

Developing a Model of an Agricultural Environmental Quality Management System (AEQMS).

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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 an Agricultural Environmental Quality Management System (AEQMS) and its application on the agricultural and farming in the U.S.

Introduction:

The mass scale agricultural and farming practices in the U.S in 20th century using technological and chemical methods to support a growing population has created massive prosperity at the expense of the health of the environment and the emergence of many disabling and killer diseases This is where Environmental Quality Management in agriculture and farming industry has become critical to the survival and quality of life in the U.S and in this planet earth(Colby, 2007)

In the past decade, the focal point of environmental quality research has been directed towards the integrated methodical study of contaminants, soils, sediments and in the air, and in the marine environment, and their implications for risk evaluation, management strategy development and deployment . Moreover environmental quality research in agriculture and farming primarily focuses on environmental contamination by dangerous substances such as biocides, pesticides, endocrine-disrupting chemicals and pharmaceuticals, and impacts of these pollutants on ecology and human health. It also deals with impacts of air pollution on nitrogen and ozone layers, on sensitive vegetation and crop production

Agriculture and environmental pollution

Agriculture has long been recognized as a major source of pollution and in many countries farmers now have to get approval of their management practices in order to avoid conflicts with environmental quality (Lagrosen, S. (2007).

Concern is also rising about the adverse consequences of peri-urban deforestation. At the same time, shortages in the availability of developable space near urban areas cause serious problems to maintaining urban prosperity. Forest and peri-urban forest contribute to adjusting extreme temperature conditions. In addition to positive environmental effects, peri-urban forests hold great aesthetic, recreational and health values. They have a positive influence on the human neural and the cardiovascular system. Urban and especially peri-urban forests offer protection to people, buildings and infrastructure from natural disasters such as soil erosion, flooding, avalanches, land sliding and alluvial sediment deposition etc. (Christopoulou, O., Polyzos, S., Minetos, D. (2007). China with a large number of populations, its rapid economic growth and inefficient use of natural resources lead to excessive pollution and rapid depletion of China's natural resources. China's government has put forth environmental policies and legislation to protect the environment and to produce a more sustainable growth (Enserink, B., Koppenjan, J. (2007.. It is widely believed that public participation contributes to better projects, better development and collaborative governance. Majority of people still cook using traditional stoves which consume a great deal of wood to the extent of deteriorating forest resources. It is suggested to use improved charcoal stoves in order to stop deforestation and balance the ecosystem (Makame, O. (2007. Much less attention has been given to the relationship between environmental factors and quality management. Some regions have experienced extremely rapid development while such progress has been lacking in the rest of the world. Lagrosen advocated that in order to implement environmental quality management, personal skills, commitment and high goals are required by individuals (Lagrosen, S. (2007). 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 challenges facing

policymakers, scientists, educators, and farmers. Agricultural production can develop the environment as well as can degrade it. Agriculture can offers a charming rural landscape and wildlife surroundings but can also affect the land by soil erosion, nutrient and pesticide excess, and the loss of wetlands. In order to trim down on environmental damages and to continue beneficial practices, agricultural producers must limit market incentives. Environmental effects usually follow from production on many farms over a large area. Outcomes like advantages and damages often take place at some distance from the farms that generate them and may be recognized only after a period which may be as short as in months or very long like in years. The inputs of an individual farmer towards the environmental benefits and damages cannot be directly observed or monitored immediately.

Impact of Agriculture on environment in the U.S

Agriculture is in the U.S. a resource-concentrated industry, with over half of the land in the adjacent 48 States. Over seventy five percent of total freshwater extractions in the U.S. are dedicated to agricultural activities The expansive amount of agriculture directs to widespread environmental impacts on surface and groundwater quality, air quality, fish and wildlife habitats, species diversity, and land characteristics. Agricultural lands in the U.S. 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 66 percent of the population 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 (3). 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 furnish open spaces and visual prospects that are increasingly valued by growing suburban populations (American Farmland Trust. 1997).

On the contrary, the way agricultural land is handled is liable to affect human health, recreational activities, and general well-being of wild life. Agriculture is a primary source of nutrients, and nutrients are the leading cause of water-quality impairments in lakes and estuaries and the third leading cause in rivers siltation (USEPA, 1995). The most frequently detected herbicides in

surface waters in the U.S. include several triazines (atrazine, cyanazine, and simazine), acetanilides (metolachlor and alachlor), and 2,4-D. These are among the highest in current agricultural use (USGS, 1997).

