

Innovations to Controlling Agricultural Environmental Areas: A Review

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ABSTRACT: *The growing intensity of agricultural activities, as well as worries about its effect on the environment and human health, have sparked concerns about agro-ecosystem management in Ontario, Canada. Because of their intrinsic characteristics and the complex web of institutional structures in which they are placed, managing agro-ecosystems for sustainability is especially difficult. The ideas of regulation and stewardship are the subject of this article. The significance of Ontario's environmental farm plan (EFP) program to environmental management is explored in depth. Farmers started the EFP program to reduce the environmental effect of agricultural operations; it is voluntary and based on stewardship principles.*

KEYWORDS: *Agriculture, Environmental, Eco-System, Pollution, Sustainability.*

1. INTRODUCTION

The agriculture sector in Ontario provides about \$25 billion to the provincial economy each year. The agri-food sector in Ontario, which comprises farmers, processors, wholesalers, and retailers, provided 700,000 jobs in 2003, accounting for 11% of total employment in the province. In 2003, overall farm cash receipts were \$8.3 billion, with dairy products accounting for 17.6%, floriculture and nursery goods for 11.4 percent, fruit and vegetables for 10.2%, cattle and calves for 10.3%, and pigs for 10.3%; and a variety of other products accounting for 15.9%. Southern Ontario is home to almost half of Canada's best agricultural land. In 2001, the entire area of farms in Ontario was projected to be 5,466,233 hectares, with the total amount of farmland being somewhat lower at 3,656,705 hectares. The current state of agriculture in Ontario should be seen in the perspective of agricultural industrialization and intensification, which has aimed to optimize outputs via increased automation, the use of technologies, and food processing. Over the last 40 years, this type of agriculture has achieved remarkable results, including increasing global food production, reducing hunger, and improving nutrition.

Despite these remarkable achievements, the long-term viability of current agricultural methods is now being questioned. The link between the industrial agricultural paradigm and environmental problems is widely established. While soil erosion and sedimentation have long been concerns associated with agriculture, Safely aptly summarizes the list of environmental quality issues to include "water quality and quantity; habitat loss; loss of biodiversity in the rural landscape; nitrates in ground and surface water; pesticide residues in food, water, soil, and air [1].

Soil salinization, compaction, and desertification; air quality and quantity; soil Salinization, compaction, and desertification; soil salinization, compaction, and desertification; air When agricultural-related environmental problems threaten or contribute to the loss of ecosystem human health or result in contamination/food-borne diseases they are magnified. As they must

now compete not only with their neighbors, but also with the more industrialized and subsidized farming operations that increasingly exist in other parts of the developed capital.

the number of farm operators has decreased by half while total production has increased; small producers have decreased while large operations have increased; the total number of pigs and chickens has increased by more than 20%; and the number of livestock per farm has also increased Intensification has been identified as a "primary factor" in Canadian agriculture that has resulted in increased environmental hazards and deterioration .Agriculture and Agri-Food Canada commissioned a thorough study that came to this result. At the national and provincial levels, indicators chosen and created from a "driving force-Outcomes-Response" were used. McRae and Smith concluded that Ontario had "mixed results," with stable and deteriorating loss of habitat, danger of water pollution, water and tillage erosion circumstances[2].

He examines the environmental issues associated with intensive agriculture in Ontario, emphasizing the need for farmers to address water pollution, biodiversity loss, safety concerns such as genetically modified organisms, and illnesses Although there is a lot of evidence linking intensive agricultural methods to environmental problems, it's also essential to note that new study has shown the potential of environmental harm from small and moderate enterprises. According to a recent survey of farm operations in Ontario, the majority of large operations managed nutrients better than middle and small operations .This was ascribed to bigger enterprises' higher financial capability, the adoption of more modern technology, and the strict regulatory restrictions that have been imposed to heavy manufacturing in Ontario since the mid.

In Canada, the link between agricultural and public health has also been a topic of discussion. The May 2000 waterborne epidemic in Walkerton, Ontario, influenced public attention. After being exposed to microbially polluted drinking water, seven individuals died and an additional 2,300 others got sick. Agricultural business in issue had exercised due care and concluded that blame lay with inept municipal water system managers and the provincial government. Despite the fact that the agricultural business was determined to have taken sufficient safeguards, the public perception and media frenzy around these occurrences has created an emotionally sensitive problem in Ontario[3].

2. DISCUSSION

2.1. Application:

In the broadest sense, an agro-ecosystem is a method of looking at agriculture from a systems viewpoint that stresses the links between the environment and productivity. Agro-ecosystems integrate the basic parts of an ecosystem with human-system characteristics including social and economic aspects. Various categorization methods have been developed in an effort to reduce the complexity of the connection between components in agro-ecosystems. Xu and Mange synthesize these categorization methods and propose that knowing agro-ecosystems' components particular subsystems, and different dimensions may help us better comprehend them.

