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More Rice, Less Water
—Integrated Approaches for Increasing Water Productivity in Irrigated Rice-Based Systems in Asia—

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Abstract: The water crisis is threatening the sustainability of the irrigated rice system and food security in Asia. Our challenge is to develop novel technologies and production systems that allow rice production to be maintained or increased in the face of declining water availability. This paper introduces principles that govern technologies and systems for reducing water inputs and increasing water productivity, and assesses the opportunities of such technologies and systems at spatial scale levels from plant to field, to irrigation system, and to agro-ecological zones. We concluded that, while increasing the productivity of irrigated rice with transpired water may require breakthroughs in breeding, many technologies can reduce water inputs at the field level and increase field-level water productivity with respect to irrigation and total water inputs. Most of them, however, come at the cost of decreased yield. More rice with less water can only be achieved when water management is integrated with (i) germplasm selection and other crop and resource management practices to increase yield, and (ii) system-level management such that the water saved at the field level is used more effectively to irrigate previously un-irrigated or low-productivity lands. The amount of water that can be saved at the system level could be far less than assumed from computations of field-level water savings because there is already a high degree of recycling and conjunctive use of water in many rice areas. The impact of reducing water inputs for rice production on weeds, nutrients, sustainability, and environmental services of rice ecosystems warrants further investigation.

Keywords: Environment, Food security, Irrigation, Sustainability, Water management, Water saving

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