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Environmental Management in Bulgarian Agriculture – Risks, Modes, Major Challenges

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This paper presents a new framework for analysis and improvement of environmental management based on the achievements of the New Institutional Economics. Following that we first, identify major environmental problems and risks in Bulgarian agriculture. Next, we access efficiency of market, private and public modes of environmental management employed in sector. Finally, we give prospects and major challenges of environmental management in conditions of EU Common Agricultural Policy implementation.

Our analysis shows that post–communist transition has changed the state of the environment and brought some new challenges such as: degradation and contamination of farmland, pollution of surface and ground waters, loss of biodiversity, significant greenhouse gas emissions. Badly defined and enforced environmental rights, prolonged process of privatization of agrarian resources, carrying out farming in structures not motivating in long–term investment, low appropriability of certain environmental rights and high uncertainty and assets specificity of environment related activities, all they were responsible for failure of market and private modes of environmental management. Strong needs for public intervention have not been met by effective government, community, international assistance intervention. Consequently agrarian sustainability has been severely compromised.

Assessment of likely impact of EU CAP implementation under "Bulgarian" conditions indicates that the main beneficiary of new support measures will be biggest operators. Income, technological and environmental discrepancy between different farms, sub–sectors and regions will be further enhanced. Field survey of different type dairy farms from two major milk producing regions supported analysis. Most farms have no sufficient capacity for adaptation to new EU requirements for dairy sector. Bulk of milk producers expect no positive impact of CAP measures on their income, volume and technology of production, investment level, product quality, access to public programs, improvement of environmental care and animal welfare, development of infrastructure, possibilities for new income generation, and social status of farm households.

INTRODUCTION

There have been a number of studies on specific environmental problems in agriculture of transitional countries from Central and East Europe (Bentcheva and Georgiev, 1999; Gatzweiler and Hagedorn, 2003; Sumelius, 2000). With few exceptions (Bachev, 2007b) there are no comprehensive studies on up to date environmental problems in Bulgarian agriculture, and specific modes of environmental governance during transition and EU integration.

In this paper we incorporate the new developing interdisciplinary New Institutional and Transaction Costs Economics based on the contributions of Coase (1960), Furuboth and Richter (1998), North (1990), and Williamson (1996). The comparative institutional analysis is employed to evaluate potential of diverse governing modes to deal with environmental problems and risks, protect absolute and contracted eco–rights, stimulate eco–investment, intensify and coordinate eco–activities etc. Firstly, we present a new framework for analysis and improvement of environmental management; next, we identify the major environmental problems and risks in Bulgarian agriculture; third, we access efficiency of market, private and public modes of environmental management employed in the sector; and finally, we give prospects and major challenges of environmental management in conditions of EU CAP implementation.

FRAMEWORK OF ANALYSIS

Environmental management means governance of environment preservation and environment improvement activities of various agents. It requires a system of coordination and stimulation of eco–actions at different levels (individual, group, community, regional, national, and transnational). Environmental preservation and improvement could be achieved through a range of market, private, collective, public and hybrid modes of governance. Efficiency of individual modes of management is quite different in the specific institutional and natural environment of each community, industry, region, and country. Depending on the particular form(s) of governance individual societies achieve quite unlike results in environmental conservation and enhancement.

The New Institutional and Transaction Costs Economics gives a new insight on the comparative efficiency of divers market, private, public and mix modes of governance, and their potential to deal with various environmental problems and risks (Bachev, 2004; Bachev, 2007a). It requires embracing all modes of governance affecting individuals "environmental" behavior:

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–institutional environment ("rules of the game") – that is the distribution of rights between individuals, groups, communities, and generations, and the system(s) of enforcement of these rights. Diverse rights are defined by formal and informal rules (laws, tradition, culture, religion, ethical norms), and enforced by the state, convention, community pressure, or self–enforcement;

–market modes – decentralized initiatives governed by the free market price movements and competition (e.g. production and trade of organic products and origins, system of fair–trade);

–private modes ("private order") – private initiatives, and contractual and organizational arrangements governing relationships between private agents (e.g. voluntary individual/collective actions, codes of professional behavior, environmental contracts, eco–cooperatives etc.);

–public modes ("public order") – various forms of third–party public (Government, community, international) intervention (public regulation, taxation, assistance, funding, provision);

–hybrid forms – combining features of market, private and public modes (e.g. state certifies producers and enforces organic standards and thus intensifies development of organic markets).

Generally organization of (any) environmental activity could be managed through a variety of alternative modes. For instance, "supply of environmental preservation service" could be a part of the main or a specialized activity of farm and governed as: voluntary activity; though private contracts with interested/affected agents; interlinked contract with a supplier/buyer; though a cooperation (collective action) with other agents; though market or assisted by a third party trade with special eco–products; though a public contract specifying farmer's obligations and compensation; though a public order (regulation, taxation, quota); within a hierarchical public agency, or by a hybrid form. Furthermore, such actions could be carried out as charity, non–for–profit, profit–making, or compulsory (mandated by the state or another authority) activity.

Efficiency of various governing modes is quite different since they have unlike comparative advantages and costs. Free market has big coordination and incentive advantages ("invisible hand", "power of competition"), and provides "unlimited" opportunities to benefit from specialization and exchange. However, market governance could be associated with high costs due to the high uncertainty, possibility of opportunistic behavior, unilateral dependency, and/or low appropriability of rights. The special contract form permits better coordination, safeguard of investment, and intensification of exchange. However, it may require significant costs for specification of contract provisions, adjustments with constant changes in conditions, enforcement and disputing of negotiated terms etc. The internal organization allows a greater flexibility and control of activity (direct coordination, adaptation, enforcement, and dispute resolution by a fiat). However, mitigation of most environmental problems requires extension beyond family borders which commands significant costs for initiation, development, and management (collective decision–making, control of opportunism in coalition, supervision and motivation of hired labor).

