



Aspen Institute Italia Award 2021

Strategic hydropower planning in the Mekong highlights challenges and opportunities for the global green energy transition.

“Improved trade-offs of hydropower and sand connectivity by strategic dam planning in the Mekong”¹. This study won the sixth edition of the [Aspen Institute Italia Award](#) for collaboration and scientific research between Italy and the United States. Four scientists from institutions in the United States and Italy are working on this ongoing effort to reduce impacts of the global clean energy transition on rivers and livelihoods.

The authors of the research project are the following:

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Building future green economy poses great economic and technical challenge for societies, in part because of the often-overlooked externalities of technology and infrastructure on people and the environment. In their research, the scientists used the example of hydropower development to

demonstrate need and opportunity to resolve such conflicts through strategic spatial planning. Hydropower is a well-proven and cost-effective way to generate renewable energy. At the same time, dams can have catastrophic impacts on people's livelihoods and the fundamental processes that underpin healthy rivers. Thus, there is great concern about the environmental impacts of future dams, mostly planned to energize socio-economic development in the global south.

The winning research demonstrated that strategic placement of dams, considering for the spatial heterogeneity of natural processes in rivers and the cumulative impacts of multiple dams, can greatly reduce dam impacts without compromising on energy generation and energy costs. That finding was derived by combining a novel computer model for evaluating large scale impacts of dams on rivers with state-of-the-art tools for decision analysis. The study was based on the example of the Mekong River in South East Asia, where a massive hydropower development occurred in the recent past, and more development is foreseen in the near future. Results show that existing dams, exploiting around 50 % of the basin's hydropower potential, have major impacts on the biophysical functioning of the studied rivers. The key finding of the study is that the same amount of hydropower could have been generated with much smaller impacts if dam sites would have been selected strategically such as to reduce their cumulative impacts.

While the results were derived for the Mekong River, the findings have broad implications for renewable water and energy systems world-wide. Globally, increasing conflicts between infrastructure and natural systems are inevitable: Other forms of renewable energy create environmental impacts, more water infrastructure will be required to meet domestic and agricultural water demands, and industrialized countries must soon review their aging infrastructure portfolios. In this context, strategic decision making, which balances economic and ecosystem needs is crucial for an ecologic transition to water and energy systems with minimal impacts on nature and maximal benefits for society.

(Picture: © Thomas Cristofolletti / Ruom)

THE AWARD

The *Aspen Institute Italia Award* for scientific research and collaboration between Italy and the United States was launched in December 2015 in keeping with the Institute's commitment to encouraging and developing international leadership and transatlantic relations. Every year, the prize will be awarded to a research project studying applied or theoretical natural sciences, in which scientists and/or organizations from Italy and the US collaborate.

The Prize consolidates the Institute's commitment towards initiatives and meetings on important topics in the fields of science and technological innovation, with particular reference to their relevance to Italy.

The members of the Award committee are:

- Professor Giulio Tremonti, Chairman of the Award committee; Chairman, Aspen Institute Italia, Rome
- Professor Domenico Giardini, Chair of Seismology and Geodynamics, ETH, Zurich
- Professor Luciano Maiani, Professor Emeritus of Theoretical Physics, "La Sapienza" University, Rome
- Professor Gaetano Manfredi, Full Professor of Construction Design, University of Naples Federico II
- Professor Giovanni Rezza, Prevention Director General, Ministry of Health, Rome
- Mr. Lucio Stanca, Vice Chairman, Aspen Institute Italia, Rome

The winners of the previous editions of the *Aspen Institute Italia Award* were:

- 2016: *Spatiotemporal spread of the 2014 outbreak of Ebola virus disease in Liberia* which created a mathematical model to interpret the spread of Ebola.

- 2017: *Wind from the black hole accretion disk driving a molecular outflow in an active galaxy* that demonstrates that wind coming from black holes contributes to the formation of new stars inside different galaxies.
- 2018: *The quest for forbidden crystals* that demonstrates the ample scope for discovering new quasicrystals in nature (with chemical compositions as-yet unexplored in the laboratory) and for extending the results of this new field of research to other scientific spheres and to groundbreaking industrial applications.
- 2019: *A Test for Creutzfeldt–Jakob Disease Using Nasal Brushings* that represents a significant step forward in diagnosing prion diseases; above all, however, it opens a new and broad perspective of diagnosis in the field of those neurodegenerative diseases that are more common and that have a significant social and economic impact.
- 2020: *Orbital angular momentum microlaser* is a research concerning the ideation and realization of a miniaturized laser that produces twisted light by exploiting an “exceptional quantum point”. Therefore, it is expected to revolutionize optical communication systems in the near future, with foreseeable outstanding impacts both on the economy and on society.