

**DEVELOPING A FRAMEWORK FOR ENVIRONMENTAL QUALITY
MANAGEMENT: THE CASE OF AGRICULTURE
AND FARMING IN THE UNITED STATES**

By

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Abstract:

This paper attempts to identify the influence of diverse factors on agricultural environmental quality and performance, along with their effects that affect directly to environmental decision-making issues and impact on environmental quality, climate change and human health. This paper also attempts to develop a basic model of Agricultural Environmental Quality Management System (AEQMS) and its application in the agricultural and farming industry in the U.S.

KEYWORDS: SUSTAINABLE AGRICULTURE, AGRICULTURAL ENVIRONMENTAL QUALITY.

Introduction:

Janke, R., and Freyenberger (1997) reported that mass scale agricultural and farming practices in the U.S in the past decades with its technological and chemical emphasis, to increase output for supporting a growing population has created enormous prosperity at the expense of the deterioration of the environment and the emergence of many disabling and killer diseases in the U.S. This is where the need for Environmental Quality Management in agriculture and farming industry has become critical to our survival and quality of life (13). However, most of these environmental quality researches primarily focused on the integrated study of contaminants, soils, sediments and pollutants in the air, and in the marine environment, and their implications for risk evaluation, management strategy development and deployment. Largosen (2007) reported that most of the environmental quality research in agriculture and farming in the past decade, focused on environmental contamination by dangerous substances such as biocides, and pesticides and their impacts on air pollution (on nitrogen and ozone layers), on sensitive vegetation, and crop production, and on ecology and public health (11).

Agriculture and environmental pollution

Agriculture has long been recognized as a major source of pollution and in many countries International Chamber of Commerce (2004) reported that in many countries, farmers have to get an approval of their management practices in order to avoid conflicts with environmental quality (10). Christopoulou, Polyzos, and Minetos (2007) presented a rising concern about the adverse effects of peri-urban deforestation which have been taking place in many countries due to shortages of developable space near urban areas.. Forest and peri-urban forest usually help adjusting extreme temperature conditions in urban areas. Peri-urban forests also hold great aesthetic, economic, recreational and health values to the society and have many positive effects on the human physical and spiritual health. Above all, peri-urban forests offer protection to people, buildings and infrastructure from natural disasters such as soil erosion, flooding, avalanches, and land slides (5). Enserink, and Koppenjan (2007) reported that China with large number of populations, its rapid economic growth and inefficient use of natural resources lead to excessive pollution and rapid depletion of its natural resources., and that its government has already put forth a number of environmental policies and legislations to protect the environment in order to produce a more sustainable growth (8). Makame(2007) reported that majority of people in Zanzibar still cook using traditional stoves which consume a great deal of wood to the extent of deteriorating forest resources (12).

Until now, very little attention has been given to developing cause and effect relationship between environmental factors and quality management. Some regions of the world have experienced extremely rapid development while such progress has been lacking in the rest of the world. It is widely believed that public participation contributes to better projects, better development and collaborative governance. Lagrosen (2007) advocated that in order to implement environmental quality, management, personal skills, commitment and high goals are required by individuals (11). Thus, environmental performance is becoming an increasingly important determinant of the commercial viability of agriculture. Designing policies, programs, and practices to manage agriculture's impact on the environment in rural, suburban, and urban settings is one of the most important and difficult challenge facing policymakers, scientists, educators, and farmers. Agricultural production can improve as well as can deteriorate the environment . Agriculture can offers a charming rural landscape with wildlife surroundings but also can ruin the land by soil erosion, loss of wetlands and use of excessive pesticide Baylis, Rousser, and Simon(2003) advocated that in order to minimize environmental damages and to continue beneficial practices, farmers and mass scale agricultural producers must develop a balanced approach to limit market incentives and place more emphasis on environmental issues (3)

Impact of Agriculture on environment in the U.S

Agriculture is the largest and highly resource-concentrated industry in the U.S. Agricultural lands are located in remote and sparsely populated areas, almost one-half of the

American population live in a region which is at least 25 percent agricultural, and more than two thirds of American live in counties where agriculture encompass at least 10 percent of the land. Even in metropolitan counties, almost one-third of the population lives in counties composed of at least 25 percent agricultural land (14). In fact, many State and local governments have developed programs that provide incentives to preserve farmland near populated areas. The landscape amenities offered by some types of agricultural land use open spaces and visual prospects that are increasingly valued by growing suburban populations (14). Norman, Janke, and Fryenberger (1997) reported that over half of the land in the adjacent 48 States of the U.S. and over three quarters of freshwater extractions are dedicated to agricultural operations. The expansive nature of agriculture in the past decades resulted in widespread environmental impacts on surface and groundwater quality, air quality, fish and wildlife habitats, species diversity, and land characteristics. The way agricultural land is handled is liable to affect human health, recreational activities, and general well-being Agriculture is a primary source of nutrients in impaired surface waters. Norman, Janke, and Fryenberger (1997) also reported that nutrients are the leading cause of water-quality impairments in lakes and estuaries and the third leading cause in rivers siltation. The most frequently detected herbicides in surface waters include several triazines (atrazine, cyanazine, and simazine), acetanilides (metolachlor and alachlor), and 2, 4-D. These are among the most commonly used in current agricultural practices in the U.S. (13).

