RIVER ECOSYSTEM ECOLOGY: A GLOBAL PERSPECTIVE

A DERIVATIVE OF ENCYCLOPEDIA OF INLAND WATERS
Professor Gene E. Likens is an ecologist best known for his discovery, with colleagues, of acid rain in North America, for co-founding the internationally renowned Hubbard Brook Ecosystem Study, and for founding the Institute of Ecosystem Studies, a leading international ecological research and education center. Professor Likens is an educator and advisor at state, national, and international levels. He has been an advisor to two governors in New York State and one in New Hampshire, as well as one U.S. President. He holds faculty positions at Yale, Cornell, Rutgers Universities, State University of New York at Albany, and the University of Connecticut, and has been awarded nine Honorary doctoral Degrees. In addition to being elected a member of the prestigious National Academy of Sciences and the American Philosophical Society, Dr. Likens has been elected to membership in the American Academy of Arts and Sciences, the Royal Swedish Academy of Sciences, Royal Danish Academy of Sciences and Letters, Austrian Academy of Sciences, and an Honorary Member of the British Ecological Society. In June 2002, Professor Likens was awarded the 2001 National Medal of Science, presented at The White House by President G. W. Bush; and in 2003 he was awarded the Blue Planet Prize (with F. H. Bormann) from the Asahi Glass Foundation. Among other awards, in 1993 Professor Likens, with F. H. Bormann, was awarded the Tyler Prize, The World Prize for Environmental Achievement, and in 1994, he was the sole recipient of the Australia Prize for Science and Technology. In 2004, Professor Likens was honored to be in Melbourne, Australia with a Miegunyah Fellowship. He was awarded the first G. E. Hutchinson Medal for excellence in research from The American Society of Limnology and Oceanography in 1982, and the Naumann-Thiennemann Medal from the Societas Internationalis Limnologiae, and the Ecological Society of America’s Eminent Ecologist Award in 1995. Professor Likens recently stepped down as President of the International Association of Theoretical and Applied Limnology, and is also a past president of the American Institute of Biological Sciences, the Ecological Society of America, and the American Society of Limnology and Oceanography. He is the author, co-author or editor of 20 books and more than 500 scientific papers.

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INTRODUCTION TO RIVER ECOSYSTEM ECOLOGY: A GLOBAL PERSPECTIVE

Rivers, streams, brooks, runs, forks, kills, creeks, are among the many names for lotic (running or fluvial) ecosystems within the landscapes of the Earth. These systems facilitate the gravitational transport of water, dissolved substances, and large and small particulate materials downstream through a diversity of types of drainage networks from relatively simple channels to highly complicated “braided” channels, both above and below ground (e.g. Allan and Castillo, 2007). The tight connection in terms of structure and function between the river and its drainage basin (catchment=European usage or watershed=American usage) has been the subject of detailed study for many decades (e.g. Hynes, 1975; Likens, 1984; Allan and Castillo, 2007). The drainage area bordering the stream is called the riparian zone and is of critical importance to the function, as well as the protection and management of a river (e.g. Naiman et al., 2005).

Nevertheless, rivers and streams are far more than channels transporting water, chemicals and sediments downstream. They function as ecosystems (e.g. Fisher and Likens, 1972, 1973) with all of the varied and complicated activities and interactions that occur among their abiotic and biotic components, which are characteristic of all ecosystems (e.g. Allan and Castillo, 2007). Thus, they are not functioning just as “Teflon pipes” in the landscape that many have assumed in the past.

Rivers and streams comprise about 0.006% of the total fresh water on the Earth (Likens, 2009b), but like lakes, reservoirs and wetlands are valued by humans far out of proportion to their small size, as these systems supply diverse drinking, irrigation, waste removal, food, recreation, tourism, transportation and aesthetic services. Rivers with the largest volume of fresh water in the world, like the Amazon, Congo, Yangtze and Orinoco, are located in the tropics or semi-tropics. In fact, some 25% of the freshwater flow to the oceans of the world comes from two rivers, the Congo and the Amazon Rivers, both at approximately the same latitude (Likens, 2009b).


The articles in this volume are reproduced from the Encyclopedia of Inland Waters (Likens, 2009a). I would like to acknowledge and thank the authors of the articles in this volume for their excellent and up-to-date coverage of these important riverine topics.

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December 2009

References