

William Oswald: A Man Ahead of His Time

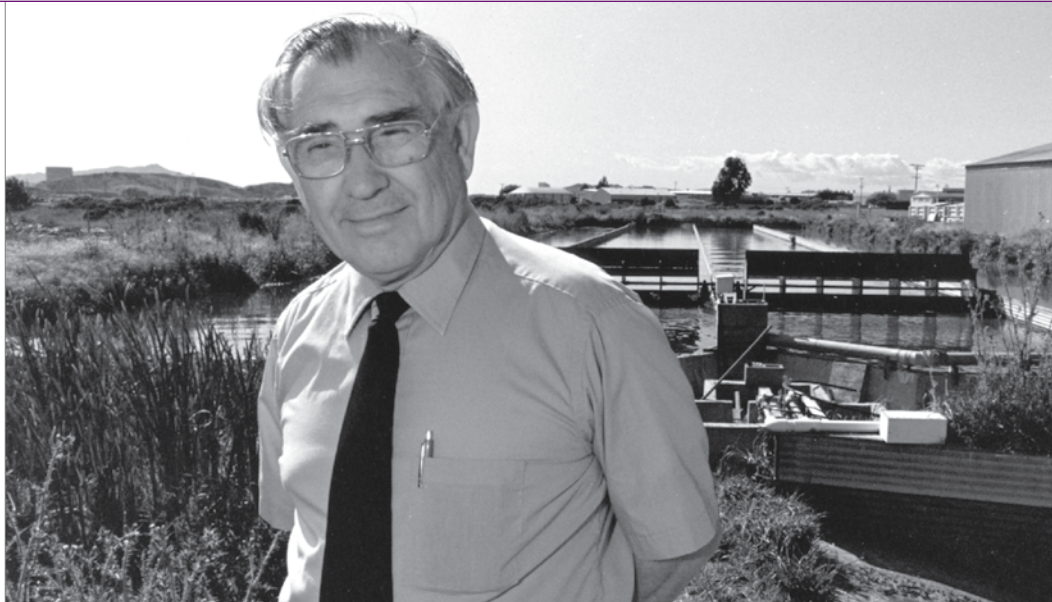
William J. Oswald, Ph.D. '57, professor emeritus of civil and environmental engineering and of public health, was among the first engineers to study the symbiotic interactions between algae and bacteria in wastewater treatment ponds. It was in the 1950s that Oswald began his research leading to designs of natural treatment systems powered primarily by solar energy, making wastewater treatment more affordable and sustainable.

"William Oswald was a man ahead of his time. He developed and demonstrated sustainable technology decades before sustainability became a popular goal," said **Bailey Green**, research scientist at Lawrence Berkeley National Laboratory (LBNL), where Oswald was also a researcher. Green was a former Ph.D. student of Oswald's in the Energy and Resources Group at UC Berkeley, and a close colleague of his for the past two decades.

Oswald is credited with developing the Advanced Integrated Wastewater Pond Systems (AIWPS) technology in which wastewater passes through a series of ponds to be treated. The process involves the use of algae photosynthesis in "high rate ponds" rather than the electro-mechanical aeration devices used in more expensive, conventional wastewater treatment systems. The algae produce oxygen that allows aerobic bacteria to break down remaining contaminants in the water. The water is then reclaimed through a series of tertiary processes for reuse and recycling in such applications as agricultural irrigation.

The study of such natural systems has developed in recent decades into the field of ecological engineering. Thousands of communities throughout the United States have adopted successful natural wastewater treatment systems, although large urban areas that do not have enough land required for ponds or wetlands still use mechanical systems.

Colleagues of Oswald's remember his humanitarianism, noting that the needs of the developing world—where many people bathe in and collect



drinking water from rivers polluted with raw sewage—motivated Oswald's research and the development of simple, affordable, and more sustainable wastewater treatment technology that produces renewable energy through methane fermentation and biogas recovery.

In one of his more recent international collaborations, Oswald worked with Green and **Veer Bhadra Mishra**, an engineer and Hindu priest from Varanasi, India, to study the use of AIWPS technology to treat the sewage from the city and in the Ganges River. Considered the "Mother of India," the Ganges River is used by devout Hindus for daily religious bathing and drinking, despite the fact that it is contaminated by human and industrial wastewater and the remains of cremated bodies. The proposal they developed has been supported by city officials in Varanasi, and is currently under consideration by federal and state authorities in India.


There have been other applications for Oswald's inventions besides wastewater treatment. High rate ponds are used to produce microscopic algae for the health food industry. Oswald also demonstrated a life support system for the U.S. Air Force space program that used algae to treat astronaut waste while producing distilled water and oxygen. The system, however, has never been used outside the laboratory.

Oswald's passion for working on affordable sanitation stemmed from several dramatic experiences in his life. As a child in rural central California, he

witnessed the choking death of a schoolmate from a roundworm infection caused by poor sanitation. While serving in the U.S. Army as a hospital administrator in Europe after World War II, he coordinated the care of patients suffering from the effects of unsanitary conditions, including contaminated water.

Oswald was a prolific writer, authoring more than 400 works published in academic journals, conference proceedings, and books. He won several medals and prizes for his research from the national Water Environment Federation and the American Society for Civil Engineers, and was a fellow in the American Academy for the Advancement of Science and a diplomate in the American Academy of Environmental Engineering. In 2005, the International Society for Applied Phycology presented him with a lifetime achievement award.

In 2005, Oswald and Green were issued two patents—one for a method to establish and optimize methane fermentation in primary wastewater ponds, and the other for an apparatus to recover biogas from methane fermentation. Oswald was also president and founding partner of Oswald Green, LLC, an environmental technology company, and of Oswald Engineering Associates, Inc., an engineering services company.

Although Oswald retired from teaching at UC Berkeley in 1990, he continued his research and engineering practice as a scientist at LBNL until his death in 2005. 

—Sarah Yang