We have to access specific coordinating, stimulating, enforcing features of each governing mode taking into account related transaction costs. Positive transaction costs (for protection and exchange of property rights) are associated with any form of governance. If property rights were well–defined and transaction costs were zero then effective environmental management would be done through any form of governance – free market, private organization, collective decision making, or a nationwide hierarchy. Then basic environmental rights would be easily protected and all information for optimization of resources (eco–demand, available technologies) costlessly obtained. Individuals would costlessly trade rights they posses in mutual benefit until exhausting potential for sustainable development (maximum growth in productivity, conservation and improvement of environment etc.). However, when property rights are not well defined and/or transaction costs are significant, then specific structure of (eco) management is crucial for the effective allocation of resources. Accordingly the comparative institutional analysis becomes an important tool for understanding and improvement of dominating system of governance.

Defining the comparative level of transaction costs is a key for accessing the efficiency (potential, limits) of different modes of governance. Rational agents will tend to use/invent such mode of governance of their activities which is the most efficient in specific institutional, economic and natural environment, and have the lowest costs comparing to all feasible alternatives (Williamson, 1996). The analysis is to focus on comparative potential of available governing modes to economize on total (production and transaction) costs as well as identification of critical factors of transaction costs – institutional, behavioral (bounded rationally, tendency for opportunism, risk aversion), dimensional (frequency, uncertainty, assets specificity, appropriability of transactions), technological etc. Furthermore, the dominating ("efficient") modes of governing of agrarian activities will contribute to a different extend to sustainable (including environmental) development (Bachev, 2004). Therefore, any deficiencies in that respect are to be identified.

Persistence of serious environmental problems is a credible indicator that an effective system of environmental governance is not put in place. It shows that needed environmental preservation activity is not carried at effective (socially desirable) scale. That is why a first step in the analysis and the improvement of environmental management is the identification of existing environmental problems and risks (Figure 1). Modern science offers precise methods to: (1) detect environmental problems and risks associated with agriculture, and (2) improve farming practices to mitigate environmental hazards caused by agriculture and other (man–made or natural) factors.

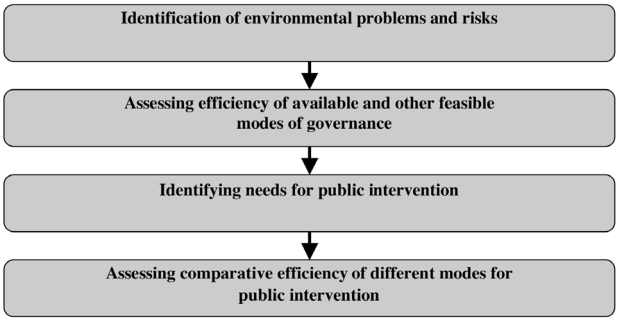

Fig. 1. Steps in analysis and improvement of environmental management.

Secondly, we have to identify the spectrum of specific (market, private, public and hybrid) modes of governance employed in farming, and access the extend they are contributing to effective environmental management, and identify the major institutional, behavioral, transaction costs etc. factors for their "eco–failures". At this stage we also have to estimate the potential of existing and other feasible governing structures to deal with emerging environmental problems and risks.

Next, deficiencies in dominating (market, private, public) structures to solve existing and emerging eco–problems (risks) are to be specified, and the needs for (new) public intervention to improve eco–management identified. For instance, market forms (organic farming) or private initiatives (eco–cooperatives) may need a long time to emerge or may never solve an eco problem. A public intervention could be more efficient – introduction of regulation (norms, methods) on chemical use in farming could prevent soil, water, and air contamination and preserve biodiversity.

Finally, feasible modes of public involvement in environmental management have to be identified, their comparative efficiency assessed in terms of contribution to sustainable development and minimization of transaction costs, and the most efficient one(s) selected.

Very often market and private sector failures are caused by unspecified or badly specified private rights (low appropriability, over–regulation). In such cases the most effective government intervention would be introduction (enforcement) of new private property rights – on biological and environmental resources; on intellectual agrarian property, organic and origin products; tradable quotas for polluting etc. That would induce market and private incentives (and governance), and carry out certain environmental activities effectively.

In other instances, it would be more efficient to put in place regulations for trade and utilization of resources/products – standards for product quality, eco–performance, animal welfare; norms for using natural resources, GM crops, and (water, soil, air, comfort) contamination; ban on application of certain chemicals/technologies; mandatory training and licensing of farmers etc. Sometimes, incentives and restrictions of tax system would be the most effective form for intervention. Environmental taxation on emissions or products (inputs/outputs of production) is broadly applied to reduce use of harmful substances. In other cases, public assistance to private organizations is the best mode for intervention, and public funding (subsidies) for environmental actions is most commonly used instrument for improving eco–performance of farms.

Often providing public information, recommendations, training to farmers, agrarian agents, and consumers are the most efficient. In some cases, pure public organization (in–house production, public provision) will be the most effective as it is in the case of agrarian research and education, agro–market information, agro–meteorological forecasts, border sanitary and veterinary control etc.

Usually individual modes are effective if they are applied alone with other modes of public intervention. Necessity of combined intervention (governance mix) is caused by the complementarities of different forms; possibility to get an extra benefits (e.g. "cross–compliance" requirement for participation in support programs); particularity of environmental problems; specific critical dimensions of governed activities; uncertainty (little knowledge, experience) associated with the impact of new forms; administrative capability of the Government to organize and finance different modes; and not least important the dominating (right, left) policy doctrine. Besides, level of public intervention (governance) depends on the kind of environmental problem (risk). There are public involvements which are to be executed at local (community, regional) level, while other requires nationwide governance. Additionally there are eco–activities, which are to be initiated and coordinated at international (regional, European Union, worldwide) level due to the strong necessity for trans–border actions (needs for cooperation in eco–resources management, exploration of economies of scale/scope, governing of spill–overs)[2] or consistent (national, local) government failures. Very frequently an effective environmental management requires multilevel governance with system of combined actions at various levels involving a diverse range of actors.

At this final stage our comparative institutional analyses also let us predict likely cases of public failures due to impossibility to mobilize sufficient political support and necessary resources and/or ineffective implementation of "good" environmental policies. Since public failure is a feasible option its timely detection permits foreseeing the persistence/rising of certain environmental problems and informing public about associated risks.

