Enrique Lopezcalva

Water Resources Practice Leader

Experience
20 years

Education
M.S., Technology Policy, Massachusetts Institute of Technology, 1997

M. Eng., Environmental Engineering, Massachusetts Institute of Technology, 1996

B.S., Chemical Oceanography, Universidad Autonoma de Baja California, 1993

Affiliations
American Water Works Association (Vice-Chair of Climate Change Committee and Member of Water Resources Planning and Management Committee)

International Water Association (member of two specialist groups: Modeling and Integrated Assessment, Watershed and River Basin Management)

Summary

Enrique Lopezcalva has 20 years of experience in the water industry including climate change adaptation, water resources systems analysis and planning; systems modeling; sustainability; risk analysis and decision-support.

San Diego Water Sustainability Study, City of San Diego - Ongoing
Project Manager. Enrique serves as project manager of this study that evaluates the sustainability of the Public Utilities Department (PUD) operations and will analyze the resiliency of the City's water supply portfolio under multiple risks and uncertainties, including climate change, seismic events, wildfires, and other disruptors. The study will also analyze the water-climate-energy elements in PUD and includes a substantial public participation process with key stakeholders in the city. The resiliency analysis will include simulations of Colorado river and State Water Project under climate change conditions, as well as the climate change impacts on San Diego's local supplies. The project will also develop a water shortage contingency plan, and will serve as the basis for the City's Long-Range Water Supply project to start later this year.

Amador County Long-Term Needs Study, Amador County Water Agency - 2017
Senior Water Resources Planner. Enrique leads the analysis tasks for the preparation of a long-term needs study for the agency, that involves multiple scenarios of demand forecast, and the assessment of potential impacts of climate change and a Wild and Scenic river designation. Enrique leads a modeling team developing and using statistical models for demand and General Circulation Models (GCMs) climatic forecasts of climate change for the quantification of climate change impacts on water demand. Additionally, Enrique leads the hydrologic modeling using a WARM model developed previously for this area of the Mokelumne River, developing climate change impacted hydrographs and quantifying supply impacts.

Orange County Sanitation District Collection System Master Plan (Climate Change Task) - 2017
Task Lead. Enrique conducted the analysis of climate change impacts on the design storm for OCSD and a conceptual review of different impacts triggered by climate change on expected baseline and RDII flows for the District.

2015 UWMP and Water Resources Plan 2040, Marin Municipal Water District (MMWD) - 2016
Water Resources Planner. This project provides improved resiliency for MMWD's nearly 200,000 customers. The project involves identifying current and future demands and supply availability, and assessing the MMWD's ability to meet projected future demands given potential future disruptions caused by extended drought conditions, climate change, earthquakes, fires, landslides and other hazards. The project included the development of a GoldSim Model, identification of vulnerabilities, development of mitigation actions to address

vulnerabilities and improve redundancy, and identification of a recommended portfolio. Enrique lead the preparation of the Water Resources Plan 2040, using the GoldSim model to develop resiliency scenarios. The project included quantification of supply and demand impacts from climate change, and the use of paleo-hydrology to define likelihood of extended droughts beyond the recorder hydrology period for the district.

Integrated Groundwater and Surface Water Modeling – Climate Change Task, Sacramento Regional County Sanitation District Climate Change Analysis -2017

Groundwater Modeling Inputs, Climate Change Lead. This project conducted integrated groundwater and surface water modeling of one project scenario representing the proposed South Sacramento County Agriculture and Habitat Lands Recycled Water, Groundwater Storage, and Conjunctive Use Program. This modeling analysis was performed to support a Water Storage Investment Program (WSIP) grant application for the Program. The scenario is applied to two baseline scenarios representing 2030 climate conditions (Project 2030 Scenario) and 2070 climate conditions (Project 2070 Scenario). The Project 2030 and 2070 Scenarios include three components: 1) in -lieu recharge; 2) wintertime irrigation utilizing recycled water to support groundwater replenishment; and, 3) extraction of stored water, using existing municipal groundwater wells. Enrique lead the task to develop the appropriate groundwater model inputs from the surface water climate change forecasted impacts, using GCM downscaled data specifically for the streams in the model domain. Temperature, ET, precipitation and streamflow were derived for all conditions for inputs to the groundwater model.

