

# **ENVIRONMENTAL DEGRADATION AND WATER SECURITY FOR THE WORLD POPULATION**

**Ramesh S. Kanwar**

Professor and Chair, Department of Agriculture and Biosystems Engineering  
Iowa State University, Ames, Iowa, 50011

## **ABSTRACT**

Food and water are two essential needs of social security. One of the most important questions facing the society today is, how to produce enough food to feed the increasing human population on this planet. Another parallel question facing the society is, how much water would be needed to produce enough food to feed the increasing population in the world. Answers to these questions are not easy. Increased population rates have added more than 4.4 billion people on earth between 1900 and 2000, and average food production has kept pace with the increases in population. Also, between 1900 and 2000, irrigated area has increased from about 50 million hectares to 250 million hectares. Agricultural water use continues to make 85% of all consumptive use on a global basis.

One of the very first basic questions for the world community is: how much water will be needed to a world population of about 10 billion in 2050 and where will it come from? Another important question is: how much crop land would be needed to feed the growing population and what is the potential to further expand land area for food grain production? Currently about 1,510 Mha area is under cultivation globally and another 3,000 Mha of land were irrigated in 1997, which nearly a doubling from 138 Mha in 1960. The availability of crop land for growing food is becoming another question for many of the world's fastest growing economies. Total cropland area per capita in the world has decreased from 0.31 ha per person in 1983 to 0.25-hector person in 2000. Since total area under cropland per person is decreasing, agricultural production systems are becoming more intensive to grow much more food on the same per unit area of land. The intensification of agriculture, especially under irrigated conditions, has brought new environmental problems including soil erosion, land degradation and decreased water quality.

Intensive agricultural production systems were introduced in 1960's with the advances in improved crop varieties, mechanization, and increased availability of pesticide and fertilizers. More recent experiences, in the developed countries, especially Europe and USA, have shown that modern and intensive agricultural production systems have increased land degradation and water contamination. The negative impacts of the use of pesticides and fertilizers to human health and the environment have been a source of concern. A better understanding of land and water resource degradation from intensive agriculture is needed to assure food security to the fastest growing population in the region. These data clearly indicates that food production alone cannot solve the local and regional food and water security needs. The purpose of this paper would be to examine the available research information on the effects of intensification of irrigated and non-irrigated agriculture on water resource degradation, use, and security.