ENVIRONMENTAL PROBLEMS AND RISKS IN BULGARIAN AGRICULTURE

The post–communist transformation of agriculture has changed significantly the state of eco–situation and

[2] Recent epidemic of avian infection is a good example in that respect.

brought to life a number of new challenges. Total amount of used chemicals has declined considerably (Figure 2). Comparing to 1989 the application of chemical fertilizers and pesticides per hectare now represents merely 22% and 31% respectively. That sharp reduction has diminished drastically the risk of chemical contamination of soils, waters, and farm produce. However, a negative rate of fertilizer application of N, P and K intakes dominates (Figure 3). Consequently, an average of 23595.4 *t* N, 61033.3 *t* $P_2 0_5$ and 184392 *t* $K_2 0$ have been irreversibly removed annually from soils since 1990. Furthermore, an unbalance of nutrient components has been typical with application of 5.3 times less phosphorus and 6.7 times less potassium for the nitrogen used. Moreover, monoculture or simple rotation is constantly practiced by most large farm managers concentrating on few profitable crops (sunflower and wheat). All these practices further contributed to deterioration of soil quality and soil organic matter content in the country.

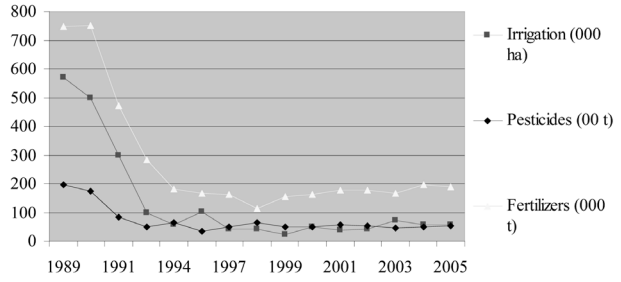

Fig. 2. Use of chemicals and irrigation in Bulgarian agriculture.
Source: National Statistical Institute

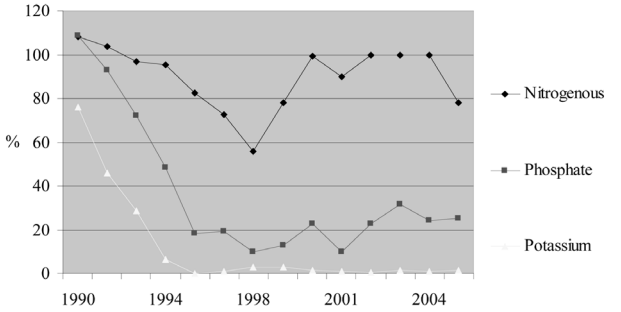

Fig. 3. Rate of fertilizer compensation of basic elements in Bulgarian agriculture.
Source: Ministry of Agriculture and Forestry

There has been considerable increase in agricultural land affected by acidification (Figure 4). Soil acidification occurred as a result of a long–term application of specified nitrate fertilizers and unbalanced fertilizer application. After 1994 the percentage of acidified soil began to decrease, however, in recent years there is a reverse tendency along with the gradual augmentation of use of nitrates. Salt affected land has doubled after 1989 but it is an insignificant part of the total. During the entire period no effective measures have been taken to normalize soil acidity and salinity.

Erosion has been a major factor for land degradation. Around one–third of the arable lands are subjected

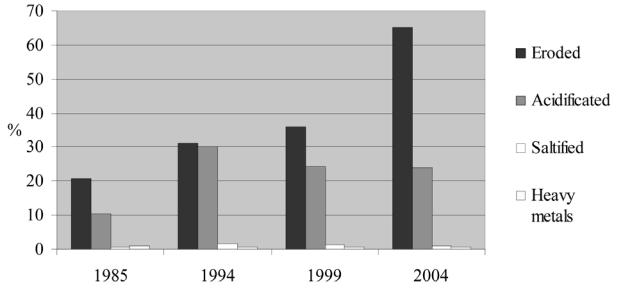

Fig. 4. Share of degradated agricultural lands in Bulgaria.
Source: Executive Environment Agency

to wind erosion and 70% to water erosion. Since 1990 water and wind erosion affect between 25–65% of farmland and total losses varies from 0.2 to 40 *t/ha* in different years (EEA). Progressing level of erosion is a result of extreme weather but it has been also adversely affected by dominant agro–techniques, deficiency of anti–erosion measures, and uncontrolled deforestation.

Irrigation impact on erosion and salinization has been significantly diminished after 1990. There has been a sharp reduction of irrigated farmland (Figure 2) as merely 2–5% of existing irrigation network has been practically used. Moreover, a considerable physical distortion of irrigation facilities has taken place affecting 80% of canals (MAF). The decline in irrigation has had a direct negative effect on crop yields and structure of the crop rotation. In addition, irrigation has not been effectively used to counterbalance the effect of global worming on farming (extension of farm season and increased water requirements) and further degradation of agricultural land.

The areas of agricultural land industrially polluted by heavy metals by industrial wastes have fallen after 1990 (Figure 3), they are not significant, and only about 30% of the affected soils need special monitoring.

Around a quarter of riverlength does not meet the normal standards for good water quality (MAF, 2006). Nitrates content in ground water have been decreasing, and now only 0.7% of samples exceed the ecological limit value (EEA, 2006). Nevertheless, monitoring of water for irrigation shows that in 45% of water samples, the nitrates concentration exceeds the contamination limit value 2–20 folds. Nitrates are the most common polluter of underground water – for the last 5 years with a slight excess over the ecological limit. Nitrate Vulnerable Zones cover 60% of the territory of the country and less than 7% of agricultural land use. The lack of effective manure storage capacities and sewer systems in majority of farms contribute significantly to the persistence of the problem. Merely 0.1% of livestock farms possess safe manure–pile sites, around 81% of them use primitive dunghills, and 116 thousands have no facilities at all (MAF, 2003). Major part of post–communist livestock is carried out by a great number of miniature and primitive holdings often located within village and town borders. It contributes significantly to pollution of air, water and soils, and disturbing population comfort (unpleasant noise, odor, dirty roads).