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 of 1.2 percent and 2.4 percent of the community and rural wells, respectively (USEPA, 1992). Ground-water levels are declining from 6 inches to 5 feet annually beneath more than 14 million acres of irrigated land (10). Ground-water overdrafts tend to permanently increase pumping costs, lead to land subsidence which compacts the aquifer's structure, and may cause saltwater intrusion (USDA/ERS, July 1997).

Soil particulate and farm chemicals are 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 (American Farmland Trust, 1997).

Habitat loss associated with agricultural practices on over 400 million acres of cropland is the primary factor depressing wildlife populations in North America. Modern farming methods brought about dramatic reductions in many species, including cottontail rabbits and ring-necked pheasants (Ribaud, M. 2007). 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 (U.S. Dept. of the Interior, 1994). Wetland losses often reduce biodiversity because many organisms depend on wetlands and riparian zones for feeding, breeding, and shelter (NRC, 1995). Agriculture is thought to have affected the survival of 380 of the 663 species listed federally as threatened or endangered in the United States (USDA/ERS, July 1997).

A model of Sustainable Agriculture:

The typical definition of "sustainable agriculture" is the use of practices and arrangement which preserve or develop ability of people and communities to offer their social and cultural welfare; economic viability and natural resource base, and improved ecosystems influenced by agricultural activities. A model of sustainable agricultural is presented in figure 1.

Sustainable agriculture, in figure 1 may be described as an approach to the understanding of psychology of behavioral changes. for achieving sustainability of all three components of the environment, viz (1) agricultural sustainability, (2) economic sustainability, and (3) social sustainability, taking into consideration that sometimes all three components may act differently. It is like moving a "sustainability balance sheet".

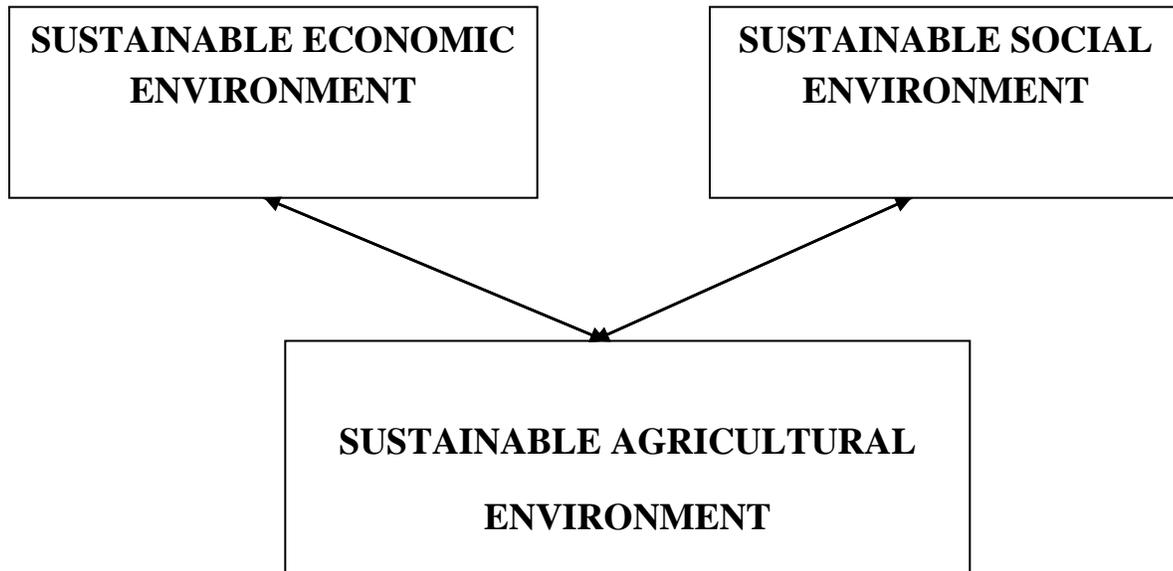


Figure 1. A Model of Sustainable Agricultural

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. Population rise and financial status 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 due to population increase, unbalanced land division and larger-scale farm operations Therefore, to preserve a sustainable agricultural

environment, efforts must be made for population control. Thus, sustainable agriculture can be defined in terms of three perceptions: economic, social and environmental sustainability (Tate, L., and Salladay, D. (2007).

