Geophysical Research Abstracts
Vol. 15, EGU2013-4029, 2013
EGU General Assembly 2013

Potential Impact of Climate Change on Hydropower Generation in Southern Taiwan

Jie-Lun Chiang (1), Han-Chung Yang (2), Yie-Ruey Chen (3), and Ming-Hsi Lee (4)

(1) Dept. of Soil and Water Conservation, National Pingtung University of Science & Technology, Pingtung, Taiwan (jlchiang@mail.npust.edu.tw), (2) Dept. of Leisure, Recreation and Tourism Management, Shu Te University, Kaohsiung, Taiwan (hcyang@stu.edu.tw), (3) Dept. of Land Management and Development, Chang Jung Christian University, Tainan, Taiwan (yrchen@mail.cjcu.edu.tw), (4) Dept. of Soil and Water Conservation, National Pingtung Universityof Science & Technology, Pingtung, Taiwan (mhlee@mail.npust.edu.tw)

Along with global warming, the climate change is under ongoing rise in global average temperature in the most areas of the world. The rainfall increases apparently in some areas while it decreases elsewhere. Climate change also causes a serious impact on water resources and hydropower generation as well. Presently, hydropower is the world's largest source of renewable electricity. It accounts for approximately 20% of the electricity generated. The average electric load in Taiwan for the year 2010 was 26.979 GW with a peak load of 33.023 GW.
Taiwan's climate ranges from the subtropics in the north to the tropics in the south. Summers are hot and humid, and the temperature can reach up to 35°C (95°F). Thus, air conditioning units are ubiquitous in Taiwan and can account for 30% of Taiwan's electric power consumption in the summer months. As the temperature rises along with the global warming, the electric load will rise as well. The purpose of this study is to analyze the impact of climate change on Taiwan's hydroelectric generating capacity and to suggest strategies for coping with these changes in order to maximize hydropower generation.
This study investigated the potential impact of climate change on hydropower based on the river discharge of the Generalized Watershed Loading Functions (GWLF) simulations which were carried out by using rainfall and temperature data from four General Circulation Models (GCMs) (CGCM2, CCCSR/NIES, ECHAM4, HadCM3 and etc.). The river discharge change of the largest basin in southern Taiwan under climate change scenarios A2 and B2 released by the Intergovernmental Panel on Climate Change (IPCC) was used to assess the climate change impact on hydropower generation. From these GCMs, it is indicated that the range of river discharge variation was -26%∼+15% in the dry season and -10∼+82% in the wet season. The potential impact on hydropower generation can be roughly estimated as the previous discharge variation.