A MUST IN TIME OF ENVIRONMENTAL PROTECTION AND SUSTAINABLE DEVELOPMENT OF AGRICULTURE

ROUMEN G. DENTCHEV (*)

Abstract

The environmental safeguard is among the most frequent problems politicians and scientists have dealt with these last two decades. Environment is really a combination of physical and institutional conditions, that is why not only the good use of natural resources is important, but also the value that man gives to them and thus the choices about their use.
This analysis shows that environmental policy is still a new-born.

Résumé

Pendant ces 20 dernières années, la sauvegarde du milieu a été énormément traitée par les hommes politiques et les savants. Le milieu est une combinaison de conditions physiques et institutionnelles, pourtant non seulement la bonne utilisation des ressources naturelles est importante, mais aussi la valeur que l'homme leur attribue, et donc les choix qu'il fait à propos de leur utilisation.
En général, d'après cette analyse, on remarque que la politique du milieu est encore à ses premiers balbutiements.

Now, environmental protection is an important policy objective for many countries for many years.
Our aim in this paper is to give a brief overview of issues, development and future of interactions between agriculture and the environment.
Citizens of all societies are increasingly indicating that a cleaner environment and more plentiful natural resource amenities are desired. The policies and rules being discussed and implemented suggest that citizens are willing to pay to achieve those objectives, both individually and collectively.
There seems to be some general agreement in much of the agricultural and environmental community that we need changes in farming practices and in agricultural production systems in order to reduce the amount of environmental degradation from the agricultural sector. (Lovejoy, S., 1991).
Agricultural practices are a combination of the methods that growers use to produce their crops. These practices are diverse and constantly evolving under the influences of many factors in a complex net of interrelationships between agriculture and the environment. Many interactions have been the motivating forces for:
a) Technological development including irrigation, drainage, mechanization, and the intensive development and use of fertilizers and pesticides;
b) Technical information;
c) Market demand and distribution infrastructure for agricultural products;
d) Government regulations, policies, prices, and price supports; etc.
One of the issues addressed by this paper is why environmental protection is seen as the essential ingredient of reform in economics in transition.