They emphasize the significance of geographical scale and the potential of conceptualizing agro ecosystems in a hierarchical manner. Because agro-ecosystems are man-made and therefore controlled for agricultural purposes, they are fundamentally different from natural ecosystems. As a result, agro-ecosystems may be seen of as a bridge between natural ecosystems and man-

made ecosystems. Agro-ecosystems are defined by the use of auxiliary energy sources and the integration of research, reviews, practices, policy, and technology. These systems are further distinguished by the fact that they are prone to "leaking," or the transfer of both mineral and organic resources, and therefore are not self-sustaining without farmer inputs. As a result, agro-ecosystem instability has serious implications for the environment outside agricultural boundaries as well as worries about human well-being and health. Maintaining agriculture in this setting while minimizing negative effects on the natural environment is and will continue to be a difficult task [4].

As a result, emphasis has been placed on the necessity for management that considers the larger environment. "A sustainable agro-ecosystem approach maintains the resource base upon which it relies, relies on a minimum of artificial inputs from outside the system, manages pests and disease through internal regulation mechanisms, and is able to recover from disturbance caused by cultivation and harvest. This approach is exemplified by Dumanski's idea of sustainable land management (SLM). SLM "calls for the integration of technology, policies, and activities in the rural sector, especially agriculture, in order to improve economic performance while preserving the quality and environmental functions of the natural resource base" Meeting the difficulties of agricultural sustainability while minimizing environmental degradation is a challenging undertaking, given the inherent complexity and interrelated structure of social and ecological systems. Filson and Rapport emphasize the importance of recognizing the social and political factors that shape agricultural systems, such as globalization and trade liberalization. Government may provide incentives, regulations, and programs to restrict harmful behaviors and promote sustainable ones. These must be specified carefully by society, with farmers and other land managers taking the lead in developing and implementing sustainable technologies that enhance land management [5].

2.2. *Advantage:*

The benefits realized by the modern industrial and intensive agricultural industries have incurred costs related to environmental degradation, loss of biodiversity, loss of ecosystem services, emergence of pathogens, and agricultural production long-term stability. The province of Ontario's experience over the last two decades has been consistent with these general trends, the difficulties of attaining agro-ecosystem sustainability have been acknowledged, and environmental and human health issues related to agriculture have been highlighted. Regulatory methods to resolving these agricultural problems were recognized as a reasonable beginning point in the creation of environmental policy. Despite its continuing importance and significant accomplishments in decreasing particular sources of pollution, the regulatory approach has difficulties in dealing with agro-ecosystems' complex and diffuse (non-point) source character. As a result, voluntary initiatives that integrate the concept of stewardship to address environmental issues from agriculture have become more popular. In this last part, we look at the Ontario Environmental Farm Plan to see how stewardship may help with agro-ecosystem management [6].

2.3. *Working:*

Concerns about the long-term viability of current agricultural methods, along with the limits of the regulatory approach described above, have prompted a search for alternatives. Volunteer agreements and programs have sparked much attention as a viable alternative. Segerson and Miceli note an increase in the number of voluntary environmental agreements throughout the European Union and the United States. While they admit that there are still concerns regarding the effectiveness of voluntary environmental protection, they also highlight the numerous advantages of voluntary agreements. These include more proactive collaboration between regulators and business, more flexibility for context-specific solutions, lower compliance costs, and lower administrative costs. The deeply ingrained concept of stewardship is at the heart of this agricultural strategy. "Because all choices are essentially personal ones, the personal ethic of each land manager is the balancing point upon which the problem rests," Safely says. The idea of stewardship as an external indication of an internally held ethic is important in the sustainable agricultural paradigm [7] .

Farmers have been labeled as land stewards because of their intimate connection with the environment .This viewpoint is explicitly stated in the paper Our Agricultural Environmental Agenda in Ontario, which says, "We, as farmers, are the stewards of 14 million acres of farm land in Ontario, as well as the domestic and wild animals that reside there." Our mission is to keep the air, water, and soil in the best possible condition".Envionics conducted a study of farmers and ranchers in Canada in 2006, and found that 79 percent of those polled were interested in learning about ecologically friendly farming methods. 59 percent of farms [8].

Have established nutrient management plans, 76 percent have reduced fertilizer application and improved soil quality via crop rotation, and 47 percent have installed permanent cover on marginal farmland, according to the same study .Despite these efforts, research has shown that many factors moderate the relationship between environmental concern and conservation behaviors. Use sociodemographic models, farm structure models, and diffusion models to synthesize research on farmers' adoption of conservation measures. Extension learning methods and political economics have been shown to affect farmer receptivity, according to Smithers and Furman.In the case of Ontario, Filson agrees that these variables are at play, and add that religion may also influence the adoption of best management practices.

