**Cover letter**

Dear Editor in Chief,

Enclose please find a manuscript entitled "Identifying regime transitions for water governance at a basin scale", that we would like to submit as a *Research Reports* for publication in *PNAS*.

In many large river basins, the use and governance of rivers for socio-economic development has led to a global transformation from natural to social-ecological or ‘hydrosocial’ water regimes. Identifying how and when water governance regimes change is therefore critical to understanding social-ecological water dynamics and guiding the efficient and sustainable use of water. Water governance decides who gets water, when, and how much. By combining these three main dimensions of water governance (supply, purpose and allocation), we developed a simple but comprehensive integrated index for identifying how and when water governance regimes change.

Applying this index to a rapidly-changing large river basin (the Yellow River Basin, China), three water governance regimes are identified (massive supply, purpose turned, and many-sided governance). Since these shifts were related to environmental, economic, social and political changes, we suggest a widespread transition schema for water governance regimes and a general transformative trajectory as a hypothesis for understanding hydrosocial water cycles in the Anthropocene. By linking river basin governance transitions with major water governance challenges, our approach can offer useful sustainability guidelines for big river basins all around the world.

This is an original paper and has not been published, nor is under consideration for the publication elsewhere. All the authors have read and approved the manuscript. The manuscript includes the main body of text with 4272 words and 5 figures, a Supplementary Information text with 2914 words, 10 supporting figures and 2 supporting tables.

Please contact us if further information is requested.

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