



## RESEARCH ARTICLE

### An integrated framework for assessing coastal community vulnerability across cultures, oceans and scales

S. Aswani<sup>a,b\*</sup>, J. A. E. Howard<sup>c\*</sup>, M. A. Gasalla<sup>d</sup>, S. Jennings<sup>e</sup>, W. Malherbe<sup>e</sup>, I. M. Martins<sup>d</sup>, S. S. Salim<sup>f</sup>, I. E. Van Putten<sup>g,h</sup>, P. S. Swathilekshmi<sup>f</sup>, R. Narayanakumar<sup>f</sup> and G. R. Watmough<sup>i</sup>

<sup>a</sup>Department of Anthropology, Rhodes University, Grahamstown, South Africa; <sup>b</sup>Department of Ichthyology and Fisheries Science, Rhodes University, Grahamstown, South Africa; <sup>c</sup>Marine Research (Ma-Re) Institute, University of Cape Town, Rondebosch, South Africa; <sup>d</sup>Fisheries Ecosystems Laboratory, Oceanographic Institute, University of Sao Paulo, Sao Paulo, Brazil; <sup>e</sup>Tasmania School of Business and Economics, University of Tasmania, Hobart, Australia; <sup>f</sup>Socio-economic Evaluation and Technology Transfer Division, Central Marine Fisheries Institute (CMFRI), Kochi, Kerala, India; <sup>g</sup>CSIRO Oceans and Atmosphere, Hobart, Australia; <sup>h</sup>Centre for Marine Socioecology, University of Tasmania, Hobart, Australia; <sup>i</sup>GeoData, Geography and Environment, University of Southampton, Southampton, UK

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Coastal communities are some of the most at-risk populations with respect to climate change impacts. It is therefore important to determine the vulnerability of such communities to co-develop viable adaptation options. Global efforts to address this issue include international scientific projects, such as Global Learning for Local Solutions (GULLS), which focuses on five fast warming regions of the southern hemisphere and aims to provide an understanding of the local scale processes influencing community vulnerability that can then be up-scaled to regional, country and global levels. This paper describes the development of a new social and ecological vulnerability framework which integrates exposure, sensitivity and adaptive capacity with the social livelihoods and food security approaches. It also measures community flexibility to understand better the adaptive capacity of different levels of community organization. The translation of the conceptual framework to an implementable method is described and its application in a number of “hotspot” countries, where ocean waters are warming faster than the rest of the world, is presented. Opportunities for cross-cultural comparisons to uncover similarities and differences in vulnerability and adaptation patterns among the study’s coastal communities, which can provide accelerated learning mechanisms to other coastal regions, are highlighted. The social and ecological framework and the associated survey approach allow for future integration of local-level vulnerability data with ecological and oceanographic models.

**Keywords:** marine hotspots; climate change; social vulnerability; coastal communities; adaptation framework

#### 1. Introduction

Across the globe, many coastal communities rely on marine resources for their food security (FS), income and livelihoods and with predicted trends in human populations, the number of people reliant on these resources is likely to increase (FAO, 2012). However, the effects of climate change including increased variability are already being experienced by coastal communities and appear to be accelerating (Dorsey et al., 2012). Depending on a range of factors, including location, these changes are having mild to severe impacts on communities both in direct and indirect ways (Miller et al., 2010). Communities in coastal areas, for instance, are particularly at risk due to sea level rise but also through their dependence on marine resources that are impacted by multiple climate change pressures. A

change in the availability and condition of marine resources has consequences on the livelihoods of fishing populations or those who depend directly on fishing as a source of food (Badjeck, Allison, Halls, & Dulvy, 2010).

Although mitigating climate change impacts remains the main priority in addressing climate change (IPCC, 2014), it is also important to develop adaptation strategies to climate change in locations where this is possible (Füssel & Klein, 2006; Young et al., 2010), particularly those already experiencing early effects (Hobday et al., 2016; Popova et al., 2016). While mitigation is generally centred on changing behaviour at the national and/or global level, adaptation is a response that provides affected communities with a locally specific course of action. For a community to develop effective means to adapt to the

\*Corresponding authors. Email: [s.aswani@ru.ac.za](mailto:s.aswani@ru.ac.za); [james.howard@alumni.uct.ac.za](mailto:james.howard@alumni.uct.ac.za)