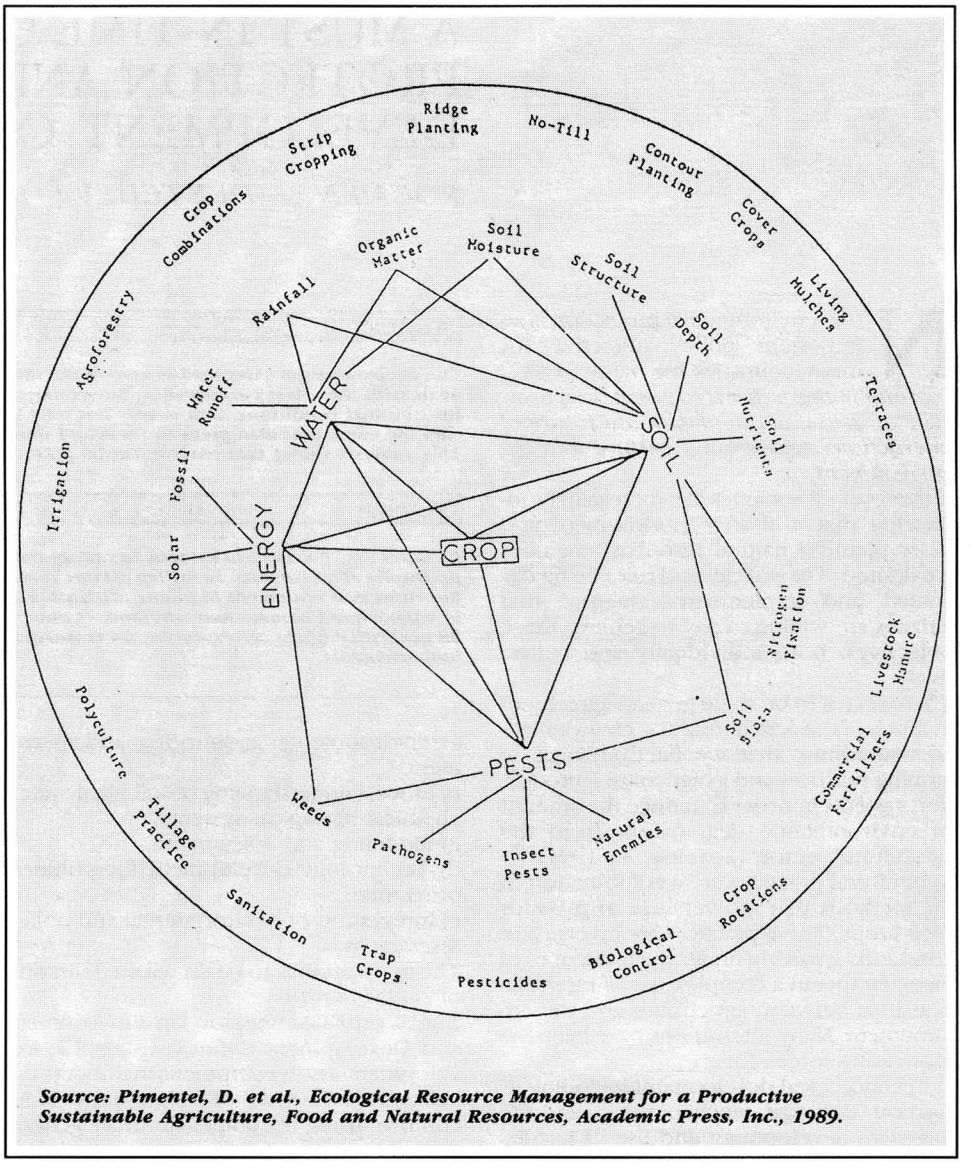
Sustainable systems

Agriculture and environment have many interfaces and linkages that must be understood to enable the long term development of sustainable systems. Successful development of sustainable systems will require research in the following areas:

a) Environmental monitoring and assessment;
b) Process understanding of soil-plant-water-chemical-biological systems;
c) Modeling and assessment;
d) Technology development for polution prevention;
e) Integration of environmental and policy assessments.
The temptation is to begin with a definition of *sustainability*.
The World Commission on Environment and Development defines sustainable development as «development that meets the needs and aspirations of the present without compromising the ability of future generations to meet own needs».
According to the Oxford Advanced Learners' English Dictionary, sustainability refers to «keeping an effort going continuously, the ability to last out and keep from falling.»
Sustainability in agricultural development, therefore, refers to the ability of agricultural systems to keep production and distribution going continuously without falling.
This is relatively general and simple view of sustainability. It is a one dimensional phenomenon in that it has only one focus: the existence of the humanity in a relatively perfect environment.
In 1988 the FAO Council defined sustainable development in agriculture as follows: «Sustainable development is the management and conservation of the natural resource base, and the orientation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations. Such sustainable development conserves land, water, plant and animal genetic resources, is environmentally non-degrading, technically appropriate, economically viable and socially acceptable».
Any discussion of sustainability must consider some key aspects of biological resources. First, each living species is the result of a long and unique evolution and, thus, has a limited claim to value in itself. The loss of species is an irreversible event. As the saying goes, «extinction is forever».
Second, living organisms are unlike nonrenewable resources in that there is no direct relationship between their market value and their prospects for preservation. On the one had, less valued biological resources have been destroyed in the pursuit of other, more valued activities.
Third, living organisms reproduce. A small number of individuals today may produce a large number of individuals in the future. Thus, unlike chemical resources that may be dispersed and converted into other forms but do not generate more of their kind, living organisms, even those with very slow reproductive rates, can increase. (Orians, G., 1990).
Environment is a combination of physical and institutional conditions. The physical conditions involve all the natural resources - land, water, sun's energy, air, minerals, and the flora and fauna that grow on the land and in the sea. The institutional part of the environment is created by people, and includes the psychological and value-oriented decisions of how the physical environment is used. The institutional environment depicts the things that people value highly about their natural resources, and the organizations, procedures, and regulations set up to use or legitimize those natural resources in the production of the goods and services necessary or desirable for a growing society. Environmental management, then, becomes both a technological and a social problem.

