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Policy Recommendations for Pursuing a Sustainable Agriculture in a Small Rural Community in Romania

LUIZA TOMA

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ABSTRACT

The paper gives a range of sustainable agricultural policy recommendations, based on the results of the previous CEESA research phases. We begin by a brief presentation of the Romanian case study dealing with the environmental awareness of farmers, measured by means of agri-environmental indicators and discrete choice modelling. Then, we present the policy instruments dealing with non-point source pollution from agriculture, focusing on those applied in the European Union, that are most likely to be used in accession countries. Here we briefly introduce the Romanian environmental institutional and legislative framework, emphasising the existent water policy instruments. We end up by proposing sustainable agricultural policies that, based on the insights of our case study, we consider to be most appropriate for the case of Romania.

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1 INTRODUCTION - BRIEF REVIEW OF THE PRECEDING CEESA OUTCOME

1.1 AGRI-ENVIRONMENTAL INDICATORS[1]

The case study was carried out in Cazanesti agricultural region, crossed by Ialomita River and located in the south-eastern part of Romania. The commune is characterised by lack of economic activity diversification resulting in an excessive dependency on agriculture. The low economic efficiency in agricultural activities is due to the high degree of land ownership fragmentation, obsolete agricultural machinery, poor infrastructure and a high percentage of elderly people employed in agriculture.

The environmental situation in the area is poor as regards to water pollution from agricultural sources. The specific problem that the case study deals with is non-point source pollution of water with discharges from agriculture (mainly waste from animal farms). The analysis of agri-environmental indicators[2] in the case study area reveals a typical picture of the Romanian farming systems' development during the last decade having produced contradictory impacts on the environment. In case of water pollution, the depreciation of farming systems' economic situation led to a decreasing use of potentially polluting inputs and to lower livestock numbers. Hence, water pollution from agriculture decreased. On the other hand, lack of financial means led to ignorance of environmental conservation and to abandonment of unproductive land.

Farm socio-economic characteristics

The number of farms and the farm size have remained relatively constant during the last decade. There are 1,100 rural household farms (average size of 3.74 hectares and an average number of plots of 1.83), 3 legal agricultural associations (average size of 914 hectares) and 1 family agricultural association (size of 73 hectares).

About 97 percent of agricultural land are used for arable farming, 2 percent is under permanent pasture, and vineyards and orchards account for about 1 percent. There are hardly any changes in agricultural land use during the last decade (a shift toward more extensive types of farming, such as pasture and meadows, generally suggests less potential impact on environment, provided however, that the lands management is environmentally sound).

The fact that more than half of the farmers (59 percent) is over 55 years old is not an encouraging sign of the potential long-term viability of agriculture, given that younger well-educated farmers are more likely in favour of changing economic and environmental conditions. Male farmers predominate (65 percent for household farms). Twenty six percent of the farm managers have graduated from highschool or college, which is quite promising as they are regarded to be driving forces for changes.

The region is characterised by a high rate of off-farm activity. Consequently, although all farm managers are occupied in agriculture, many of them consider it as an auxiliary job. Over two thirds spend more than 75 percent of their time in agriculture. A total of 58 percent of the farmers have preserved their occupational status, the others were pre-

[1] Toma, 2002a.

[2] We applied the OECD scheme of agri-environmental indicators (OECD 1999, 2001).

viously employed in food industry, services and trade (in equal shares of about 14 per cent). The previous non-agricultural occupation is consistent with the high unemployment in industry and service sector. In principle, the fact that more than half of the farmers has always been occupied in agriculture would mean that they have greater experience and are more likely to apply better agricultural practices.

The number of workers hired on a permanent or temporary basis provides evidence of the farm economic viability, indicator of a potentially higher environmentally friendly behaviour. Household farms that hire labour (9 percent) keep above-average livestock numbers (12.2 livestock heads compared to 4.83 average per commune). As regards dairy farming, 100 percent of farms with more than 3 cows hire labour. That is even of greater importance for protection of the environment since dairy farming is less intensive.

Farm financial resources
From among the farmers that made agricultural investments (13.3 percent), 38 percent invested in livestock and 16 percent in machinery and dwellings. No farmer invested in land. The agricultural investment structure presents a low financial profile of the household farms in the sample. Moreover, the alleged type of credit sources (either relatives or friends, and, unsurprisingly, no banks) implies farmers' risk aversion and the scarcity of collaterals.

Farm management and the environment
Cazanesti sample has no farms with nutrient management plans. Chemical and organic fertilisers are applied without precise measurement of crop uptake (100-150 kg NPK per hectare; there are no exact figures on manure application). There is a reasonable understanding of crop needs and nutrient availability at different growth stages and these needs are efficiently met by nutrient applications. However, scientific knowledge is often impeded by shortcomings in practice (availability of cash or credit to buy inputs, tendency to cultivate more profitable crops sometimes at odds with proper crop rotation, low funding for soil testing, etc.).