Long-Range Supply Planning – Climate Change Impacts, City of Santa Fe, NM – 2017

Task Lead. The project will be the second phase of a Basin Study conducted by the City and the Bureau of Reclamation to assess impacts of climate change to the supply reliability of the City. The project will be using CMIP5 forecasts and developing specific hydrographs for the City's Santa Fe reservoirs, San Juan Chama Project reservoirs, and the Rio Grand in the project area. Enrique also leads the systems modeling associated with testing return flow credits and other supply options to mitigate impacts, using the City's WaterMAPS model (simulation).

Los Angeles Stormwater Conservation, Los Angeles County Department of Public Works - 2015

Climate Change Analysis Task Lead. Enrique was the task leader for the analysis of climate change impacts in long-term demands for the LA area. Enrique defined a cost-effective approach to quantify climate change impacts based on statistical modeling and the use of downscaled Global Circulation Model (GCM) forecasts of temperature and precipitation. Using historical data of demands, temperature and precipitation, the team developed a statistical model of weather impacts on demand and applied GCM forecast to the model to define the new variability of water demands expected under climate change. The team coordinated with the US Bureau of Reclamation to define GCMs, downscale methods, and greenhouse gas emission scenarios consistent with other climate change related tasks in the study.

San Diego Integrated Regional Water Management – Climate Change, San Diego Regional Water Management Group. 2016 - Ongoing

Task Lead. Enrique leads tasks associated with the climate change IRWM Plan update in 2017, and serves as the liaison between the RWMG and the on-going San Diego Basin Study that evaluates impacts of climate change (on water supply) in the San Diego Region and an advisor to the RWMG. The Basin Study is being conducted by the US Bureau or Reclamation and staff from City of San Diego, County of San Diego and the San Diego County Water Authority.

Water Supply Reliability Assessment, Irvine Ranch Water District - 2009

Deputy Project Manager and Technical Lead. Developed a methodology and a fully probabilistic model using @Risk to assess the reliability of the District under different resiliency scenarios involving climate change,

hydrology and seismic risk. The model was used to define the supply and capacity gaps for which capital investments were recommended.

Water Reliability Assessment, Moulton Niguel Water District - 2015
Technical Lead. Developed a methodology and a systems model, including probabilistic analysis, to assess the supply reliability of the District under different scenarios involving climate change locally and in the Bay Delta Region in California, hydrology and seismic risk locally and in the Bay Delta region. The model was used to define the supply and capacity gaps for which capital investments were recommended.

Oklahoma State Water Plan, Oklahoma Water Resources Board - 2010
Alternatives Analysis and Water Supply Assessment Lead. Developed approach to assess the supply and demand balance and define and evaluate supply options, in different regions of the state.

Statewide Water Supply Initiative (Phase 1), Colorado Water Conservation Board - 2010
Decision Support Lead. Developed multi-objective decision making tool to rank alternatives and define statewide strategies according to the preferences of multiple stakeholders in Colorado's nine major river basins.

Long-Range Water Supply Plan, City of San Diego - 2012
Modeling Lead. Enrique lead the modeling effort to assess supply reliability portfolios and the performance of those portfolios under climate change conditions, impacting demands and supply. The modeling effort was conducted as part of an integrated resources plan for water supply, involving the integration of water, wastewater, recycled water and stormwater, involving multiple stakeholders and a formal assessment of uncertainty and risk.

EPA and California Department of Water Resources Climate Change Handbook for Regional Water Planning, EPA Region 9 - 2012
Co-Author. Served as the lead content contributor for the development of a climate change handbook for water planning practitioners. The handbook includes sections on adaptation, vulnerability assessment, impact assessment, strategy evaluation and plan implementation under uncertainty.

Pumped Storage Analysis Study, U.S. Bureau of Reclamation - 2013
Climate Change Task Lead and Modeling Technical Review. Provided technical review on the systems modeling for the analysis of pumped storage options on existing conventional hydroelectric facilities located in the Mid-Pacific and Great Plains regions. Developed and applied a methodology to include climate change impacts in the modeling and economics analysis.