(*) Roumen G. Dentchev is Head, Dept. of Trade, Transfer of Technology and Joint Venture, Agricultural Academy, Inst. of Floriculture, 1258 Negovan-Sofia, Bulgaria. He is currently Guest Researcher at the Agricultural Faculty, University of Bari, Italy.

Agricultural systems typically evolve over long periods of time in response to climate, soils, agricultural technology, socioeconomic conditions and other factors. Long-term sustainability of such systems requires that they:
a) are economically sound in the local socioeconomic context;
b) conserve and protect crucial soil and water resources;
c) are capable of adapting to the changing social, economic, and natural environments.
Sustainable agriculture, as well as conventional agriculture, involves a synthesis of ideas that stem from a variety of motivations and beliefs. Sustainable agriculture as contrasted with conventional agriculture is sometimes perceived as a set of alternative technologies that predominately involves the limiting of direct or inderect use of purchased petrochemical-based inputs. Other authors define sustainable agriculture to be a more holistic concept than merely a set of technologies: it includes aspects of the quality of rural life and economic revitalization of rural areas. In both cases, however, one desired outcome of adoption of sustainable agriculture practices is improved environmental quality.
The relationship between sustainable agriculture and the environment is one of complementarity and interdependence. Agricultural production systems are heavily dependent upon the capacity of natural resources to sustain their development. Advances in agriculture have modified this dependency and reduced environmental constraints upon production through the use of irrigation, plant breeding, mineral fertilizers, and pest control.
The basic goals of sustainable agriculture include the idea that management and technologies can be developed and implemented that both maintain production goals and prevent unacceptable environmental damages. Technology development to prevent pollution has a key role.
Some of the trends that encouraged a modern, intensive agriculture were, however, the result of public policies other than agricultural policies. These included low interest rates, relatively easy credit, subsidized prices for water and energy. Resources that are priced below their true opportunity cost are used in excess. Modifications of these public policies have a potential to have major impact on the structure of agriculture and hence on its relationship with the environment.
The interface between agriculture and the environment is not unidirectional. That is, agricultural systems can be stressed from pollutants derived from other sectors of the economy. Direct plant damage from acid deposition is well known. Similarly, concerns about effects on agricultural systems from increased ultra violet light resulting from stratospheric ozone depletion have led to research in this area. Ozone damage to plants is another issue under careful study as tropospheric ozone levels increase, especially near urban centers.



Source: Pimentel, D. et al., Ecological Resource Management for a Productive Sustainable Agriculture, Food and Natural Resources, Academic Press, Inc., 1989.

Figure 1 - Some of the complex ecological interactions among soil, water, energy and biological resources in crop ecosystems.

Global climat impacts of most concern are increased droughts, sea level rise, and temperature increases. It is noteworthy that agricultural production is often stressed from atmospheric sources of polution; treating the environmental interface as having only local, site-specific boundaries is no longer adequate to develop solutions and set policies.
The global climate change issues also include methane emissions from agricultural use of nitrogen fertilizers. Today's agriculturists operates with large amounts of machinery, and heavy usage of chemical fertilizers and pesticides. Besides large farms, small and medium-sized farms in both Europe and developing countries nowadays depend more and more on chemical inputs in order to maximize returns on land-use and consequently raise farm income. (Fanariotu, I. and D. Skuras, 1991).
The intensification of agriculture has had negative environmental effects resulting mainly from over-reliance on technical advances in machinery, chemicals, and seeds. Some of the main problems are excessive application of fertilizers, heavy use of pesticides, soil erosion, and water pollution. The timing and rates of fertilizer application are critical to both good crop production and avoidance of the potential hazards of soil and water pollution. Excessive application can result in excessive uptake of nitrates in plant tissues and contamination of soil by heavy metal impurities.
Most discussions treat chemical use policy issues in terms of their environmental and health effects. In this connection the consumer is affected directly when purchasing agricultural products, and indirectly when the environment, the local amenity, and landscape, are taken into account.
The major principles that underlie an