We can speak of a 'relaxed' integrated pest management, as scientific knowledge has been adjusted to practical circumstances. While crop rotation is more or less respected, there is no use of biological pesticides in the sample area but of chemical ones (on average 1 kg active ingredient of pesticides per hectare).

The same holds true of environmental land management practices. There are no strict rules like zero-tillage practices, contour cultivation, strip-cropping. Cazanesti area has had a low efficiency irrigation system, based on flooding. Flooding technology is the least efficient type of irrigation system and implies high environmental risks.

1.2 WATER POLLUTION IN THE CASE STUDY AREA[3]

Chemical and organic fertilisers and pesticides have been the main agricultural pollutants in the sample area. The decrease in the use of chemical fertilisers in 1990s was an important factor in reducing water pollution in recent years. Pollution from organic fertilisers has also declined due to the smaller livestock numbers. On annual average, con-

[3] Toma, 2002a.

centrations (monthly measured by the National Company "Romanian Waters") have fallen below maximum allowable limits (MAL) in surface waters (Ialomita River), but they still exceed threshold pollutant values in groundwater. This can be explained by a slower process of self-decontamination of groundwater. The extent of groundwater pollution from agricultural nutrients is less documented than surface water pollution, largely because of the cost involved in groundwater sampling. Moreover, it is difficult to correlate nutrient contamination levels in groundwater with changes in farming practices and production systems, because it can take many years for nutrients to leach through overlying soils into aquifers.

Groundwater in the sample area shows a high nitrate content (due to agricultural leakage). Sanitary controls revealed that water from wells exceeds maximum allowable limits of pollutant concentrations (mainly nitrates) and is neither drinkable for humans nor for livestock.

In the sample area, both agricultural and non-agricultural sources– livestock and crop farms, and household waste disposal – have contributed to the increase in harmful substances exceeding MAL that were detected between the two receptor points (upstream and downstream the critical area) on Ialomita River. Both sources of contamination are harmful to the environment, although to different extents. Summing up, the main pollution problem has been diffuse source contamination of water resources with livestock waste.

According to the different chemical component concentrations, Ialomita River water was categorised into different qualities. Among the chemical components whose level might have increased due to agricultural sources (livestock and crop farming) in the sample area, Cl^- and Na^+ exceeded the MAL for fixed residues, on yearly average, and the river water was categorised as 'degraded water'.

On a yearly average, some chemical components do not exceed maximum allowable limits as to be included in 'degraded water' category (although they are included in the 2nd or 3rd categories, unfit for livestock consumption and aquatic fauna), but they show above-MAL values during some months (spring and autumn). This time relation is likely to be associated with either livestock waste disposal accidents that are penalised by the environmental agency, and with the application of fertilisers during spring and autumn agricultural operations. However, it is impossible for the environmental agency or local authorities to render permanent monitoring of farms for improper household and livestock waste disposal practices.

Parameters, that indicate salinity (fixed residues, Cl^-, Na^+), exceed MAL on a yearly average. These are elements whose concentrations are strongly dependent on dilution by rainfall, which is another factor to explain for the high dispersion of concentrations over time. From a multiple correlation analysis, we conclude a very strong correlation between these parameters (Pearson coefficient takes values between 0.87 and 0.97), suggesting a common origin for these groups of variables, which, in our case, is livestock waste. The analysis of bacteriological samples taken from wells in 2000 revealed a strong bacterial contamination of the wells and their water that proved to be unfit for drinking during more than 80 percent of the time in a year period. As a result of our survey, 28.3 percent of respondents consider that drinking water quality in the com-

mune is impairing human health, 63.6 percent are not aware of the direct effect of water quality on human health, and 8.1 percent do not answer.

A total of 44.4 percent of farmers use the long strip of pasture following closely the right bank of the Ialomita River for livestock grazing, on average six months per year. Out of these farmers, 60 percent consider that the pasture quality is poor, either due to poor maintenance or due to pollution. Veterinary services are used by 15.5 percent farmers for cases of livestock indigestion caused by infested drinking water and 20 percent for other livestock diseases, not including the regular checks.

Related to household waste disposal, 80.8 percent of the farmers declare to have used community garbage platforms, the rest store it in their backyard and burn it later on. Livestock waste is disposed on the same community garbage platforms by 71.7 percent of farmers, 13.1 percent dump it in their own backyards or on the fields, 14.1 percent do not answer and only 1 percent use it properly as organic fertiliser.

1.3 DISCRETE CHOICE MODELLING[4]

The subsequent methodological step in our CEESA analysis dealt with random utility theory to analyse the economic and environmental trade-offs at farm level in the Cazanesti case study.