Sustainable agricultural practices in the U.S.

The development and delivery of environmental quality policy and legislation has been of key interest during the past decade in the U.S. that lead to some progress in sustainable agricultural practices in the U.S. Significant improvement in ecosystem quality has also been achieved through many ongoing projects that, with the help of local communities examine air, water and soil quality, biodiversity and climate change. With collaboration with local authorities, the Environment Protection Agency (EPA) and others agencies in the U.S., has provided many opportunities for knowledge exchange, research projects and improvements of agricultural environment. Many environmental programs are being introduced to preserve the environment. The figure 2. shows various agricultural environmental programs introduced in the US. in this decade. (Baylis, K., Rausser, G., and Simon, L. Oct. 2003) which lead to the development of an Agricultural Environmental Quality Management Systems (AEQMS): as shown in figure 3.

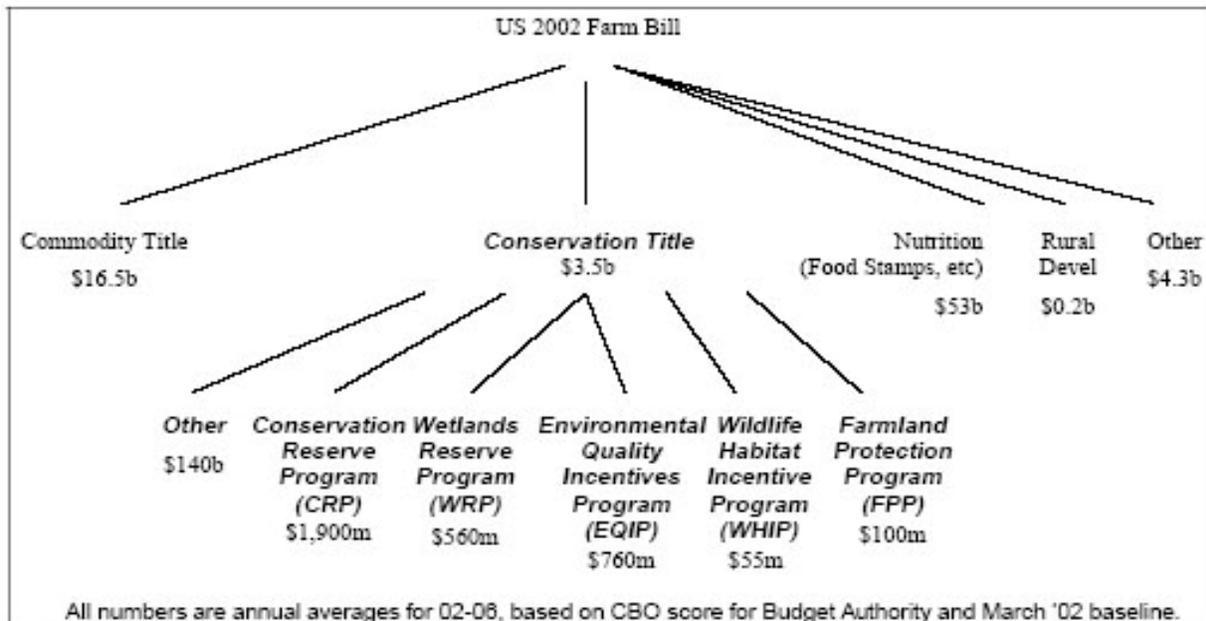
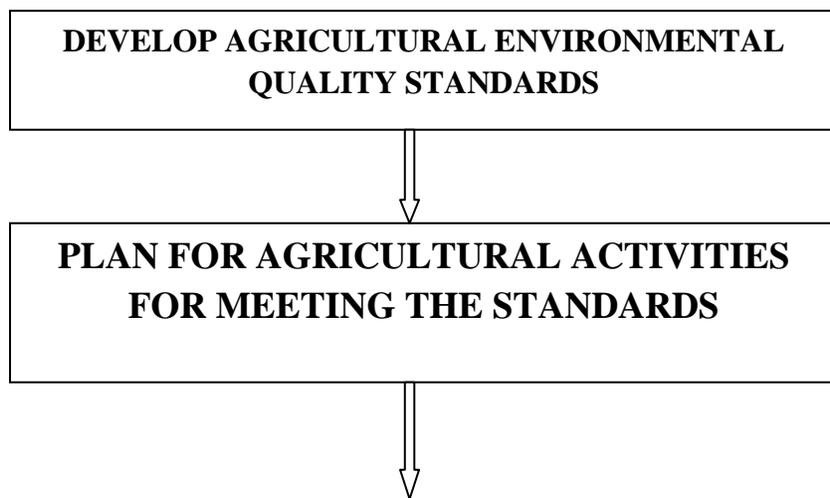


Figure 2: Different Environmental Management Programs in this decade in the U.S..

