

## **Meeting the Global Challenges of Water Scarcity**

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**Abstract.** Freshwater resources have been heavily exploited in river basins around the world, resulting in severe competition among water users and widespread and severe ecological degradation. Nearly half of all river basins are now experiencing severe water shortages during some portion of the year, with a growing number of rivers going intermittently dry due to overuse during dry seasons or droughts. The vast majority (>90%) of water consumption is attributable to agricultural use, with nearly half of all irrigation going to wheat and rice production alone. Industrial and other urban uses account for only a small fraction of total water consumption, but sewage discharge associated with urban water use has made many freshwater sources unsuitable or unhealthy for subsequent downstream use. When water scarcity progresses to an extreme level, such as in the Yellow River of China, the Murray-Darling of Australia, or the Colorado River in the USA, considerable economic disruption has resulted and in many cases governments have intervened to 'cap' or mandate water use reductions. However, freshwater biodiversity impacts may appear much earlier in the all-too-common progression from low to severe water scarcity in a river basin, resulting in loss of freshwater species richness or abundance or diminishment of ecosystem services such as fisheries production or waste assimilation. Many indicators suggest that water scarcity is likely to intensify in coming decades; while differing patterns of population growth, lifestyle changes, and climate change will present different scenarios on each continent, water users, managers and planners are challenged to meet growing water needs virtually everywhere. This paper will highlight hopeful progress being made in both public and private spheres, including environmental flow protection by governments, capping and trading of water use rights, certification of corporate water users, and a growing awareness by consumers of the impacts of their personal water footprints.