It is difficult to identify a unique social preference criterion related to agricultural and environmental policies as the decision-making process is influenced by multiple competing objectives (Toman, 1994). Farmers are mainly concerned with farm profitability and less with resource conservation, unless in clear cases where there is a direct proportional relation between the two objectives. But in most cases, the economic and environmental objectives are competitive.

Agricultural policy analysis should consider multiple objectives referring to farm income, soil erosion, nitrate leaching, waste storage and any other surface and groundwater quality indicators because all of these measures are interrelated. Although there is not necessarily a direct trade-off between water quality and farm profitability for a proposed policy change, economic-environmental trade-offs are common in agricultural production.

A potential use of the trade-off information is to derive a utility function for a decision-maker by presenting the trade-off information. Decision-makers can be asked whether they are willing to move between two points, that represent efficient combinations of the different objectives. These points are taken from the estimated efficient trade-off surface rather than chosen arbitrarily. Once a utility function for a particular decision-maker is derived, it can be used to identify the most preferred point on the efficient trade-off surface. While different decision-makers can have different utility functions, they all face the same and unique trade-off surface.

For underlining the impact of socio-economic variables in the decision-making process at farm level as regards environmental choices, we estimated and compared two binary logit models. The first was the basic 'restricted model', which showed the importance of

[4] Toma, 2002b.

choice set attributes in explaining farmers' environmental choices. The second 'extended model' included socio-economic variables in addition to the attributes in the choice set.

We derived the utility functions generated by two options that were based on the bundle of attributes of 'environmental effort' to assess the impact of the current 'environmental quality'. The models provided an estimate of the effect of a change in each attribute on the probability that one of the options was chosen.

In making his choice between the two options, the farmer compares the increased environmental effort (from 'no effort' to 'significant effort') with the change in water quality (from 'polluted water' to 'clean water'). The first option is chosen if farmer's welfare from the first option's level of attributes is higher than the welfare generated by the second option. Namely, farmer's choice is the result of the comparison of the utilities predicted for each option. The second model introduces socio-economic variables in addition to the attributes used in the choice sets. The use of socio-economic variables as independent variables is justified under the hypothesis that socio-economic characteristics are separate factors influencing environmental behavioural intentions and behaviour.

The coefficients for attributes in the choice set were found significant and with the *a priori* expected sign. The impact of 'environmental efforts' on farmers' choice was higher than their attitude towards water pollution. Among the socio-economic variables considered (all variables' coefficients having the *a priori* sign), half of them were significant (age, main occupation, land ownership, dwellings ownership, investment behaviour). The impact of these variables on farmers' choices towards environment has a strong empirical reasoning (underlying the discussion on agri-environmental indicators above).

Compared to the restricted model, the explanatory power of the extended model increased. Thus, adding the block of socio-economic variables proved to be justified both theoretically and empirically. Besides the theoretical advantages, they presented the benefit of analysing farmers' environmental decisions based on their socio-economic situation. As the 'environmental efforts' variable is more significant than the 'environmental quality', it is easy to deduce the reasoning behind it, namely the low capability of farmers to perform these efforts. This fact is consistent with the insights of the above discussion on the socio-economic variables, notwithstanding farmers' being seriously concerned about their own health and that of their livestock, together with general community welfare.

2 NON-POINT SOURCE POLLUTION (NPS) ABATEMENT POLICY INSTRUMENTS - ANALYSIS OF THEIR APPROPRIATENESS IN THE CASE OF ROMANIA

2.1 NON-POINT SOURCE POLLUTION ABATEMENT POLICY INSTRUMENTS

NPS pollution problems mainly refer to emissions by small sources (e.g. household farms) and include nutrient pollution, pesticide pollution, sedimentation, and hazardous and solid wastes. Monitoring individual emissions, that are associated with farming activities and cause environmental degradation, is not possible due to the great number of sources, the diffuse character of pollution and stochastic elements (e.g., weather).

Therefore, the environmental inspector, who seeks to implement a given environmental policy, can only measure the ambient pollution at specific 'receptor points', but cannot assign any specific part of the pollutant's concentration to a specific polluter if there is more than one polluter producing the same pollutant.

Braden and Segerson (1993) and other authors refer to problems characterising NPS pollution as regards the lack of information (we choose this classification among the several existing ones due to its relevance to the case of Romania):

- problems related to monitoring and measurement. A major informational constraint is that of asymmetries between the environmental agency and the polluter. The agency is typically less informed than the polluter about the abatement costs and technology of pollution reduction. Using the language of the principal-agent relationship, there is a problem of hidden information or adverse selection. In order to set an efficient environmental policy, the inspector must know the costs of the polluter. However, it is not in the interest of the polluter to provide this information (since the regulation will negatively affect his revenues, the polluter is motivated to overestimate abatement costs and to underestimate its emissions). To limit the probability of polluter's unreliable behaviour, the inspector must create an incentive mechanism that persuades the polluter to reveal true information, i.e., that provides the polluter with a benefit.

