This study introduces a new method of assessing hazard and risk to coastal populations from tsunami. Earthquakes with specified return periods occurring along the Arakan-Andaman-Sumatra-Java and Makran subduction zone and having magnitudes ($M_W$) between 7.6 and 9.3 (fault lengths from 100 to 1,000 km) were considered as potential sources of tsunami for countries around the Indian Ocean. Fault parameters such as size and slip were determined using two scaling law equations. Modeling was carried out using the numerical tsunami model (TUNAMI) and bathymetry data with a resolution of 1.86 km. This model is based on linear long-wave theory in the spherical coordinates and neglecting the effect of bottom friction. Probabilistic Tsunami Hazard Analysis (PTHA) was applied using simulated maximum tsunami height. Tsunami hazard maps were developed for return periods from 5 to 600 years. The combined tsunami hazard map was then merged with global population density data with a resolution of 0.93 km to estimate the coastal population at risk for each country. A new method for tsunami risk assessment combining hazard and population is proposed. The risk level is calculated using the combination of maximum tsunami height (0.125 m to > 32 m ranked exponentially 1 to 10) and population (1 to > 10,000 ranked exponentially 1 to 10) giving a maximum value of 100. This risk ranking can be used to compare tsunami risk between countries. The tsunami hazard map which has been developed and the proposed risk level mapping will help assess potential macro scale tsunami hazard and risk globally.