



**Politecnico
di Torino**

Dipartimento di Ingegneria
dell'Ambiente, del Territorio
e delle Infrastrutture



ACADEMIC SEMINAR

Beyond Hubbert's Peak Oil: Peak Water as a Driver of Peak Grain

Prof. Gabriel Katul

Tuesday, June 9, 2026 | 4.30 pm
Politecnico di Torino, Meeting Room, 1st Floor, DIATI Entrance 3

ABSTRACT

Rapid groundwater depletion represents a significant threat to food and water security because groundwater supplies more than 20% of global water use, especially for crop irrigation. A large swath of the US High Plains, which produces more than 50 million tons of grain yearly, depends on the Ogallala aquifer for more than 90% of its irrigation needs. A dynamical systems model is developed as a coarse-grained theory for explaining boom-bust patterns in groundwater use and crop production dynamics. The model explains and predicts peak groundwater withdrawals and subsequent reductions on three High Plains states. It also predicts peaks and declines in irrigated annual crop production that follow peak groundwater withdrawal occurs. The model shows how recharge rates and the adoption of irrigation technologies control these trends. It also provides a general framework for assessing groundwater-based irrigation sustainability and how remote sensing products may be used to infer early warning signals about over-exploitation of grain-sourced groundwater withdrawals.

This study was conducted by Prof. Gabriel Katul together with Assaad Mrad.

SHORT BIOGRAPHY:

Gabriel G. Katul received his B.E. degree in 1988 at the American University of Beirut (Beirut, Lebanon), his M.S. degree in 1990 at Oregon State University (Corvallis, OR) and his PhD degree in 1993 at the University of California in Davis (Davis, CA). He currently holds a distinguished Professorship in Hydrology and Micrometeorology at the Department of Civil and Environmental Engineering at Duke University (Durham, NC) and at the Department of Civil, Construction, and Environmental Engineering at University of Alabama (Tuscaloosa, AL).