agricultural system that will be productive while protecting the environment are outlined in **figure 1**.

1. Adapting and designing the agricultural system to the environment of the region.
2. Optimizing the use of biological resources in the agroecosystem.
3. Developing strategies that induce minimal changes in the natural ecosystem to protect the environment and minimize the use of fossil energy in manipulating the agroecosystem.

The goal is to conserve soil nutrients and water, while at the same time encouraging beneficial organisms and discouraging pests.

Discussions of sustainability issues must indicate some sense of order so as to aid the process of setting priorities in the allocation of resources to attain sustainable growth and development performance.

Because past agricultural policies in many countries have influenced relative prices, the structure of markets, and technological change, it is easy to conclude that agricultural policies that support farm prices have been the cause of much of the negative environmental impacts. As a result, there is considerable effort by scientists, agriculturists, environmentalists to modify these policies in a manner to better protect the environment.

Governmental efforts to protect the environment have resulted in reduction of pollution from all sources. Pollution control laws have been established in many countries to regulate air emissions, water discharges, and waste disposal.

As the need for increased agricultural production will probably continue for the next several decades, integrated agricultural/environmental policies to sustain the long-term productivity potential of the land for agriculture will require increased funds. Conservation and treatment of land and water degradation are not cheap. The task is to persuade policymakers of the benefits of allocating scarce resources to uses which will usually have only long-term benefits. However, the rising public concern over environmental damage should facilitate efforts to give a higher to such spending. The current, intensive agriculture has not evolved without environmental costs. Environmental protection can be profitable even with strict economic calculations. On the other hand, the costs of neglecting conservation are high in terms of human suffering and lost agricultural production. (Tsutsui, H., 1991). Off-site damages from agricultural systems are difficult to quantify in precise economic terms but more attention to this area should lead to more informed policy analysis. Recent concerns about ground and surface water quality, habitat alteration, food safety, and ecological damages from toxic chemicals have led to an increased emphasis on generation of more monitoring data, accelerated study of pollution prevention methods, and development of alternative agricultural practices.

It can be said that agricultural development comprises the activities by human beings aiming at the improvement of the quality of life of the rural population through the equal distribution of the wealth and benefits derived from sustainable increases in agricultural production without damaging the environment.

Implications for economics in transition

Economic transition is abandoning old loniks and forging new connections that bring together untried partners in incomplete processes. Any transition requires great courage because the path is never clear.

Agriculture has an outstanding role in reform process in Central and Eastern Europe. The transformation of the centrally planed economy to the modern mixed economy creates a chance for development of agriculture.

The objective of this transformation is the creation of conditions necessary for accelerating the development of agriculture, in conformity with the democratic processes. The approach envisages radical changes leading to a more effective use of land, labour and human resources.

Our purpose here is to look at the transition experience of the decisions of environmental problems and sustainable agriculture of the countries, from socialism to capitalism or from growth to maturation. In some countries reform of agriculture is needed to ensure the rational use of land and to check misuse of marginal areas.

There are significant environmental problems associated with the process of economic development, especially in its early stages when growth is more dependent on natural resources.

