

STATE AND EFFICIENCY OF MANAGEMENT OF AGRO-ECOSYSTEM SERVICES – THE CASE OF BULGARIA

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ABSTRACT: *This paper incorporates New Institutional Economics and analyzes the state and efficiency of management of agro-ecosystem services in Bulgaria. Firstly, it presents framework of analyses of management of agro-ecosystem services including: definition of agro-ecosystem services and its management; specification of management needs and spectrum of governing modes (institutions, market, private, public, hybrid); assessment of efficiency of different form of management in terms of potential to protect eco-rights and investments, assure socially desirable level of agro-ecosystem services, minimize costs, coordinate and stimulate eco-activities, meet preferences and reconcile conflicts of related agents. Secondly, it identifies and assesses the management of agro-ecosystem services in Bulgaria. Transition and EU integration have brought about significant changes in the state and management of agro-ecosystems services in the country. Newly evolved market, private and public governance have led to a significant improvement of a part of agro-ecosystems services introducing modern eco-standards and public support, enhancing environmental stewardship, disintensifying production, recovering landscape and traditional productions, diversifying quality, products, and services. At the same time, the novel eco-management is associated with new challenges such as unsustainable exploitation, lost biodiversity, land degradation, water and air contamination. Moreover, implementation of EU common policies would have no desired impact on agro-ecosystem services unless special measures are taken to improve management of public programs, and extend public support to dominating small-scale and subsistence farms.*

KEY WORDS: *agro-ecosystem services; environmental management; market, private, public and hybrid modes; eco-impact of EU policies; Bulgaria*

JEL CLASSIFICATIONS: *D23, L22, Q12, Q13*

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1. INTRODUCTION

The problem of assessment and management of ecosystem services takes increasing attention in recent years (Boyd & Banzhaf, 2007; Daily, 2000; Duraiappah, 2007; Farber, et al., 2002; Hanson, C.; et al., 2008; MEA, 2005). It is recognized that maintaining and improving ecosystem services requires an effective management at various levels - individual, organizational, community, regional, national, transnational. It is also known that effective forms of management are rarely universal and there is a big variation among different ecosystems, regions, countries. Efficiency of environmental management depends on specific management structure which affects in dissimilar ways individuals behaviour, gives unlike benefits, commands different costs, and leads to diverse actual performances (Daily, 2000; Duraiappah, 2007; Bachev, 2007).

Agro-ecosystems comprise a considerable portion of ecosystems and are associated with diverse services (Bachev, 2009). Nevertheless, research on management of this specific ecosystem services is still at the beginning stage (AEHP, 1996; Antle, 2007; Jolejole, et al., 2009; WISP, 2008). Most studies focus on certain hotspots or type agro-ecosystems (e.g. pastoral, crop) and individual modes of management (formal, contract, business, public). What is more, significant costs associated with eco-system services management (known as transaction costs) are not entirely taken into account. Furthermore, uni-disciplinary approach dominates, and efforts of ecologists, economists, lawyers, behavioural and political scientists are rarely united. Besides, there are little studies on specific natural, economic, institutional, international etc. factors responsible for the variation among different ecosystems, regions and countries. With few exceptions (Bachev, 2009; Gatzweiler, et al., 2002) there are no publications on specific modes and efficiency of management of agro-ecosystem services in transitional and new EU states.

This paper incorporates interdisciplinary New Institutional and Transaction Costs Economics framework (Furuboth & Richter, 1998; North, 1990; Williamson, 1996) and analyzes forms, efficiency and perspectives of management of agro-ecosystem services in Bulgaria. First, it presents a holistic framework for analysis and improvement of management agro-ecosystem services. Second, it identifies and evaluates market, private and public modes of environmental management in Bulgarian agriculture. Next, it analyses structures for management of agro-ecosystems services in Zapadna Stara Planina, a mountainous region in the North-West part of the country. Finally, it assesses the prospects for evolution of environmental management in the conditions of EU common policies implementation.

2. FRAMEWORK FOR ANALYSIS OF THE GOVERNANCE OF AGRO-ECOSYSTEM SERVICES

Humans benefit from multiple resources, products and processes supplied by natural ecosystems known as *ecosystem services*¹. *Agro-ecosystem services* comprise

¹ They include: *provisioning services* (food; water; pharmaceuticals, biochemicals, and industrial products; energy; genetic resources), *regulating services* (carbon sequestration and climate regulation; waste

ecosystem services provided by agro-ecosystems. The later implicitly includes agricultural activity (crop production, raising animals, and natural resource management) as a *key* component. Type and amount of agro-ecosystem services depends on natural evolution of ecosystems, progression of farming practices, development of social demand and preferences. Therefore, *in the beginning* the analysis is to specify different ecosystem services associated with various agro-ecosystems. Modern science offers precise methods to classify diverse ecosystem services (including agro-ecosystems ones), and their spatial and temporal scales (MEA, 2005). For instance, Figure 1 illustrates the spectrum of services of Agro-ecosystems in Zapadna Stara Planina in Bulgaria.