Serious environmental challenge has been caused by deficiency in storing and disposal of the out–of–dated or prohibited pesticides of ancient public farms. Currently those chemicals account for 11079 *t* and a good proportion of them are not stored in safe places. As much as 82% of all polluted localities in the country are associated with these dangerous chemicals (EEA, 2006). Besides, illegal garbage yards in rural areas have noticeably increased reaching 4000, and farms contribute extensively to waste "production" with both organic and industrial materials.

There have been significant degrading impacts of agriculture on biodiversity. Policies toward intensification and introduction of foreign varieties and breeds during communist period, and lack of any policy toward protection of biodiversity afterwards have been responsible for that. All 37 typical animal breeds were endangered during last decades as 6 among them are irreversibly extinct, 12 are almost extinct, 16 are endangered, and 3 are potentially endangered (MEW, 2006).

Since 1990 a considerable portion of agricultural lands have been left uncultivated for a long period of time (or entirely abandoned) which caused uncontrolled "development" of some species and suppressing others. Some of the most valuable ecosystems (natural and semi–natural grassland) have been severely damaged. Part of meadows has been left under–grazed or under mowed, and intrusion of shrubs and trees into the grassland took places. Some of fertile semi–natural grasslands have been converted to cultivation of crops, vineyards or orchards. This has resulted in irreversible disappearance of plant species diversity. Meanwhile, certain public (municipal, state) pastures have been degraded by the unsustainable use (over–grazing) by private animals. In addition, reckless collection of some valuable wild plants and animals has led to destruction of all natural habitats. Above and beyond, some genetically modified crops have been introduced without an independent assessment of possible hazards for traditional and organic production and human health, or providing appropriate safeguards and information.

There has been a significant reduction of green–house gas emissions from agriculture since 1988 (Figure 5). After 2000 there is a reverse trend toward increase in agricultural GHG. The sector has been a major ammonia and methane source accounting for 66% and 25% of the national.

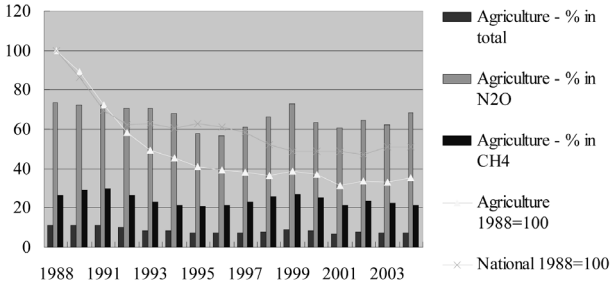

Fig. 5. Trend and components of green–house gas emissions from Bulgarian agriculture.
Source: Vassilev *et al*., 2006

EFFICIENCY OF MARKET, PRIVATE AND PUBLIC MODES OF ECO–MANAGEMENT

Since 1989 Bulgarian agriculture has seen a fundamental transformation of the property rights and institutional structures (Bachev and Tsuji; Bachev and Kagatsume, 2002a). New private rights on major natural (farmland, forestry, water) resources has been introduced or restored, markets and trade liberalized, modern public support and regulations introduced. During most of the transition diverse environmental rights (on clean and athetie nature; preservation of natural resources, biodiversity) were not defined or badly defined and enforced (Bachev, 2007b). Out–dated system of public regulations and control dominated until recently which corresponded little to contemporary needs of environmental management. There was no modern system for monitoring the state of soil, water, and air quality, and credible information on the extent of environmental pollution and degradation. There was no social awareness of concept of sustainable development nor any "needs" to include it in public policy and private/community agenda.

In the last few years before EU accession, country's laws and standards were harmonized with the immense EU legislation[3]. Community acquis have introduced a modern framework for the environmental governance including new rights (restrictions) on protection and improvement of environment, preservation of traditional varieties and breeds, biodiversity, animal welfare etc.[4] However, a good part of these new "rules of the game" are not well–known or clearly understood by public authorities, private organizations and individuals. There is not enough readiness for effective implementation of the new public order because of the lack of experience in agents, adequate administrative capacity, and/or practical possibility for enforcement of novel norms (lack of comprehension, deficient court system, widespread corruption). In many instance, the enforcement of environmental standards is difficult (impossible) since the costs for detection and penalizing of offenders are very high, or there is no direct links between the performance and the environmental impact. For example, although the burning of fields has been banned for many years since it is harmful for the environment yet this practice is still widespread in the country.

The harmonization with EU legislation and emergence of environmental organizations also generate new conflicts between private, collective and public interests. However, the results of public choices are not always for the advantage of effective eco–management. Strong lobbying efforts (profit–making interests) of particular

[3] All were adapted before January 1, 2007 and contained 26000 pieces of legislation in 80000 pages.
[4] References to huge EU legislation in the area are at: http://ec.europa.eu/policies/index_en.htm

groups have led to 20% reduction in numbers and 50% reduction in area of network for preservation of wild flora, fauna and birds NATURA 2000.

During much of the transition newly evolving market, private and hybrid structures have not been efficient in dealing with various environmental issues. Privatization of farmland and assets of ancient public farms took almost 10 years to complete[5]. During a good part of that period, the governance of critical agrarian resource was in ineffective and "temporary" structures (Privatization Boards, Liquidation Councils, Land Commissions). Sales and long–term lease markets for farmland did not emerge until 2000, and leasing on an annual base was a major form for the extension of farm size. That was combined with a high economic uncertainty and inter–dependency of agrarian assets (Bachev, 2006). Consequently, most of farming activities has been carried out in less efficient and unsustainable structures such as part–time and subsistence farms, production cooperatives, and huge business farms based on provisional lease–in contracts (Table 1). Specialized livestock farms comprise a tiny portion of all farms while 97% of the livestock holdings are miniature "unprofessional farms" breading 96% of goats, 86% of sheep, 78% of cattle, and 60% of pigs (MAF, 2005). Market adjustment and intensifying competition has been associated with a significant decrease in unregistered and cooperative farms since 1995.

