



Methods for assessing the sensitivity of water resources of atolls in the greater tropical Pacific region to climate change

Christopher de Freitas (1), Manuel Helbig (2), and Andreas Matzarakis (3)

(1) University of Auckland, School of Environment, Auckland, New Zealand (c.defreitas@auckland.ac.nz), (2) Institute of Geography, University of Göttingen, Germany, (3) Meteorological Institute, Albert-Ludwigs-University of Freiburg, Germany

For most atolls of the Pacific, fresh water resources are scarce. Water catchment areas are small and groundwater storage is in the form of a shallow fresh water lens. This essential resource is coming under increasing pressure as populations grow and rates of development increase. These things and the realisation of the possible impact of climate change have highlighted the sensitivity of island communities to the availability of water. However, to assess this sensitivity requires not only standard climatic data such as air temperature and rainfall, but also more specialised data on net allwave radiation and surface-to-air water vapour gradients. Therein lies a major problem as very little island-specific climatic data are available. The aim here is to assemble and validate a suitable database suitable for modeling the water balance of atolls. ERA40 reanalysis data are used for that part of the Pacific bounded by latitudes 30°S to 30°N and longitudes 150E° to 120°W and compared with the climate records of selected low islands. Data are at a 2.5° x 2.5° grid resolution and cover the period January 1962 to December 2000. Results are presented for a variety of water surplus or deficit indicators, which include indices developed to assess regional sensitivity to climate change. An important one is per cent change in mean rainfall required to bring about a zero water balance. It is shown how sensitivity to climate change may be assessed. With this information, planning decision-making is possible without knowing precisely the magnitude of climate change that will occur.