The countries of Central and Eastern Europe that are pursuing forced-draft economic development policies to improve the incomes and living standards of their population, and that are servicing large external debts, not only are implicity using very high time discount rates, but also lack the resources to address environmental problems. They choose to use their resources to improve per capita incomes or to service their debt in the short run rather than to address environmental problems that have a payoff only in the future. There may be considerable distruction of both renewable and nonrenewable resources in the process. They are not prone to make such investments for environmental protection and sustainable agriculture. That is why increased attention on the part of public society, politicians and scientists to environmental problems and sustainable development of agriculture in these countries and in those with serious debt problems is so important. On the other side, political instability has made sustained agricultural development almost impossible in most Central and Eastern European countries. Political instability results at least in four types of changes in the policy environment of direct relevance for sustainability. First are the changes in programme priorities introduced by new democratic governments. Changes in priorities produce changes in public resource allocations which affect policy sustainability. Second are policy changes of a largely cosmetic nature, meant to give a semblance of change when in fact nothing has changed. Third are changes produced by changes in the public bureaucracy, the traditional source of public advice. Fourth is the loss in sustainability caused by the time required by new political and bureaucratic leadership to study the files and get informed on policies of the previous discredited regime.

It is necessary to consider the positions describing below if we want the next economic development of the Central and Eastern European countries to be sustainable and according to the environment.

First, to be succesful any environmental protection should be part of a larger macroeconomic policy context that includes pricing of energy and water according to their true opportunity costs, that addresses the level of real interest rates, that includes credit availability. That is, the protection of the environment should be integrated into a broader package of economic reform. In most circumstances, tinkering with commercial agricultural policy will have modest benefits at best; although being cognizant of environmental-agricultural tradeoffs will minimize the number to times those policies work at cross purposes.

Such inclusion of environmental goals with broader policy goals, whether in regulatory or an economic incentive structure will not occur without a conscious effort ... there is need for clear priorities that are based on careful analysis of policy alternatives. These analyses must include contributions from social scientists if they are to reflect least cost options to change individual or institutional actions, but technical and ecological expertise is also needed if the policies are to be based on the best scientific information available.

Furthemore, unless there is a stable and sound macroeconomic influence, little environmental protection can be anticipated. However, if a stable and sound macroeconomic system provides the necessary economic environment, then pricing of resources — particularly water and energy — close to their true opportunity costs will avoid many environmentally damaging practices of excessive irrigation, fertilization, or chemical use. Furthemore, the use of economic incentives to encourage environmental protection has the advantages of encouraging least cost responses to achieve the desired policy goal - but only if the firm or individual perceives the incentives as economic costs or benefits. That is, if a firm does not operate on a profit and loss basis and, instead, if its next year's budgets are determined by last year's expenses, then any losses incurred due to environmental fines or taxes are counter productive. Not

only is there not an incentive to protect the environment, the incentive is actually the reverse to pile up fines or other costs so that next year's budget is increased. Incentives will only work if the market is allowed to function once it is in place.

There is much to be said for non-government organizations and governmental entities working togheter to define and achieve economic and environmental goals. Inclusion of the stakeholders in a decision — including environmentalists — in the design of environmental and agricultural policy frequently results in more reasoned, more cost effective policies.

Finally, one can view pollution stemming from farm activities as by-products or externalities to be «internalized» and incorporated into the farmer's decisions via adjustments to prices and other economic incentives. In many cases, such internalization makes good economic and ecological sense. Alternatively, one can view pollution as representing the boundaries that describe the limits for a well functioning market to achieve desired results. This perception calls for the close examination of property rights and for collective action to achieve desirable outcomes. While such an approach may mean regulations, it can also include public ownership of some of the property rights to fragile lands, wetlands, and aquifer recharge areas so that they will not be cultivated. Public ownership may include all rights - such as would be the case with public ownership of wetlands as a wildlife refuse; or, it could be limited ... for example, the farmer who owns an aquifer recharge area holding all property rights except the right to use certain chemicals. That is, the cropland has a public held easement placed against the land to limit the farmer's choice of agricultural practices. In certain situations, this approach also makes economic and ecological sense. (Batie, S., 1991). ●

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