  NPS pollution does not fit the traditional principal-agent model, where it is assumed that the principal can observe individual output but is concerned with some unobserved characteristics of the agent or some level of unobserved effort of the agent. In the case of NPS, the inspector cannot observe the abatement output from any individual nonpoint source.

  When dealing with agricultural NPS, main restrictions arise from the fact that inspecting agencies are mostly understaffed and underequiped. Furthermore, inspectors may fail to enter the polluter's premises, to detect separate damages across farms and to subsequently assign liabilities. The large number of farms contributing to the problem also decreases the possibility of farms co-operating to reduce pollution levels and the likelihood that an individual farm, whose contribution is small relative to the total, will ignore/deny the impacts of its practices on resource quality (Tomasi, Segerson and Braden, 1994).

- problems related to natural variability (associated to weather or topographical conditions) that result in stochastic pollution processes.

These problems provide for an explanation of the still modest control of NPS and, in particular, of actions to regulate pollution from agricultural sources. Policy-makers face difficulties in updating traditional pollution control strategies and regulatory approaches in order to address NPS problems. In the case of agricultural NPS pollution, there are particularly high transaction costs associated with regulatory policies (research, information gathering and analysis; enactment of enabling legislation including lobbying costs; design and implementation of a policy; support and administration of on-going programs; monitoring/detection; and prosecution/inducement costs) due to the high cost of monitoring individual pollutant discharges (McCann and Easter, 1999).

Besides economic activities that are responsible for NPS pollution problems, agriculture, in particular, has substantially been, and continues to be, although to a smaller ex-

tent, exonerated from mandatory regulation, and has not been confronted by effective economic incentives aimed at internalising the social costs of pollution. On the contrary, rather than addressing market failures and promoting a more sustainable use of natural resources, agricultural policies in transition countries have often added further distortions, and by doing so, have often worsened the misuse of resources.

Designing policies to achieve efficiency (first-best outcome) is often impossible because the relationship between economic damages and non-point source pollution is seldom known. Instead, policies can be designed to achieve specific environmental goals (such as reducing ambient pollution levels or reducing fertiliser applications in a region) at least cost, provided that the policy instruments are available to a resource management agency and that relevant policy transactions costs and any other political, legal, or informational constraints exist (second-best outcome).

There are difficulties associated with each of these aspects due to the problems mentioned above. In contrast to point-source pollution problems, NPS problems must be addressed by preventing the generation of the residuals at their source rather than attempting to control the pollutant on its way from source to final point of delivery.

The type of environmental policy action required in any sector is influenced by the marginal costs and benefits of reducing pollutant levels. The inability to assess the costs of the environmental damages stemming from agriculture makes it difficult to determine the level of abatement effort necessary and the potential acceptability of the instruments attempting to achieve that effort.

Political acceptability of any environmental policy in agriculture is also influenced by the composition of the polluters. In Romania, environmental problems arising from agricultural production are caused by a large number of farms, the majority of which are family-owned holdings with low financial means. Given the general need to continue to support these farms and the influence of the farm sector to get such support, any potential policy instrument will need to consider such political facts. Still, small-scale farmers in Romania pollute less as compared to agricultural associations and state farms, as they usually use lower quantities of potentially polluting inputs. Nevertheless, NPS pollution does not depend only on the quantity of agricultural inputs used but also on the farm location, timing of input application, and technological practices. All these data are corroborated with stochastic factors, which show that, after all, size of pollution source is necessary, but not sufficient in explaining environmental impacts.

The non-point nature of most agricultural externalities limits the applicability of conventional policies used to combat point-source externalities. The NPS pollution problem requires the use of others than standard instruments of environmental policy (Pigouvian taxes, tradable emission permits, emission standards) as incentives for dischargers to follow socially desirable policies (see Griffin and Bromley, 1982).

We give a brief review of policy instruments aimed at controlling pollution from agricultural diffuse sources and their applicability in Romania, focusing on the instruments introduced through the reforms of the Common Agricultural Policy (CAP). These reforms were aimed, inter alia, at integrating environmental protection into agricultural and rural development policies.

Regulatory approaches can be classified according to the reference basis adopted for setting policy measures, namely observable total discharges (direct regulatory approach) or estimated individual pollutant discharges (indirect regulatory approach).
Policy instruments consistent with the direct regulatory approach are typically implemented in the form of

- ambient tax/subsidy policy schemes[5] that, broadly speaking, depend on deviations between measured and desired ambient pollutant concentrations. Each polluter pays a tax that varies proportionally with changes in the ambient concentration. Only information about the pollutant at the receptor site is required rather than emission levels of each polluter and, in addition to the reduced data requirements, the mechanism is also budget balancing. However, this approach is politically less acceptable, as it separates between behaviour and penalty. This is a general constraint that applies mostly everywhere, not only in Romania.

