

1. Title: IMPACT OF CLIMATE CHANGE ON GLACIERS-A CASE STUDY OF BHUTAN , (JANUARY 2016)

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Abstract:

Within the recent days, the positive trend of climate change and its impact on glaciers on the northern part of Bhutan has been a hot issue and it can be seen with our naked eyes that numerous of glacial lakes are formed. GLOFs have been one of the major concerns for the people of Bhutan. Rapid melting of glaciers has resulted in the formation and expansion of moraine-dammed lakes, creating a potential danger from glacial lake outburst floods (GLOFs). Most lakes have formed during the second half of the 20th century. The Himalayas and glaciers are huge storage and very important source of fresh water. On the other hand, they are one of the most sensitive indicators of climate change as they grow and shrink in quick response to changing air temperature. Surface temperature of the earth is rising globally, which is the major indicator of global climate change. The Himalayan ice and glaciers are gradually melting due to global temperature rise resulting to significant shrinkage in snow-covered area, retreating of glaciers at a rate of 18-35 of meters per year and formation of Glacier Lake. This research aims to assess impact of climate change on the glaciers of Bhutan in Lunana region. Geographic Information System (GIS) was used for the digitization of different years of satellite maps. And here it indicates the trend analysis of the temperature of Bhutan for the fifteen years and the Mann-Kendall's (MK) nonparametric test and Sen's slope estimation techniques were used to quantify the overall statistical significance of the results.

2. Title: Expansion of Glacial Lakes in Bhutan during 1990-2009,

Indian Journal of Science and Technology, Vol 9(36), DOI: 10.17485/ijst/2016/v9i36/85047, September 2016

Abstract:

In recent decades, there are notable impacts of climate change on the glacial lakes in the Himalayan region. Therefore, the glacial lakes are expanding due to melting of the glaciers. The current study has been adapted to observe the changing pattern of glacial lakes during 1990 to 2009, which are located in the glacier mountain in Bhutan. The identification of the actual area of the lakes has been done using satellite imagery (Landsat TM and Landsat ETM+) by digitization after application of the correction methods (geometrical and radiometrical) on raw satellite images. The satellite images are utilized for the time periods of 1990, 2001, 2007 and 2009 for this study. The lake volume has been calculated using a glacial lake area and Digital Elevation Model (DEM). Finally, changes in the volume of lakes have been observed from 1990 to 2009. The highest increment of lake volume is found in the Luggye (45%) and Thorthormi

(27%), while the lowest is observed in the Thorthormi-4 (1%). Overall, the highest expansion rate of glacial lakes is found in the Thorthormi-1.

3 Title: Seasonal and annual variation of Temperature and Precipitation in Phuentsholing

International Journal of Advanced Scientific Research and Management, Vol. 1 Issue 10, Oct 2016. IJASRM (ISSN 2455-6378), LEKI Dorji

Abstract:

Bhutan is one of the sensitive regions to climate variation particularly to temperature precipitation changes in the World as there is indication of melting Glaciers in the northern part of country. In this study, trends in precipitation and temperature at annual, seasonal and monthly time scales for the periods of 1996-2014 were examined for the Phuentsholing which is located near the Indian Boarder. Nonparametric tests (such as Mann-Kendall and Sen's Slope) to determine climatic trends. In contrast, seasons represent slight precipitation increase (which are not statistically significant) annually, spring and autumn. Temperature data showed slight increase seasonally like spring and summer, even though results are not statistically significant for annually 1996-2014. The temperature data for summer months represent statistically significant increasing trends during the last 18 years. The main objective of this study is to observe the temperature and rainfall trend so far in Phuentsholing. Mann-Kendall's (MK) nonparametric test and Sen's slope estimation techniques were used to quantify the overall statistical significance of the results.