

## Socio-Hydrology on the global scale in the Anthropocene

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There are several motivations and rationales why socio-hydrology is emerging. Even though the responses of water on the earth to human activity are those the discipline of hydrology covers as UNESCO defined in 1964, hydrologists mainly pursued to observe and understand water cycles on the earth from natural scientific point of view. Typically, "naturalized flow" was estimated and simulated even for practical prediction of stream flow into reservoirs.

In the 21<sup>st</sup> century, the recognition of the Anthropocene prevailed that "real" environment is modified by human influences and differs substantially from "natural" environment, mainly because the changes and the impacts of climate due to the increase of greenhouse gas emissions by human beings became apparent. Real land use and land cover, instead of potential or natural land cover and land use, should be given as boundary conditions for realistic simulation of climate system, and plausible future predictions of land use and land cover including the changes of vegetation should be given for reliable predictions of future climate.

It was not apparent whether human activities, such as reservoir operations and water withdrawals for human needs, have significant impacts on the global hydrological cycles and feedbacks for climate systems, realistic consideration of human interventions have been required for realistic estimates of the impacts of climate change.

These have been the major drivers to promote socio-hydrology on the global scale, and the human interventions on water cycle, such as reservoir operations and human water withdrawals from rivers and ground water, have been included in hydrological and water resources modeling. Owing to the development of socio-hydrologic modeling on the global scale, it was prevailed, for example, storing water in man-made reservoirs should have been suppressing the sea level rise with comparative rate with other causes such as glacier melt in Greenland and Antarctica, ground water in several regions in the world has been depleting substantially and pushing up the mean sea level as a result of mass balance of water in the hydrosphere, and the impacts of climate change on the water resources management would be less significant with autonomous adaptation by changing crop calendar and reservoir operations.

Such a socio-hydrologic development in global hydrology is promising to promote scientifically relevant, socially expected, and personally dedicated studies. In the 20<sup>th</sup> century, hydrological science was expected to be objective and value-neutral, however, in the Anthropocene in the 21<sup>st</sup> century, it is expected to propose possible alternative options how to respond to natural and anthropogenic changes in hydrologic cycles even on the global scale. Overview on the socio-hydrologic modeling on the global scale will be presented.

Keywords: human interventions, hydrological cycle, water resources