The indirect regulatory approach[6] includes the following instruments:

- estimated emission charges and standards[7]. There are no models applied in Romania that could provide accurate estimates of the complex fate and transport of most agricultural pollutants. But accurate proxies are necessary if this indirect approach is to receive political legitimacy. Even if the estimates were accurate, the costs for regular application of these complex models, particularly in terms of data collection, would be so large as to outweigh any gains.
- marketable emissions permit systems[8]. The diffuse nature of agricultural pollution makes the use of conventional tradable permits infeasible. Therefore, they have been modified to a tradable permit system on polluting inputs and a point/non-point source trading scheme. Neither of them can be applied in the case of small farms[9] in Romania due to limitations of the monitoring systems.
- input- and output-oriented policy measures[10]. These include input and output levies, mandatory restrictions on input use, codes of good agricultural practice, reforms of agricultural policies, contingent subsidies (cross-compliance measures), and compensation for abandonment of potentially polluting activities (set-aside).

  As some of these instruments are going to be applied in Romania after accession - since they are common instruments applied in the EU-, we present them in more detail in the next subchapter – policy instruments' concepts together with results of their implementation in the EU members.

No single economic instrument emerges as the ideal choice for reducing pollutants from agricultural production. Each instrument is appropriate under certain circumstances but none by itself adequately addresses the informational and uncertainty problems associated with diffuse-source pollution prevalent in agriculture. For such problems, the costs

[5] Segerson (1988), Cabe and Herriges (1992), Xepapadeas (1991), Bystrom and Bromley (1996).

[6] See seminal papers of Griffin and Bromley (1982) and Shortle & Dunn (1986).

[7] Shortle and Dunn 1986; Dosi and Moretto 1993; Shortle and Abler 1994.

[8] Taylor et al., 2001, Horan et al., 2000, Horan et al., 2001.

[9] The case of big farms (thousands of hectares) would be, of course, different. But then we would move away from the NPS case and closer-to-traditional policy instruments could be applied.

[10] Dosi and Zeitouni, 2000.

of monitoring and enforcing a given policy are generally inversely related to its effectiveness in meeting the environmental target at minimum total abatement costs.

Performance-based instruments, such as emission and ambient charges, are targeted directly at environmental quality but suffer from measurement problems, while design-based instruments, such as input taxes, can be implemented more easily but suffer from the indirect relationship between the chosen design base and environmental damage.

2.2 EU AGRI-ENVIRONMENTAL AND RURAL POLICY INSTRUMENTS

Codes of good agricultural practice and vulnerable zones
In EC legislation, the term "good agricultural practice" is more commonly applied to the regulation of nitrate pollution from diffuse sources, and in this context, it can be seen as being an application to agriculture of the concept of best environmental practice that is applied in industry (Nitrate Directive (91/ 676/ EEC).

The EC 1992 agri-environmental programme
As noticed by Brouwer (2000), it is difficult to assess to what extent CAP has effected agricultural development and, in particular, structural changes such as intensification, specialisation, and concentration, which are commonly regarded as the causes of the observed negative externalities. The agri-environmental programme provides compensations to farmers who undertake to reduce input use, change to other, more extensive crop patterns and to more environmentally friendly production methods or set aside farmland for at least 20 years with the aim to protect hydrological systems. More than 20% of the total European Union's farmland has been effected by Regulation 2078/92 (European Commission, 1998).

Cross-compliance measures
Cross-compliance measures require that a producer engages in, or refrains from, specified activities in order to be eligible for other government programs, such as income support programs. The link between farming support and farmers' environmental performance can be implemented in different ways, with various levels of environmental effectiveness. Batie and Sappington (1986) identify two general approaches: the red ticket approach, where eligibility for certain benefits is made contingent upon the farmer attaining a given environmental standard or set of standards, and the green ticket approach, where farmers become eligible for higher levels of support if they comply with or exceed a given environmental standard.

EC introduced cross-compliance measures through Agenda 2000, as a Member States' policy option. Cross-compliance is stated by the European Commission as one of the elements which has made the CAP truly green. Attaching environmental conditions to farmers' support payments is a way of improving their environmental performance. This approach is given new emphasis following the recent changes in the CAP. Cross-compliance may be seen as a means of addressing concerns, such as the protection of water, soil and air, landscape change and the conservation of wildlife.

Land retirement (set-aside)
Land set-aside is one of the options available for reducing agricultural harmful impacts upon groundwater. European Union introduced a voluntary environmentally oriented set-aside program within the agri- environmental program established through Regula-

tion 2078/ 1992. The environmental effectiveness of set-aside programs depends on the degree of correlation between farmland productivity and farmland environmental sensitivity as well as on the foreseen compensation for land retirement.