Agricultural Environmental Quality Management Systems (AEQMS):

AEQMS is well thought-out approaches to agriculture for facilitating farmers to assess and perk up their environmental performance on the farms. AEQMS may also be considered as a quality management approach that helps to accomplish continuous improvement through a Demming's "Plan, Do, Check, and Improve (PDCI)" cycle that can comprise of the finest management practices and Codes of Practices along with other existing quality management activities such as Statistical Process Control (SPC), and quality assurance (QA) audit schemes. Farmers, producers and growers may also be encouraged to get certified to the international ISO 14001 Environmental quality standards (modified for agriculture) or to specific customer and/or industry quality systems requirements using external second and third party audit. A model of Agricultural Environmental Quality Management System (AEQMS) is presented below in figure 2. It includes a five stage process: (1) Development of Agricultural environmental quality standards, (2) Planning agricultural activities meeting the standards, (3) implementing those planned activities (4) monitoring and control using SPC and auditing of performance results, and (5) issuing of Certificate of Compliance to the farmers, producers, and growers meeting the established standards. Also publish a Registrar containing the names of all Certified farmers, producers and growers for their prospective customers all over the world.



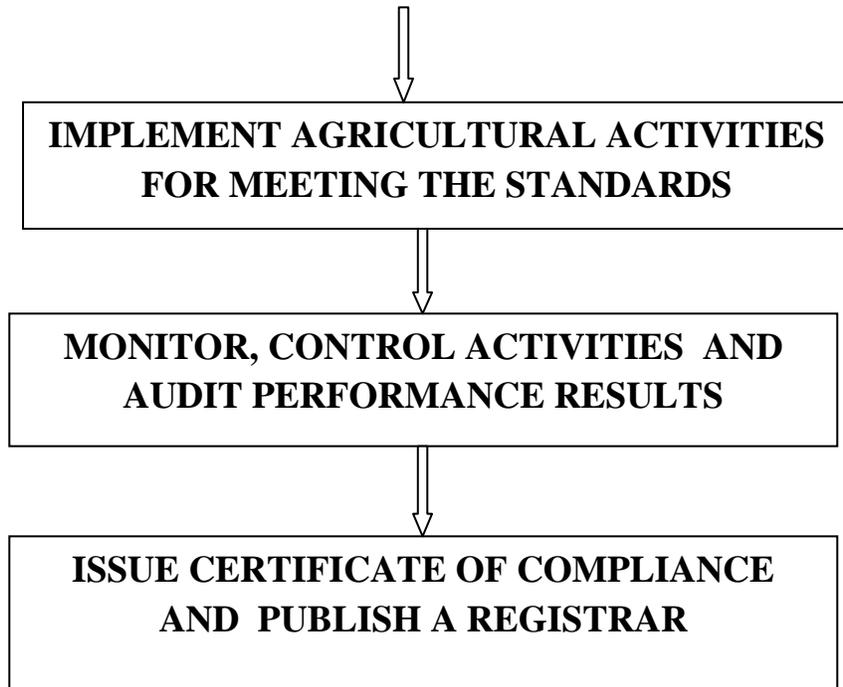


Figure 2.A Model of Agricultural Environmental Quality Management System

Conclusion:

Practical environmental regulations directed towards the preventions of pollution at its source along with proper waste management and remediation program is essential to any agricultural organization for its survival and prosperity in the long run.. A company moving ahead of the curve on environmental issues will find a competitive advantage over those struggling to keep up. New and greener products and processes can increase consumer appeal, and open up new business opportunities. Also a reputation for being environmentally progressive improves employee morale, investor support, community acceptance, and management's self respect. Contribution from each and every individual is also necessary to achieve a cleaner environment, sustained economic growth.

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