Jeddah Infrastructure Master Plan, Kingdom of Saudi Arabia - 2013
Technical Review. Applied expertise in the use of climate variable forecasts, from global circulation models, to review and revise the technical approach for the definition of hydrograph impacts from climate change, for its use in flooding analysis and estimates of increased flooding risk.

Watershed Master Plan, Singapore Public Utilities Board - 2013
Project Manager and Flood Risk Assessment Lead. Evaluated alternative solutions to minimize flood risk in four catchment areas in Singapore with a total area of 8,300 hectares, for historical and greater than historical (climate change) storms. Alternative flood mitigation options include traditional flood control infrastructure as well as green infrastructure. Analysis and selection of alternatives includes cost-benefit analysis and flood risk mitigation analysis.

Publications/Presentations

American Water Works Association Annual Conference 2018. Climate Change in California – Moving into the Mainstream. June 2018.

Interview Featured in Climate Change Business Journal, 1st Quarter 2018 issue.

Rachel Gross; Enrique Lopezcalva; 2018. Systems Models Support Reliability Analysis and Decision-Making Under Changing Conditions. Journal of the American Water Works Association (AWWA), April 2018,

American Water Works Association (AWWA) Manual (M-17) for the Climate Change Committee for the development of Climate Action Plans (CAP). Co-author. In progress: Spring 2017.

American Water Works Association National Webinar. Developing Climate Action Plans. August 2017

California -Nevada AWWA Spring Desalination Forum. The California Drought – Permanent Changes in Water Resources Planning. May 2017

ASCE EWRI. Using a Systems Model to Analyze Climate Change Impacts on Water Supply and Demand. 2017

Amsterdam Water Week 2016. Extreme Uncertainty and Climate Change in Water Supply Decision Making. October 2016.

American Water Works Association Annual Conference. Decision-Making in Climate Change Planning – Managing New Categories of Uncertainty. June 2016

Multiple Dimensions of Climate Change Uncertainty – Implications for Watershed Planning and Management. Presented at the IWA Conference on Watershed and River Basin Management, San Francisco, September 2014.

D. Myers, P. Grace, E. Lopez Calva and X. Zhang. 2012. District-scale Water Management: Impacts on Infrastructure, Energy, Pollution and Greenhouse Gas Emissions. Water Practice & Technology Vol 7 No 4.

USEPA, 2012. (Case Study Author) EPA Guidelines for Water Reuse, PA/600/R-12/618. September 2012.

USEPA, 2012. (Co-Author) EPA Office of Research and Development, Thomas O'Connor Principal Investigator. Total Water Management Technical Report. EPA National Risk Management Research Laboratory.

Cox, T. Lopez Calva, E., Navato, A. 2011. Quantifying Climate Change in Water Supply Planning for a Snowpack-Driven Watershed. AWRA Climate Change Specialty Conference, 2011 Conference Proceedings.

Cox, T. Lopez Calva, E., Davis, W. 2009. Incorporating Climate Change into Water Supply Planning Models. AWRA Adaptive Management 2009 Conference Proceedings.

Weaver, K.; Lopez-Calva, E. 2009. Regional systems dynamics modeling for Adaptive Long-Term Water Supply Planning. AWRA Adaptive Management 2009 Conference Proceedings.

Loutsch, A. E. Lopez Calva, B. Heywood, B. Nakagawa, 2007. Systems Modeling for Development and Analysis of Alternatives for Sustainable Groundwater Management. Published in AWWA 2002 American Water Works Association National Conference Proceedings. 2007.

Lopez Calva, E. 2006. Process Design Concepts and Tools to Effectively Manage an Integrated Resource Plan. Source Magazine, California Nevada AWWA. Spring 2006.

Lopez-Calva, E., C. Knatz, C. Elitharp, and J. William Yeh. 2006. "Multi-linear Regression Solution for Groundwater Storage in a Systems Dynamics Model." Presented at AWWA 2006.