A form of EU intervention in rural areas is the programme *LEADER Plus initiative*[11]. It is based on a method for establishing a strategy and actions adapted to the area rather than a particular list of standard measures offered for implementation. Among its features, we mention the following (as related to the recommendations for our case study):

- The area-based approach. The geographical area for the intervention is small and homogeneous. In this way social, economic and institutional actors know each other well and also know what are the strengths and opportunities, the weaknesses and constraints of the area;
- The bottom-up approach. In order to arrive at the actions that will be realised, the local actors need to be mobilised through participation and involvement in the formulation of a strategy;
- The local action group. This is a partnership between private and public actors, relevant at local level, which becomes the agent for stimulating a participatory approach, defining the strategy and the actions, the costs, the financing and manages the implementation of the plan.

Participatory approaches and incentive schemes are most appropriate to the case of small rural communities in Romania when dealing with environmental issues. In the following subchapter we present the current Romanian environmental policy framework that will reveal a lack of instruments to deal specifically with NPS pollution from agriculture. Therefore, the subsequent Chapter 3, on policy recommendations will have in view both the EU example and the potentials and constraints of the Romanian case.

2.3 THE CURRENT ROMANIAN ENVIRONMENTAL POLICY FRAMEWORK[12]

Current Romanian policies have started to adopt an approach towards sustainability based on the integration of the environment into sectoral policies and the reshaping of social and economic behaviour through the use of a broader range of instruments and by promoting the principle of shared responsibility. The process of increasing environmental awareness has started and has been linked to the EU pre-accession process and Romania's ratification of world conventions on environmental issues. The Romanian institutions and legislation in the agri-environmental field have been harmonised gradually according to the current EU framework, a process that will continue in the long term.

In general, Romanian *institutions* have a relatively recent experience in the field of environmental protection. They have a good technical expertise/experience, but limited ex-

[11] The present framework of rural policy within the European Union was defined in Agenda 2000 in 1997 and in 1999 in Berlin, with the final decisions on the financial allocations for the period 2000-2006. The first and most important one is the Regulation for Rural Development (Reg. 1257/99). A second form of intervention in rural areas is also possible with the Structural Funds either in objective 1 (lagging behind) and objective 2 (conversion of areas facing structural difficulties) areas. A third instrument is the LEADER Plus Community Initiative.

[12] Water quality relevant.

perience in management, economics and enforcement of the environmental legislation. Their main weaknesses are (European Commission, 2000): 1) insufficient co-ordination at the central level between the ministries involved, in need of more clearly defined responsibilities and a better communication; 2) limited experience in introducing economic instruments and in managing human resources and projects; 3) limited staff engaged in the overall process and 4) lack of equipment at the local level. As regards the non-governmental institutions dealing with environmental issues, they are perceived as the most dynamic field in the Romanian civil society. They have started to exert greater influence on the quality of the Romanian environment, but, at present, they are not as powerful as to actually influence the environmental policy.

The current *legislative framework* in the field of water management and pollution abatement has been focussed on the EU harmonisation process (Romanian Government 2002a, 2002b). The position paper for Chapter 22, Environment, has been submitted to the EU Council during the Belgian Presidency of the EU Council (sem. II/2001) and has been opened during the Spanish Presidency of the EU Council (sem. I/2002). Romania will implement the acquis communautaire in the field of environmental protection until the date of accession, with the exception of some EU legal acts[13]. Successful enforcement of environmental legislation depends widely on training level and financial resource allocation necessary for technical endowment. Transposition and implementation of the acquis in the field of environmental protection represent a difficult process because of the inter-sectoral character and of the impact of the related problems on the whole Romanian industry. This process implies significant costs and imposes structural changes on the Romanian economy.

Water *policy instruments* currently used in Romania[14]
There are two basic types of permits: environmental permits (i.e., permits for operation) and environmental agreements (i.e., permits for new investment). Permits are issued for a maximum of five years. The procedure and activities subject to permitting have been introduced by the Environmental Framework Law (No. 137/1995). Prior to the issuing of a permit, an environmental impact assessment should be carried out. The basic procedure (i.e. public consultation) is set out in the Framework Law. The permits' requirements are established by the Inspectorates for Environmental Protection on a case-by-case basis. In some specific cases of water use, the Romanian Waters National Company issues an additional technical opinion.

In Romania there is a unitary economic mechanism for the water management products and services, which consists of: prices; tariff; penalties; and allowances (bonus) – water charges. The tariffs are levied on a set of emission charges on water pollution aimed at reducing the pollutant substances in the river flows at the limits set by the law. If the limits are exceeded, fines or penalties are levied. The penalties are levied for the non-compliance with the permits or contracts, both for water intakes and discharges for wastewater. The purpose is to reduce the environmentally harmful impacts of certain activities and to enforce the users to respect the provisions of the permits.

[13] We mention the ones related to water quality: Council Directive No 98/83/EC on the quality of water intended for human consumption (Romania requests a transition period of 15 years, until 2022); Council Directive No 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources (Romania requests a transition period of 7 years, until 2014).

