



How will
global climate change
affect your watershed?

Know what streamflow
changes to plan for with our
state-of-the-art science.



Hydrology Futures, LLC, will provide you with a valuable scientific product, so that you know what to plan for.



Mariza Costa-Cabral, PhD

Chief Researcher, Hydrology Futures, LLC

Dr. Costa-Cabral is the founder of Hydrology Futures, LLC, a Seattle-based company specializing in the hydrologic impacts of global change. Costa-Cabral (PhD in Hydrology, 1997) has a broad experience in environmental research. Prior to founding Hydrology Futures, LLC, she was a tenured scientist at the GKSS Research Center in Germany, where she developed and applied models of particulates transport in the atmosphere and over the land surface. At the University of Washington in Seattle she worked in hydrologic modeling of river basins with high geophysical variability. Her current work addresses the impacts of projected climate change, land cover and use change, and streamflow regulation, on the streamflows of geophysically distinct river basins. A major focus of this work is on identifying the most meaningful statistical measures of streamflow change to be used in the presentation of simulation results.



Reiner Schnur, PhD

O.A.Sys, Ocean Atmosphere Systems, GbR
Consulting Researcher for Hydrology Futures, LLC

Dr. Schnur is co-founder of O.A.Sys Ocean Atmosphere Systems GbR (www.oasys-research.de), a company based in Hamburg, Germany, that produces expert scientific work in the field of Earth Systems modeling. Dr. Schnur is also a tenured staff member of the Max Planck Institute for Meteorology, a world leader in climate research. Dr. Schnur is a mathematician by training, holds a PhD in Meteorology, and is an experienced scientist in climate and hydrology research. His diverse work includes global climate modeling with emphasis on soil-vegetation-atmosphere interactions, compilation of forcing data sets for land surface models, statistical analysis of climate simulations, and the study of the regional impacts of climate change.

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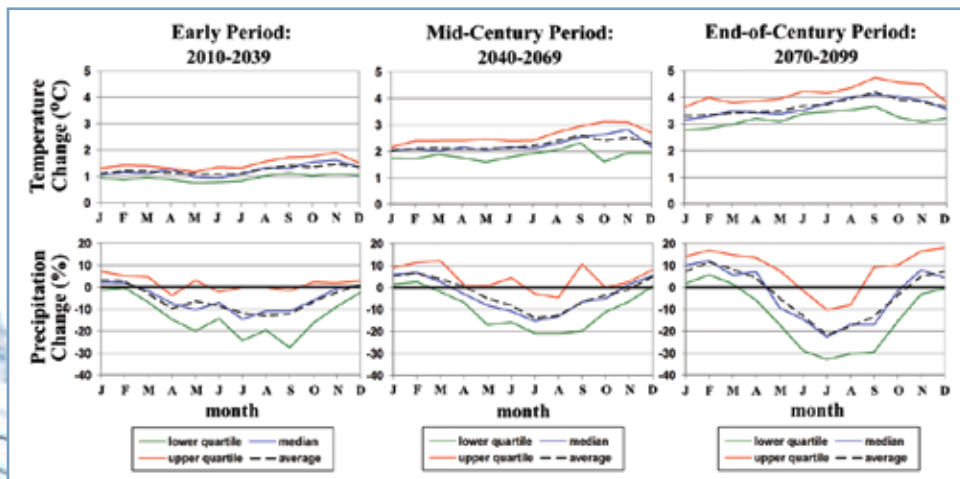




Global climate change is predicted to have considerable regional effects throughout the world by the middle of this century.

Altered regimes of precipitation and temperature will result in modified streamflow regimes, with potentially major consequences to ecology, water supply, and energy production. There is a widespread need throughout the world to forecast streamflow changes through the end of the 21st century. Hydrology Futures, LLC, is responding to this challenge using the best climate projections downscaled to your specific watershed, state-of-the-art hydrologic models, and complex techniques of results analysis, to forecast likely altered frequencies of high and low streamflows at different stream channel locations.

Figure 1: Changes in monthly mean temperature and precipitation for the early, mid-century, and end-of-century periods, projected by 14 Global Climate Models (GCM), for an example watershed.



* In case that you already have an appropriate hydrologic model that has been successfully calibrated for your river basin, it may be possible to use it to study these climate change scenarios.

Hydrologic Modeling Under Climate Change Scenarios

We use state-of-the-art physically-based, distributed hydrologic models*, to simulate the response of a river basin's streamflows to forecasted climate change scenarios†. These scenarios will reflect likely precipitation and temperature changes in your river basin in three future time periods:

- an early period: 2010-2039
- a mid-century period: 2040-2069
- an end-of-century period: 2070-2099

For each of these time periods, three different scenarios will be used to represent a range of likely conditions. Scenarios of land cover/use and scenarios incorporating dams can also be studied, and their differing responses to climate change can be analyzed.

Analysis of Forecasted Streamflow Changes

A major focus of our work is on finding the best way of presenting to you the results of our hydrologic simulations. We use those measures of streamflow change that will be most useful to assist you in planning. Figures 2 and 3 show an example from a watershed previously studied, where projected changes are shown for every location along the course of a main stream channel.

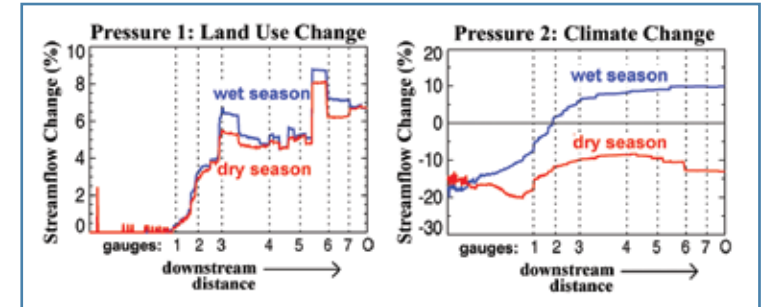


Figure 2: Change in mean seasonal streamflows, along the length of the mainstem channel, forecasted based on scenarios of land cover/use (left panel) and end-of-21st-century climate change (right panel).

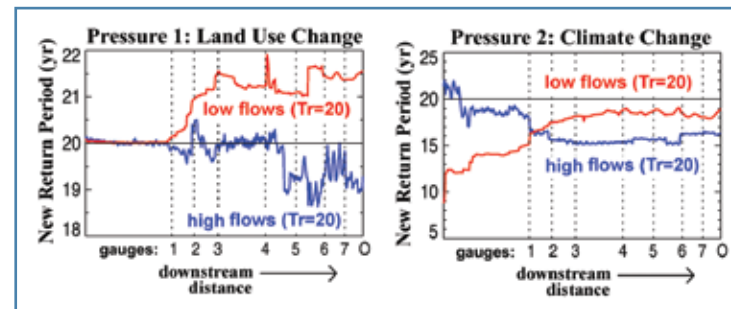


Figure 3: New return period for the high and low streamflow values that in the 20th century had a 20-year return period (i.e., were topped or bottomed, respectively, every 20 years on average). Increased or lessened frequency of occurrence corresponds to new return periods that are, respectively, lower or higher than 20 years.

† Scenarios are based on the latest simulations by Global Climate Models, i.e., the simulations that formed the basis for the Fourth Assessment Report (2007) of the Intergovernmental Panel on Climate Change (<http://www.ipcc.ch>). We use such simulation results downscaled to your river basin, based either on statistical downscaling techniques or, when appropriate and available, on Regional Climate Model simulations.

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