The drinking water of an estimated 50 million people in the United States comes from ground water that is potentially contaminated by agricultural chemicals (13). From its 1988-90 survey of drinking water wells, the EPA found nitrate in more than half of the 94,600 community water system wells and in almost 60 percent of the 10.5 million rural domestic wells. Levels exceed minimum recommendations in 1.2 percent and 2.4 percent of the community and rural wells, respectively (14). Ground-water levels are declining from 6 inches to 5 feet annually beneath more than 14 million acres of irrigated land (6). Ground-water overdrafts tend to permanently increase pumping costs, lead to land subsidence (which compacts the aquifer's structure), and can cause saltwater intrusion (12).

Soil particulate and farm chemicals are also carried in the air we breathe. The highest concentration of commonly used agricultural herbicides, triazine and acetanilide, has been found in the areas where they are used most frequently and in the highest amounts (14). Habitat loss associated with agricultural practices on over 400 million acres of cropland is the primary factor depressing wildlife populations in North America. Papapodopol and Nolan (2008) reported that modern farming methods brought about dramatic reductions in many species, including cottontail rabbits and ring-necked pheasants (15). Annual wetland loss fell from the 458,000-acre average of the mid-1950's through the mid-1970's, to a 290,000-acre average between the mid-1970's and mid-1980's. Wetland losses often reduce biodiversity because many organisms depend on wetlands and riparian zones for feeding, breeding, and shelter. Agriculture is thought to affect the survival of 380 of the 663 species listed federally as threatened or endangered in the

United States (15). This is where the need for Environmental Quality Management in agriculture and farming industry has become critical to our survival and quality of life. This paper presents a model of Sustainable Agriculture and provides a framework for developing an Agricultural Environmental Quality Management System (AEQMS).

Definition of Sustainable Agriculture:

The definition of sustainable agriculture was first adopted in 1989 by American Society of Agronomy as: "A Sustainable agriculture is the one that over long term enhances environmental quality and the resource base on which agriculture depends, provides for basic human food and fiber needs, is economically viable, and enhances the quality of life for farmers and society as a whole." (1). Norman, Janke and Fryenberger (1997) provided the typical definition of "sustainable agriculture" as "the use of practices and arrangement which preserve or develop ability of people and communities to offer for their social and cultural welfare; economic viability and natural resource base, and ecosystems influenced by agricultural activities (13). U.S Government in 1990 Farm Bill also defined sustainable agriculture as "an integrated system of plant and animal production practices having a site specific application that over the long term will satisfy human food and fiber needs, enhance environmental quality and natural resource base upon which the agricultural economy depends, make more efficient use of renewable resources, and on farm resources, and integrate where appropriate, natural biological cycles and controls, sustain the economic viability of farm operations, enhance the quality of life for farmers and society as a whole."(13).

Since population and financial condition go hand in hand, undernourishment and economic decline are the results of population increase past the limits that the traditional self-sufficient economy can normally maintain. Thus, population rise and financial status also have a deep impact on environment. A high degree of stress on the environment is produced due to the people residing away from their traditional places of habitation in concurrence with population raises, unbalanced land division and larger-scale farm management. Therefore, to preserve the environment, efforts must be applied for population control as well. Stability is needed among philosophy and clear information on top practices. Thus, Sustainable agriculture can be achievable only when all three components, environmental sustainability, financial sustainability, and social sustainability, are balanced properly, taken into consideration that sometimes all the components may act differently (14). Fig 1. Represents a model of sustainable agriculture.

Fig 2. A Model of Agricultural Environmental Quality Management System(AEQMS)

RESOURCE DATA BANK OF CONTROL STANDARDS, QUALITY AUDITORS, AND OTHER RESOURCE DATA				
FERTILIZER	INPUT CONTROL	WORK-IN-PROCESS CONTROL	OUTPUT CONTROL	OUTPUT
SEEDS	Inspection	Inspection, Testing, Monitoring , SQC, SPC, and Auditing	Inspection,	GRAINS
WATER	Testing	TRANSFORMATION PROCESSES: PREPARING SOIL, SOWING, IRRIGATING AND FERTILIZING, APPLYING HERBICIDES AND, PESTICIDES, AND HARVESTING	Testing	WTER & AIR POLLUTANTS
HERBICIDES	SQC and		Monitoring	DEFORESTA- TION AND
PESTICIDES	QC Audit		SQC and Quality	SOIL ERROSION
			Auditing	

vegetables, and other foods as output. At the same time the agricultural /farming processes such as preparation of soil, sowing of seeds, irrigating, fertilizing, applying herbicides and pesticides, and harvesting grains and vegetables may also cause deforestation, soil erosion, water pollution, and air pollution. By use of appropriate control techniques such as monitoring, testing, inspection, quality control and auditing with specific standards, the desired balance of financial, social and environmental factors can be achieved.

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