[14] General framework, not non-point source pollution abatement focused.

There are also water pollution non-compliance fees and financial mechanisms for the completion, modernisation and rehabilitation of water quality improvements (water supply, wastewater treatment plant, sewage systems and networks, etc.) These mechanisms include state subsidies, government-guaranteed loans and exemption from import duties on environment technologies. The Water Law 107/1996 and Government Decree GD 1001/1990 deal with pricing policy for all sectors. These policies are, however, under review and new methodologies are being elaborated for the more efficient allocation of water.

Three charging systems for waste disposal are applied: for households (a fee per household, based on family size); for industry and other waste producers (a fee per ton of waste generated) and for disposal at public disposal sites and landfills (a charge per ton dumped). There are no special charges for hazardous waste; the charge for 'normal' waste is applied. Waste disposal standards are much below EU standards and have to be updated.

A series of new instruments are being considered by the Ministry of Waters and Environmental Protection, although not yet adopted. The instruments include flood protection fees and dam protection and enhancement fees, fertiliser and pesticide product charges. The Ministry is also exploring the introduction of emission trading and the trading of effluent discharge permits (which would enable industry and municipal sewage treatment plants to trade Biochemical Oxygen Demand (BOD), nitrogen and phosphate discharges). Further measures are also under consideration, such as an increase in effluent tariffs based on quantities and distinguishing between various types of suspended and discharged substances, the improvement of penalty systems to further discourage non-compliance and the re-introduction of deposit refund systems.

3 SUSTAINABLE AGRICULTURAL POLICY AND INSTITUTIONAL RECOMMENDATIONS

There are several types of policies to deal with NPS abatement and aiming at sustainable agriculture. As discussed above, policy instruments that are based on the direct regulatory approach - typically taking on the form of ambient tax/subsidy policy schemes - are politically less acceptable in the case of Romania due to the separation between behaviour and penalty.

As regards the indirect regulatory approach, it would be difficult to use of estimated emission charges & standards and of marketable emissions permit systems to deal with agricultural NPS. There are no models applied in Romania that could provide accurate estimates of the complex fate and transport of most agricultural pollutants, but accurate proxies are necessary if this indirect approach shall receive political legitimacy. Even if the estimates were accurate, the costs of regularly applying these complex models, particularly in terms of data collection, would be so large as to outweigh any gains. The diffuse nature of agricultural pollution makes the use of conventional tradable permits infeasible, therefore they have been modified to a tradable permit system on polluting inputs and a point/non-point source trading scheme. Neither of them can be applied in the case of small farms in Romania due to limitations of the monitoring systems.

Taking the results of our case study into account as well as farmers' characteristics, types of pollution and general developments of Romanian agriculture and rurality during transition, and having in view the current and forecasted developments of the Euro-

pean Union Common Agricultural Policy, we make the following policy recommendations for a sustainable agriculture:

- Create incentives for the farmers to adopt best management practices at farm level (environmentally friendly); these would include reduction of barn waste, animal waste management (manure storage and management), diversions, grazing land protection. With the view to the characteristics of the Romanian farmers (as presented in our results of the previous research phases), carrot approach would be more suitable than the stick one.

  Therefore, we suggest establishing water quality incentive projects to provide financial assistance for adopting alternative management systems. Targeting programs to regions where agriculture is the primary source of environmental impairment is one of the most important ways of enhancing program cost-effectiveness. This depends on conditions of natural resources, gravity of those conditions, expected improvements, resources from project activities, societal benefits, likely producer participation, and availability of local resources. These types of projects should allow for an adequate timeframe to overcome constraints to adoption and the lags between on-field changes and off-site effects. Farmers must be convinced that there is a problem to be addressed, learn about alternative management practices, adopt the practices, and successfully implement them.

- Design local participatory strategies to co-interest agricultural producers in reducing agricultural NPS pollution. One aspect of the participatory issues would relate either to subsidies/direct support to farmers, who would adopt environmentally friendly agricultural practices, or to state environmental regulations if the problems would not be solved through voluntary NPS control measures. It has been proved for many categories of environmental problems that implementing environmental policies through responsible groups can be more effective or less costly than through individuals. Such approaches may be the most appropriate for dealing with the many environmental issues that are predominantly local in nature.

  The motivation for farmers to form or join environmental co-operatives is in most cases related to protecting the value of their farm assets and avoiding 'burdensome' regulations. The farmers should be convinced that, by voluntary action, they would more likely achieve satisfactory locally acceptable solutions to pollution problems than would some outside authority. The most common activity has been to work together in preparing farm plans that usually take the shape of a 'whole farm approach', encouraging farmers to consider all the environmental, economic and sociological factors that impact the sustainability of their farms.

  Considering the process of environmental internalisation from a dynamic perspective, voluntary approaches are particularly appropriate as transitional measures, especially in situations where demands for changes in environmental performance are being imposed for the first time. The technology is usually underdeveloped and, moreover, the information available to environmental agencies is usually poor.