Dominating modes for carrying out farming activities have had little incentives for long–term investment to enhance productivity and environmental performance (Bachev, 2006). The cooperative's big membership makes individual and collective control on management very difficult. That focuses managerial efforts on current indicators, and gives a great possibility for mismanagement of cooperatives. Besides, there are differences in investment preferences of diverse members due to non–tradable nature of the cooperative shares. Given the fact that most members are small shareholders, older in age, and non–permanent employees, the incentives for long–term investment for land improvement and renovation of assets have been very low.

Table 1. INumber, size and importance of different type farms in Bulgaria

	Unregistered	Cooperatives	Agro–firms	Total
Number				
1995	1772000	2623	2200	1777000
2000	755300	3125	2275	760700
2005	515300	1525	3704	520529
Share in number (%)				
1995	99.7	0.1	0.1	100
2000	99.3	0.4	0.3	100
2005	99.0	0.3	0.7	100
Share in farmland (%)				
1995	46.5	40.7	12.8	100
2000	19.7	61.6	18.7	100
2005	33.5	32.6	33.8	100
Average size (ha)				
1995	1.3	800.0	300.0	2.8
2000	0.9	709.9	296.7	4.7
2005	1.8	584.1	249.4	5.2

Source: National Statistical Institute

On the other hand, small–scale and subsistent farms possess insignificant internal capacity for investment, and small potential to explore economy of scale and scope (big fragmentation and inadequate scale). Besides, they have little incentives for non–productive eco–investment. Moreover, there has been no administrative capacity and political will to enforce quality and eco–standards in that vast informal sector of the economy. Likewise, larger business farms operate mainly on leased land and concentrate on high pay–off investment with a short pay–back period. In general, survivor tactics and behavior rather than a long–term strategy toward farm sustainability has been common among the commercial farms.

During the entire transition phase the agrarian long–term credit market was practically blocked due to the big institutional and market uncertainty, and high specificity of farm investments (Bachev and Kagatsume, 2002b). In addition, newly evolving Bulgarian farming has been left as one of the least supported in Europe (OECD, 2000). Public aid was mainly in the form of preferential short–term credit for the grain producers. Later additionally contributed to unilateral N fertilization by the biggest producers having access to the programs. Despite the considerable progress in the public support since 2000 the overall support to agriculture is considered very little (Bachev and Kagatsume, 2006). In addition, only a small proportion of the farms benefits from some form of public assistance most of these farms being large enterprises from regions with less environmental problems. Basically, a publicly supported farm must meet the requirements for good environmental performance. However, the minor amount of actually supported farms, and the deficiency of clear criteria for eco–performance, and the lack of effective control, all have contributed barely to overall improvement of environmental situation in the country. Which is more, "Agro–ecology" measures was not introduced until 2007.

Hence, since 1990 all "environmental management" has been left on farmers good will and market signals. Market governance (competition, marginal rule) has led to significant decline in crop and livestock productions (Figure 6). Smaller size and owner operating nature of most farms avoided certain problems of large public enterprises from the past and revived traditional (more sustainable) technologies, varieties and products. A by–product from market and private governance was a considerable desintensification of agriculture and ease of environmental pressure. Good part of farm produce got organic character obtaining a good reputation for high quality and safety. In additions, private mode introduced incentives and possibilities for integral environmental management (revival of cultural heritage, anti–

[5] Until 1989 farming was carried in few numbers of large public farms averaging tens of thousands of ha.

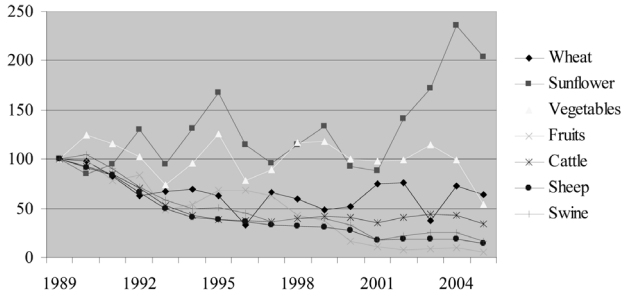

Fig. 6. Dynamics of major crop and livestock productions in Bulgaria (1989=100).
Source: National Statistical Institute

pollution, esthetic, comfort measures) profiting from inter–dependent farming, fishing, agro–tourism and recreation, processing, trade. However, improved environmental stewardship to owned resources did not extend to the nature in general. Private management is often associated with less concern to manure and garbage management, over–exploitation of leased and common resources, and contamination of air and groundwater.

A market driven organic farming has emerged in recent years as well (Figure 7). It is a fast growing approach but it is restricted to 92 farms and covers merely 0.23% of the Utilized Agricultural Area (MAF, 2006). In addition, 27 881 ha has been approved for gathering wild organic fruits and herbs. There are also 5 organic livestock farms with 722 animals and 269 bio–apiaries with 23883 bee families. The organic form has been introduced by business entrepreneurs who managed to organize and fund this new venture arranging needed independent certification (by foreign certification bodies) and finding potential buyers for the highly specific output. Produced bio fruits, vegetables, essential oil plants, herbs, spices, and honey are entirely for export since only a tiny internal market for organic products exists. The slow development of organic market is not only because of the higher prices of organic products but also because of the limited consumer confidence in the authentic character of products and certification. Eco–labeling of processed farm products (relying on self–regulation) have also appeared but it is more a part of the marketing strategy of companies rather than a genuine action for environmental improvement.

Since 2001 the assets of public owned irrigation

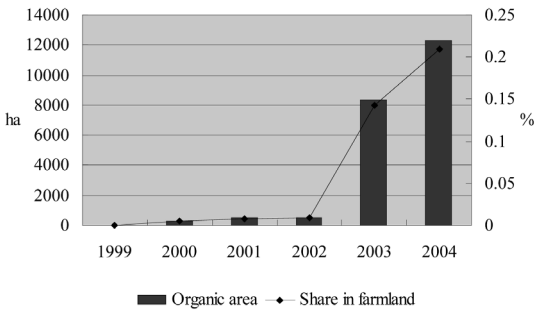

Fig. 7. Development of organic farming in Bulgaria.
Source: Ministry of Agriculture and Forestry

companies were transferred to the newly evolving Water Users Associations. However, expected "boom" in efficiency from a collective management of irrigation activities have not been materialized. That is because of the semi–monopoly situation of regional state water suppliers, little water–users incentives to innovate facilities and expand irrigation, and still uncompleted privatization of state irrigation assets.

