

# Climate Change Impact Analysis

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## Overview

This course provides a deep insight in the topic of climate change, and provides training on climate change impact analysis. First, the problem of global warming is explained as well as the different types of impacts on society. Second, methodologies for the analysis of historical trends in time series will be explained, and how trends as a result of anthropogenic activities can be separated from natural climate variability. Particular focus is given to the presence of multi-decadal climate oscillations next to trends, and the influence of the El-Niño Southern Oscillation on weather conditions. Next, the most important part of the course deals with impact analysis of climate change. State-of-the-art methodologies for climate change impact analysis will be discussed. It will be explained how results of the available climate models can be applied for impact analysis at the local scale. This involves methods for derivation of climate change signals, for downscaling and bias correction. Uncertainties in the future climate change projections are assessed by considering an ensemble of climate model simulations. From this ensemble, a more reduced set of climate scenarios can be derived, tailored to a specific type of impact investigation. Different methods exist to compute the impacts of these climate scenarios by means of impact models. Next to the details of the different methods, also the limitations and pitfalls of methods will be explained. Also the various issues and challenges the research community as well as professionals are facing when dealing with the assessment and adaptation of climate change impacts are discussed.

For each of these types of methods, next to the theoretical sessions, hands-on training will be provided on PC. During these sessions, methods for trend analysis, statistical downscaling, bias correction and impact analysis will be applied on PC to local case studies and datasets. During these practical sessions on PC, applications will mainly be taken from the field of catchment hydrology and water engineering. This involves impact analysis of climate change on floods and water availability.

Finally, next to climate change impact analysis, also the typical climate adaptation needs are discussed as well as decision making under uncertainty. Climate scenarios are subject to high uncertainties, which need to be addressed by means of flexible, adaptable solutions. Solutions have to be searched that are climate proof, which means effective for each of the potential future climate scenarios.

<b>Modules</b>	<b>A: Introduction to climate change and impacts : May 23</b> <b>B: Introduction to climate models : May 24 – June 25</b> <b>C: Statistical downscaling and bias correction Part1 : May 26 – May 27</b> <b>D: Statistical downscaling and bias correction Part2 : May 30 – May 31</b> <b>E: Climate scenarios and impact analysis of climate change : June 1 - June 2</b> <b>F: Climate adaptation and decision making under uncertainty : June 3</b> <b>Number of participants for the course will be limited to Thirty.</b>
<b>Who Can Attend ?</b>	<ul style="list-style-type: none"><li>▪ Executives, engineers and researchers from governmental organizations, industry, consultancy firms, including R&amp;D laboratories.</li><li>▪ Students at all levels (BTech/MSc/MTech/PhD) or Faculty from reputed academic institutions and technical institutions.</li></ul>

<b>Fees</b>	<p>The participation fees for taking the course is as follows: <b>Participants from abroad : US \$300</b>  <b>Industry/ Research Organizations: Rs 20000 Academic Institutions: Rs. 5000</b>  <b>Students at all levels: Rs. 500</b></p> <p>The above fee include all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, 24 hr free internet facility. Food and Lodging expenditure is to borne by the participants. Limited Accommodation may be provided on payment basis on request.</p>
<b>How to Apply ?</b>	<p><b>If you wish to register for the course, please visit the website of GIAN</b>  <a href="http://www.gian.iitkgp.ac.in/">http://www.gian.iitkgp.ac.in/</a></p> <ol style="list-style-type: none"> <li>1) Click on Course Registration. 2) Register and then 3) Log-in 4) Fill up your details</li> <li>5) Upload your photo and signature 6) Make online payment of Rs.500</li> <li>7) Then click on Course Registration. List of available course will be shown</li> <li>8) Check the course Climate Change Impact Analysis 9) Click on Save</li> <li>10) Click on Confirm Courses</li> </ol> <p>Then you are done. Wait for our Communication.</p> <p>11) If selected, then you have to pay the fees of the course and after paying the fees, your participation will be confirmed.</p>

## The Faculty



**Dr. Patrick Willems** is professor in water engineering at KU Leuven (University of Leuven). Prof. Willems' main area of expertise is the study of hydrological extremes (floods along rivers and urban drainage systems, water availability) by combined use of physically based mathematical simulation models and statistical methods. He is a key international expert in the study of the impacts of climate change on water systems. Prof. Willems is currently also member of the Open Panels of Experts (OPACHE) of the Commission for Hydrology (CHY) of the World Meteorological Organization (WMO), member of the Advisory Working Group on Downscaling of the WMO, member of the Technical and Scientific Committee of the European Water Association, member of the Royal Belgian Academy for Overseas Sciences in his country Belgium, and member of the Water & Climate expert group of the Royal Academy for Sciences and Arts of Belgium, member of the Scientific Committee of the Division on Hydrological Sciences – Subdivision Precipitation and Climate of the European Geophysical Union (EGU). Since 2013, he is acting as Editor-in-Chief for the Elsevier Journal of Hydrology: Regional Studies.



**Dr. Ujjwal Saha** is an Assistant Professor in the Department of Civil Engineering, IEST Shibpur from December 2013. Prior to joining Shibpur, he was a faculty member in NIT Raipur from June 2013. Prof. Saha completed his Ph.D from IISc, Bangalore in the year 2015. His area of Ph.D was Climate Change Impact on Urban Rainfall and Flooding. He did his M.E in Water Resources Engineering Specialization from Jadavpur University in the year 2004 after doing his B.E in Civil Engineering from B.E. College (D.U.), Shibpur in the year 2002. From 2005 to 2008, he served the Government of West Bengal as an Assistant Engineer in the Irrigation department. He is interested to pursue research on Climate Change, Sustainable Energy Options, Rainfall Modeling and Water resources planning and management. He has published research paper in three International Journal and one National Journal as well as two national conferences. He has given a special training on climate change downscaling to the researchers of UPM, Malaysia in October 2014. He has also visited the UPM, Malaysia as a research collaborator in June 2015.

## Course Coordinator

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