  The emergence of voluntary farm community groups in several countries appear to have been prompted by one or more of the following motives (OECD, 2001):
  - concern about declining farm profitability;
  - increasing awareness of the linkages between certain aspects of ecological sustainability and farm financial sustainability;
  - fear that solutions to problems of sustainability, in general, and pollution, in particular, would be imposed by a central authority, combined. This fear goes

along with the confidence within the groups that by taking their own initiative they would be more likely to achieve satisfactory, locally acceptable results than if they were simply to wait for the government to impose a solution.

This reasoning is closely linked to the rationale of the farmers in our case study area, proceeding from the appropriateness of supporting voluntary action instead of applying control and command policies. But the effectiveness of the voluntary approach is critically dependent on the credibility of the understanding and the ability of government to monitor performance. Moreover, the suitability of participatory approaches may be limited by the motivation of farmers to participate in such activities, and the environmental issues they are both willing to address and capable to address effectively.

- Support local research on the environmental and economic performance of best management practices. Farmers tend to be sceptical about practices implying national standards when there is no local history of use. Alternative practices new to an area need to be locally field tested so that farmers can see the environmental and economic benefits first-hand.

- Design an effective information and education program for farmers on local environmental problems and the impacts their operations have on these problems; make results available to the community to enhance public education and contribute to more effective management of water quality problems in the future. The development of the existent agricultural knowledge system (regional agricultural consultancy agency) would prove a useful educational tool. If farmers neither believe that there is a water quality problem nor think that the water quality problem is caused by agriculture, education programs must both educate them about water quality issues and assist them in recognising the ways in which their farming practices contribute to the problem.

- Make available a full range of education, technical, and financial assistance (USDA, 1997). There are a number of constraints to farmers adopting alternative management practices that cannot be fully addressed by a single type of assistance. Education can inform producers about innovative practices, technical assistance reduces the private cost of obtaining information about a particular practice on a particular farm, helps provide managerial skill that may be lacking, and financial assistance helps overcome a short planning horizon, allows the farmer to accept greater risk beyond the short run, and provides an incentive to try something new.

- Propose strategies for a better inter-agency co-operation (e.g., the relationship between environmental protection agencies, agricultural consultancy agencies, agricultural directorates, farmers associations, local authorities, local NGOs). Local groups assess natural resource conditions and needs, identify environmental priorities and resources available, develop proposals for priority areas, and make program policy recommendations. Making use of farmers' site-specific knowledge in planning processes at the regional level can help improve coherence between farm-level actions and regional initiatives.

- Reform agricultural policies in ways that contribute to reduce distortions in the use and quality of water resources, and enhance environmental benefits associated with water use in agriculture.

- Establish transparent water management policies in order to identify the full economic, environmental and social costs and benefits of water use in agriculture, and any associated transfers between farmers, taxpayers and consumers.
- Strengthen the legal framework and institutions to promote greater efficiency in the allocation and use of water; clarify water rights systems; encourage farmers, water service providers and users to form associations aimed at improved water management.
- Improve the existent information on the agri-environmental processes involved in the linkages between agriculture, water and environment, such as by funding public and private research and development; build a better body of knowledge at public and decision-making levels about the hydrological and environmental aspects of water systems, and the relationship between water resources and water quality and policies.

4 CONCLUSIONS

Political acceptability of any environmental policy in agriculture is influenced, inter alia, by the composition of the polluters. In Romania, environmental problems arising from agricultural production are caused by a large number of farms, the majority of which are family-owned holdings with low financial means. Given the general need to continue to support these farms and the influence of the farm sector to get such support, any potential policy instrument will need to consider such political realities.

The non-point nature of most agricultural externalities limits the applicability of conventional policies used to combat point-source externalities. NPS pollution problem requires the use of other than standard instruments of environmental policy as incentives for dischargers to follow socially desirable policies.

No single economic instrument emerges as the ideal choice for reducing pollutants from agricultural production. Each instrument is appropriate under certain circumstances, but none of it by itself adequately addresses the informational and uncertainty problems associated with diffuse-source pollution prevalent in agriculture.

Designing local participatory strategies to co-interest agricultural producers in reducing agricultural NPS pollution, together with related policy recommendations for a sustainable agriculture are most appropriate having in view the insights of our case study.

The small rural community where our case study took place is one of the many with similar economic, social and environmental background in Romania. Therefore, carrying out similar surveys in other rural areas would permit an extended evaluation of rural population's concern as regards environmental issues, would allow analysing and deciding upon the best policy and institutional tools to be applied locally and regionally for accomplishing a sustainable agricultural development.

Replicating our survey not only in space, but also in time would make available time-series data, which would allow assessing the outcomes of the proposed sustainable policies, i.e. the evaluation of environmental quality and general rural community welfare trends.

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