

Accepted Manuscript

Assessing small hydro/solar power complementarity in ungauged mountainous areas:
A crash test study for hydrological prediction methods

B. François, D. Zoccatelli, M. Borga

PII: S0360-5442(17)30465-6

DOI: [10.1016/j.energy.2017.03.090](https://doi.org/10.1016/j.energy.2017.03.090)

Reference: EGY 10557

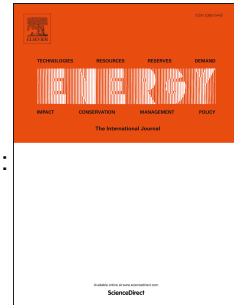
To appear in: *Energy*

Received Date: 8 December 2016

Accepted Date: 19 March 2017

Please cite this article as: François B, Zoccatelli D, Borga M, Assessing small hydro/solar power complementarity in ungauged mountainous areas: A crash test study for hydrological prediction methods, *Energy* (2017), doi: 10.1016/j.energy.2017.03.090.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



1 **Assessing small hydro/solar power complementarity in ungauged**
2 **mountainous areas: a crash test study for hydrological prediction**
3 **methods**

4 **François B.^{1*}, D. Zoccatelli¹ and M. Borga¹**

5 ¹ University of Padova, Dept. Land, Environment, Agriculture and Forestry, Padova, Italy

6 * now at: Department of Civil and Environmental Engineering, University of Massachusetts, Amherst,
7 Massachusetts, USA

8

9 Correspondence to: B. François (*bfrancois@umass.edu*)

10 **Abstract**

11 In many regions, the integration of small hydropower with solar/wind energy is examined as a
12 way to meet renewable energy targets. A good understanding of the potential for this integration
13 in the typically poorly gauged catchments is important. We examine the skill of different
14 hydrological prediction methods to predict complementarity between run-of-the river hydropower
15 and solar power in data sparse mountain basins of the Eastern Italian Alps. Two kinds of
16 prediction methods are used: a semi-distributed, conceptual hydrological model, and an index
17 method based on the drainage area ratio. In the case of the hydrological model, we analyse the
18 efficiency of the method when the model parameters cannot be calibrated but must be transposed
19 from a donor catchment where calibration data are available. The complementarity between the
20 two energy sources is examined using the standard deviation of the energy balance as a proxy of
21 the balancing system costs and it is evaluated over different temporal aggregation scales. Results
22 show that the performance depends on the temporal scale and outlines the impact of small phase
23 errors in hydrological prediction. In general terms, the index method performs better for
24 snowmelt dominated catchments while the hydrological model performs better for rain-fed
25 catchments.

Download English Version:

<https://daneshyari.com/en/article/5476845>

Download Persian Version:

<https://daneshyari.com/article/5476845>

[Daneshyari.com](https://daneshyari.com)