify the vulnerability and risk factors that need to be addressed at the community and household levels and (ii) to assess the status of socio-ecological resilience to cyclone vulnerability. Data for the present study were collected from primary as well as secondary sources. Two hundred and six sample households were selected from the cyclone-affected areas by using a stratified random sampling technique. Major factors that made rural households more vulnerable to cyclones were the severity of cyclone damage, income constraints, lack of banking awareness, absence of a market for selling products and loans and migration-driven labour scarcity. These findings would contribute to the understanding of the vulnerability of both space and society in coastal Odisha and thereby suggest strengthening measures to create cyclone resilience.

Keywords: Adaptation, cyclone, resilience, risk, vulnerability.

encountered many floods, droughts and cyclones¹. Among the three cyclones that have had the most devastating effect, affecting the lives and livelihoods of millions of people along the coast. Between 1891 and 2021, the state was hit by about 110 cyclones². Cyclones enhance not only vulnerability and risk factors but also reduce people's adaptive capacity. Lack of development exposes vulnerable communities to the risks of cyclone disasters and has been affecting the sustainable development of the state³.

Significant progress has been made during the last 25 years (1999–2024) in reducing the loss of human lives due to cyclones. About 10,000 casualties in 1999 have been brought down to almost zero due to cyclone *Yaas* in 2021. This demonstrates the efforts made by the Odisha government through the enhancement of various mitigation and adaptive measures. Adaptive capacity can be specific and generic. The former represents interventions that reduce, particularly, the impact of cyclones, eg. early warning systems and erecting cyclone shelters that help in curbing potential mortality. The generic adaptation measure refers to the development characteristics such as economic capacity, technology and infrastructure that may increase the ability of the system to withstand cyclones^{4,5}. There is a robust institutional arrangement from the state headquarters up to the cyclone shelter level at the grassroots that has earned appreciation from the United Nations. However, there are many areas of concern in making coastal Odisha a cyclone-resilient region. To reduce the impact of cyclones on humans, a socio-ecological resilience study is pertinent. The objectives of the present study are to identify the vulnerability and risk factors at the community and household levels and to assess the socio-ecological resilience to cyclone vulnerability.

Risk to resilience continuum