Generally, an initiation, development and maintenance of an organization of large group is very costly, and such a coalition is not sustainable for a long time ("free rider" problem). In Bulgaria, the evolution of farmers and environmental associations has been additional hampered by the big number of rural agents and their diversified interests (size of ownership and operation, type of farming, individual preferences, different age and horizon etc.).

There has been need for public intervention but central and local authority involvement has not been comprehensive, sustainable, or related (Bachev, 2007b). Budget of Ministry of Water and Environment accounts for 1.5% of the National and agriculture gets a tiny portion of it (MWE, 2006). Number of public programs has been developed to deal with emerging environmental challenges (eco and biodiversity preservation, proper water management, greenhouse gas emission limitation etc.) National monitoring systems of environment and biodiversity have been set up and mandatory eco–assessment introduced. Nevertheless, public involvement has been insignificant, fragmented and reactive to urgent environmental problems (such natural disasters). The programs are not well coordinated and developed (executed) in a highly centralized manner without involvement of independent experts and stakeholders. In addition, there is considerable deficiency in administrative capacity in terms of staff, qualification, material and financial means. As a result inefficiency in priority setting and implementation, and a minor impact of the public programs prevails. Moreover, a multifunctional role of farming has not been effectively recognized; proper system for its assessment introduced; and provision of a public service "environmental preservation and improvement" funded by the society. Neither, essential public institutions and infrastructure crucial for the sustainable farming development have been built (Bachev, 2007b).

A great number of international assistance projects (funded by the UN EU, World Bank, Foreign Governments, NGOs etc.) have been carried out to "fill the gap" of the government failures. They try to introduce western experiences in sustainable development and make a difference. However, they are limited in scale and unsustainable in time; often not adapted to local institutional environment; and above all with no significant impact. Subsequently, the modernization of Bulgarian farms according to the EU (quality, safety, environmental, animal welfare etc.) standards has been delayed; and growth in farms productivity, competitiveness and sustainability severely restricted; and technological, income and eco–disparity between farms of different type, sub–sectors and regions broadened.

ENVIRONMENTAL MANAGEMENT IN CONDITIONS OF EU CAP IMPLEMENTATION

EU integration and CAP implementation will provide new opportunities for Bulgarian farms (Bachev, 2007b). EU funding alone, which agriculture will receive from 2007 on, will be 5.1 times higher than the overall level of support to farming before acceding[6]. Besides, EU accession introduces a "new order" – strict regulations and control; tough quality, food safety, eco– standards; financial support and protection against market instability. External monitoring, pressure and sanctions by EU will lead to better enforcement of laws and standards. Furthermore, huge EU markets will be opened which will enhance competition and let Bulgarian farms explore their comparative advantages (low costs; quality, specificity and purity of produce). Novel conditions of market competition and institutional restrictions will give strong incentives (pressure) for new investments for increasing productivity and conforming to product, technology and eco–standards. Larger business farms are most sensitive to new market demand and institutional regulations since they largely benefit (or lose) from timely adaptation to new environmental regulations. Besides they have higher capacity to generate resources and find outside funding to increase competitiveness and meet new institutional requirements. The process of adaptation will be associated with appropriate land management and the intensification of production. The later could revive or deepen some of the environmental problems unless pro–environmental governance (public order, regulation) is put in place to prevent that from occurring. On the other hand, small–scale producers and most livestock farms will have hard time adapting to new competition pressure, investment needs, and new food safety, eco, animal–welfare standards (Bachev, 2007b).

Significant part of farms will receive direct payments from EU. In view of the current (low) level of support, direct payments will augment farm sustainability and give means for adaptation to the new standards. However, EU support will benefit uneven different type of farms as no more than 3% of the farms (large cooperatives, agri–firms) will obtain more than 85% of subsidies. Many effective small–scale (vegetables, tobacco) operators and subsistence farms will receive no or only a tiny fraction of direct payments. Besides, specialized livestock farms will not be eligible to receive any payments under "area based scheme". Above and beyond, the bulk of subsidies will go to the more developed regions where the biggest farms and utilized farmland are located.

There will be also significant EU funds for rural development exceeding 4.7 times the relevant pre–accession level. This amount of resources will let more and relatively smaller farms to get access to public support scheme and invest in modernization of enterprises. Furthermore, new essential activities will be effectively funded (commercialization and diversification of farming; organic farming; maintaining biodiversity; environment protection; animal welfare; support for less–favored areas and regions with eco–restrictions). All these will bring additional income for farmers, and increase economic and environmental sustainability. Mostly bigger farms would be able to participate in public support programs because they have superior managerial experience, available resources, possibilities for adaptation to new requirements, potential for preparing and wining projects. Besides, actual system of governance of public programs would less likely change overnight. Therefore, agrarian and rural development funds will continue to benefit largest structures and richest regions; and more abuses will likely take place; and CAP support will not contribute to decreasing economic and eco–discrepancy between farms, sectors, and regions.

CAP implementation will improve eco–performance of farms. There is a mandatory requirement to "keep the farmland in good agricultural and environmental status" to receive direct payments and participate in public programs. Direct payments would likely induce farming on currently abandoned lands, and improve environmental situation and biodiversity. There will be also huge budget allocated for special environmental measures (going beyond "good farming practices") and many farms will likely enroll in respective programs.

CAP measures will affect positively environmental performance of large farms. Namely these enterprises (and big polluters) will be under constant administrative control and severe punishment (fines, losing licenses, ceasing activities) for obeying new standards. Therefore, they will be strongly interested in transforming their activities according to new eco–norms making necessary eco–investments, changing production structures etc. They also will be motivated to participate in special agro–environmental programs, since they have lower costs (potential for exploring economies of scale/scope) and higher benefits from such long–term public contracts.