The economic feasibility of conservation measures is the most important variable that mediates conservation activities. It has repeatedly been recognized as the most important factor among farmers and a barrier to adoption. The above-mentioned functional aspects of stewardship emphasize an essential pragmatic feature. Stewardship may be used as a tool to encourage responsible management As a result, volunteer stewardship programs have been developed and implemented to promote environmental management and help farmers overcome some of the challenges they face. When implementing effective stewardship programs, consideration should be given to the roles and responsibilities of both stewards and society; the type of program implementation best suited to achieve the desired results and the goal to be achieved. In both the United States and Canada, the positive incentive method has a long history of use in agriculture Through the use of a variety of methods, these initiatives promote stewardship. Education, recognition, verbal agreements, creative development, technical help, management incentives, management agreements, easements, and private property purchases are among the tools

presented by in the form of a typology. They note that when one progresses from schooling to private property purchases, the cost, attainability, and degree of formality rise. The ideal approach is not to tell the farmer what to do but to establish a policy climate where farmers are more empowered but still held accountable,” Dumanski wrote regarding SLM.

There are many stewardship initiatives all around the globe. Australia's National Landcare Program is one of the most well-known and biggest instances of agricultural stewardship. As Landcare approaches its 20th anniversary, it now has over 4,000 organizations, 120,000 volunteers, and about 30% of Australia's agricultural community. Cite the United States Conservation Reserve Program as an example of voluntary soil conservation and erosion prevention. Between June 2000 and March 2003, Agriculture and Agri-Food Canada launched the Agricultural Environmental Stewardship Initiative.

AESI is “intended to advance environmental stewardship in the agriculture and agri-food sector through support for projects involving education and awareness, technology transfer, and stewardship tools that will help address the impacts of agricultural practices on water, soil, and air quality, as well as biodiversity,” according to the organization .The program provided funding for a broad range of environmental initiatives carried out by conservation agencies, municipalities, and agricultural groups, including riparian protection programs, wetland protection measures, and the planting of 66 trees. Upland habitat, as well as studies to enhance the utilization of fertilizers, herbicides, and pasture management Adaptation Council. While the initiative is not yet complete, the projects that have been executed have received positive feedback and have been deemed effective by both farmers and agencies. Documentation on how stewardship programs particularly contribute to the management of agro-ecosystems is rather missing from the aforementioned debate [9].

3. CONCLUSION

Stakeholders may influence the policy process as active participants via voluntary stewardship initiatives. Agricultural groups in Ontario overcame existing divisions and disputes in the face of increasing demands to achieve consensus on how to handle environmental problems, according to Nancy Grudens-Shuck's description of the creation of OFEC. OFEC turned out to be a success beyond farmers' hopes, Montpetit says This assertion is backed up by OFEC's capacity to build and improve the EFP during the last 15 years, as well as its recent national expansion. Stewardship programs have the ability to distribute knowledge and influence participant behavior. If there are asymmetries in information between the regulator and the agricultural producer,” as Dinar and suggest, it is doubtful that farmers' actions would match regulators' objectives. Research, Reviews, Practices, Policy, and Technology promotes farmer-to-farmer learning and uses grassroots facilitators, as downloaded by. “The ‘point’ of the Farm Plan adult education program, unseen to most outsiders, was the learner-centered aspect of the curriculum,” says Grudens-Schuck .According to the survey findings presented in this article, the EFP promoted greater awareness, knowledge acquisition, and application of that information to practice.

Participants said in their comments that there was a shift in their knowledge and awareness of the agriculture-environment connection that prompted them to take action. While this research did

not look at the variables that affect involvement in the EFP, Mathijs showed that social capital influenced farmers' desire to engage in stewardship programs. As shown by the 90 percent of respondents who said they would attend another farm planning workshop, such programs may have a significant social component. Stewardship programs are successful because they may address hazards that aren't addressed by current regulatory frameworks. The majority of the farms in the EFP research identified one or more activities or circumstances that violated current environmental and safety laws. The bulk of these issues had one of two features that made them seem inconspicuous to the regulatory framework in place. They were either non-point source pollution contributors or latent threats. Dormant hazards are behaviors and circumstances that have not yet produced significant environmental or safety damage, but have the potential to do so in the future. Such a result is unsurprising, considering that such methods are hidden from regulators and their detrimental environmental effect is not readily apparent to the farmers themselves. The EFP shows how volunteer stewardship programs may identify environmental and health concerns create strategies to remedy them, and carry them out.

Despite the fact that some farmers left the EFP before it was implemented the program resulted in significant implementation, with more than 52 percent of the hazards highlighted by farmers being addressed. Stewardship efforts may also encourage behaviors that aren't directly related to the programs. More than half of individuals who responded to the survey reported in this article said they continued to update and implement activities beyond those suggested in the EFP process, sometimes at significant expense. Farmers are entrusted with a great amount of responsibility is an underappreciated and undervalued contribution to agroecosystem management. Rather than providing a base minimum standard of practice and a system of enforcement to address issues of intentional contravention, stewardship programs like the EFP assist farmers in not only voluntarily complying with regulations, but also in exceeding them and adopting best management practices[10].

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