Experience of developed countries demonstrates that some terms of the specific contracts for environment and biodiversity preservation, animal welfare, keeping tradition etc., all they are very difficult (expensive) to enforce and dispute (Dupraz *et al*., 2004). In Bulgaria the rate of compliance with these standards will be even lower because of the lack of readiness and awareness, insufficient control, ineffective court system, domination of "personal" relations and bribes etc. (Bachev, 2007b). Correspondingly, more farms than otherwise would enroll will participate in such schemes (including the biggest polluters and offenders). Subsequently, the outcome of implementation of that sort of instruments would be less than the desirable

[6] For 2007–2009 the EU funds allocated for "agrarian and rural development", "direct payments", and "market support" accounts for €733 millions, 722 million, and €388 million accordingly. Besides, Bulgarian agriculture will receive resources from the EU Structural Funds and the national budget.

("European") level.

What is more, direct costs/lost income for conforming to requirements of special programs in different farms will vary considerably, and they will have unequal incentives to participate. Having in mind voluntary character of most CAP instruments we should expect that the biggest producers of negative impacts (large polluters, non–compliants with standards) will stay outside of schemes since they would have high eco–enhancement costs. Small contributors would like to join since they would not command great efforts (additional costs) comparing to supplementary benefit. Moreover, Government will not set up high performance standards because of perceived "insignificant" eco–challenges, strong internal political pressure, and possible external problems with EU control (and sanctions) on cross–compliance. Therefore, CAP implementation will probably have a modest positive impact on the environment performance of Bulgarian farms.

Public support (demand) will give push to further development of organic farming, industry's eco–initiatives (labeling, standards, codes of behavior), protected high quality products (Protected Designation of Origin, Protected Geographical Indication, and Traditional Specialty Guaranteed), system of fair–trade, production of wind and manure energy at farm. Significant EU market and lower local costs give strong incentives for investment in organic and specific productions by large enterprises. Small farms have less capacity to put together or find necessary capital and expertise for initiating, developing, certifying and marketing. Besides, coalition (development, management, exit) costs between small producers are very high to reach effective operation level (exploring economies of scale/scope). Therefore, later will either stay out of these new businesses or have to integrate into larger ventures. Assuring effective traceability of origin and quality for small farms is very costly and they are not preferable partner for integrators (processor, retailers, exporters). Besides, internal market for organic and specialized farm products would unlikely develops fast – low income of population, lack of confidence in system of control.

Many semi–professional and professional livestock farms will be less sustainable in a middle–term because of low productivity and non compliance with EU quality, hygiene, animal welfare and eco–standards (Bachev, 2007b). A few numbers of them will be able to adapt through specialized investment for enlargement and conforming to new institutional restrictions. Meanwhile, EU pressure for enforcement of standards in commercial sector will increase and lead to closure or take–over of a greater part of livestock farms. The improvement of manure management and reduction of animals will be associated with a drop of the environmental burden by the formal sector (less over–grazing, manure production and mismanagement). Only few subsistence farms will likely undertake market orientation and extend their scale because of the lack of entrepreneurship, resources, age of farmers, and insufficient demand for farm products (Bachev, 2007b). For authorities will be practically (technically, politically) impossible to enforce official standards in the huge informal sector. Therefore, massive (semi)subsistence farming with primitive technologies, food safety, and eco–standards will continue to exist in years to come.

Economic needs (economizing on scale/scope or interdependency of assets) would bring about a change in size and governance of individual farms and/or evolution of group organization, cooperation, and joint ventures. For instance, big interdependency of activities would require concerted actions for achieving certain eco–effect; high asset dependency between livestock manure (over) supplier and nearby (manure demanding) organic crop farms would necessitate a coordination. Special governing size and/or mode will be imposed by institutional requirements – a mandatory minimum scale of activities is set for taking part in certain public programs (marketing, ecology, organic farming, tradition, cultural heritage); signing a 5 year public eco–contract would dictate a long–term lease or purchase of land etc. Some production cooperatives would profit from their comparative advantages (potential for exploring economy of scale/scope on institutionally determined investment, adapting to formal requirements for support, using expertise, financing and executing projects, complementarily to individual farms, non–for–profit character), and extend activities into eco–projects, eco–services, eco–mediation between members etc.

Hybrid modes (public–private partnership) are much more efficient than pure public forms given coordination, incentives, and control advantages (Bachev, 2007a). Involvement of farmers increases efficiency, decreases asymmetry of information, restricts opportunisms, increases incentives for costs–sharing, reduces management costs. For instance, hybrid mode is more appropriate for supplying non–food services by farmers like preservation and improvement of biodiversity, landscape, cultural heritages. It is determined by farmers information superiority, strong interlinks of activity with traditional food production (economy of scope), high assets specificity to the farm (farmers competence, cite–specificity of investments to farm and land), and spatial interdependency (need for cooperation of farmers at regional/wider scale), farm's origin of negative externalities. Enforcement of most labor, animal welfare, biodiversity etc. standards is often very difficult or impossible. That is particularly truth for the huge informal sector where individual "punishments" do not work well while overall damages from incompliance are immense. That is why policies should be oriented to market orientation of subsistence farms, support and incentives for collective modes, eco–programs for informal farms and groups. Principally, public support to voluntary eco–initiatives of farm and rural organizations (informing, training, assisting, funding) would be more effective than mandatory public modes in terms of incentive, coordination, enforcement, and disputing costs. Furthermore, involvement of farmers, farmers organizations, and interests groups in priority setting and management of public programs at different level is to be institutionalized in

order to decrease information asymmetry, possibility for opportunism, costs for coordination, implementation and control, and increase overall efficiency and impact.

There are still a number of "blank points" in adaptation of EU regulations. For instance, "the whole farm" is a subject of support in agri–environmental measures (organic farming) but its borders are not defined at all in national legislation. That will create serious difficulties since land and other resources of most farms are considerably fragmented and geographical dispersed. Furthermore, all surveys show that many of specific new regulations are not well known by implementing authorities and majority of farmers (Bachev, 2007b). Lack of readiness and experiences would require some time lag until the "full" implementation of CAP. The later will depend on the pace of building an effective public and private capacity, and training (acquiring experience by) bureaucrats, farmers, and other agents. Besides, most farm managers have no adequate training and managerial capability, and are old in age with small learning and adaptation potential. Therefore, there will be significant inequalities in application of new laws and standards in diverse sectors of agriculture, farms of different type and size, and various regions.

There will be enhancing competition for eco–resources between different industries and interests. That would push further overtaking natural resources away from farm governance and change into non–agricultural (urban, tourism, industry) use. Needs to compete for and share resources would deepen conflicts between interests groups, regions, and neighboring states. All that would require special governance (cooperation, public order, hybrid form) at local, national and transnational scales to reconcile conflicts in the benefit of an effective eco–management.

According to the experts the implementation of EU CAP will affect most aversely sustainability of dairy farms (Bachev, 2007b). Our survey of dairy farms[7] has found out that different type farms have unequal capacity for adaptation to new EU requirements and unlike expectation about the probable impact of CAP on their farms. A great number of farms have no sufficient capacity for adaptation to new institutional requirements for the dairy sector (Table 2). That is particularly truth for the small–scale unregistered producers which dominate the sector. Bigger milk producing firms indicate they process a big or good capacity in terms of knowledge on new regulations, skills and knowledge for adaptation, improvement of quality and hygiene, animal welfare, and eco–performance. Potential for adaptation to new eco– and animal welfare requirements of few cooperatives in the area is low. Furthermore, only a third of dairy holdings believe their production capacity corresponds to the modern requirements of competition, pro-

Table 2. Share of farms with big and good capacity for adaptation to new EU requirements for dairy sector (per cent)

Farms capacity	Unregistered	Firms	Coops	Total
Extend of knowledge on new requirements	22.7	63.6	100	38.2
Available skills and knowledge for adaptation	22.7	54.5	100	35.3
Available production capacity	27.3	45.4		32.3
Improvement of quality and hygiene standards	36.4	72.7	100	50.0
Improving animal welfare	31.8	72.7		44.1
Improving environmental performance	31.8	54.5		38.2
Finding necessary investment	9.1	27.3		14.7

Source: survey data

Table 3. Expectation for impact of EU CAP implementation on your farm (percent of farms)

Impact on:	Unregistered		Firms		Total	
	+	−	+	−	+	−
Volume of production	22.7	9.1	36.4	27.3	26.5	14.7
Income of farm	22.7	9.1	45.4	18.2	29.4	14.7
Technology of production	13.6	4.5	54.5	9.1	26.5	5.9
Investment	18.2	4.5	45.4	18.2	26.5	8.8
Products quality	18.2	0.0	45.4	0.0	26.5	0.0
Access to public programs	9.1	4.5	54.5	9.1	23.5	8.8
Improvement of animals care	13.6	0.0	45.4	9.1	26.5	2.9
Improvement of care for environment	9.1	0.0	54.5	9.1	23.5	2.9
Development of infrastructure	9.1	0.0	54.5	9.1	23.5	2.9
Opportunities for new income	18.2	9.1	36.4	9.1	23.5	8.8
Social status of your household	13.6	4.5	45.4	27.3	23.5	11.8

Source: survey data (+) – positive impact; (–) – negatove impact

[7] It was carried out in summer 2007 and included 66 commercial farms from Plovdiv and Pazarjik regions.

ductivity, and justification of improvement of environmental performance and animal welfare. Merely one–seventh of dairy farms have potential (internal capacity, access to outside sources) to fund necessary investment associated with the adaptation to new EU norms and standards.

Most unregistered farms believes that CAP will have neutral impact on their income, volume and technology of production, investment level, product quality, access to public programs, improvement of eco–care and animal welfare, development of infrastructure, possibilities for new income, social status of farm households (Table 3). Bulk of firms expects positive effect in all above directions while coops are merely optimistic for improvement of animal welfare and negative for impact on income and access to public programs. Just under 12% of farms report they do not need to make any considerable changes in order to keep selling milk in new conditions. Almost two–third of them says they have to make progressive changes in hygiene of production, more than 41% in milk quality, and 26% in volume of production and animal care. For more than 35% of farms the adaptation to new requirements for safety, quality, eco–conditionality etc. is associated with "significant costs and investment" and raising "amount and intensity of labor".

CONCLUSIONS

Our analysis has identified major eco–problems and risks in Bulgarian agriculture, specified driving factors for their emergence and persistence, and made more realistic forecast about eco–development. We have proved that contemporary development of Bulgarian agriculture is associated with specific (and quite different from other European states) environmental challenges, some of them reaching up to the point of no or limited management (degradation of soil quality, erosion etc.). That has been a result of the specific institutional and governing structure evolving in the sector during past 20 years. Comparative institutional and transaction costs analysis also shows that implementation of the common EU policies will give unlike results in "Bulgarian" conditions. In short and medium term it most likely will enlarge income, technological and environmental discrepancy between different farms, sub–sectors and regions. In a longer–term environmental hazard(s) caused by the agricultural development will enlarge unless effective public and private measures are taken to mitigate the existing and emerging environmental problems and risks.

Identification of efficiency and complementarities of different modes of environmental governance has a substantial importance for improvement of public policies, and individual and business strategies. Firstly, it helps anticipate possible cases of market, private sector, and public (community, Government, international assistance) failures, and design appropriate modes for public intervention – assistance, regulation, in–house organization, partnership with private sector, fundamental property rights modernization. In particular, it facilitates formulation of specific policies and institutional framework to overcome existing eco–problems, and safeguard against possible eco–risks, and avoid severe eco–challenges in developed countries. Next, it could assist agrarian and rural agents organizational modernization, individual and collective actions in successful adaptation to changing economic, institutional and natural environment.

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