Maintaining a sustainable supply of agro-ecosystem services requires an effective *social order* (governance). *Environmental management* means management of environment preservation and environment improvement *activities of various agents*. It requires a system of coordination and stimulation of eco-activity which will induce *appropriate behaviour*² of individuals and *coordinated actions* at local, national, and transnational levels.

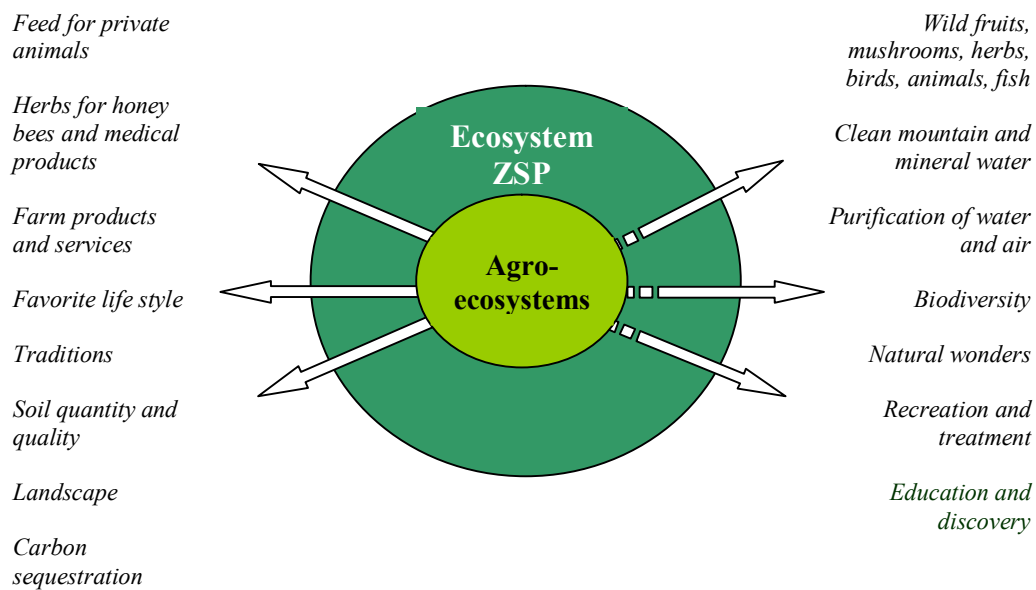


Figure 1. Services of Agro-ecosystems in Zapadna Stara Planina, Bulgaria

According to (awareness, symmetry, strength, harmonization costs of) interests of agents associated with agro-ecosystem services there are different *needs for*

decomposition and detoxification; purification of water and air; crop pollination; pest and disease control; mitigation of floods and droughts), *supporting services* (soil formation; nutrient dispersal and cycling; seed dispersal; primary production), *generation and maintenance of biodiversity, and cultural services* (cultural, intellectual and spiritual inspiration, recreational experiences, scientific discovery) (MEA, 2005)

² "pro-environmental" actions, "anti-environmental" inactions.

management of actions. For instance, Farm 1 has to manage its *efforts* and *relations* with the Farm 2 since both receive services from the Ecosystem 1 and affect (positively or negatively) service supply of that ecosystem. Besides, both farms are to manage their relations with consumers of services from Ecosystem 1 (agents in Social system 1) to meet *total demand* and *compensate costs* for maintaining ecosystem services to that direction. In addition, Farms 1 and 2 have to coordinate efforts with agents in Social system 1 to *mitigate conflicts* with agents in Social system 2 (affecting negatively services of Ecosystem 1). Furthermore, Farm 1 is to manage its relations with Farm 3 for effective service supply from Ecosystem 3, and manage its interaction with Ecosystem 2. Moreover, Farms 1 and 3 have to manage their relations with Farms 4 and agents from Social system 1 (consumers of services of the Ecosystem 3) and Social system 2 (consumers and destructors of Ecosystem 3 services). Finally, Farm 1 affecting adversely the Ecosystem 4 services is to manage relations with agents in Social system 2 (consumers of Ecosystem 4 services) to reconcile conflicts and secure effective flow of ecosystem services. Therefore, the Farm 1 is to be involved in *seven* systems of governance in order to assure an effective supply of the services from ecosystems of which it belongs or affects.

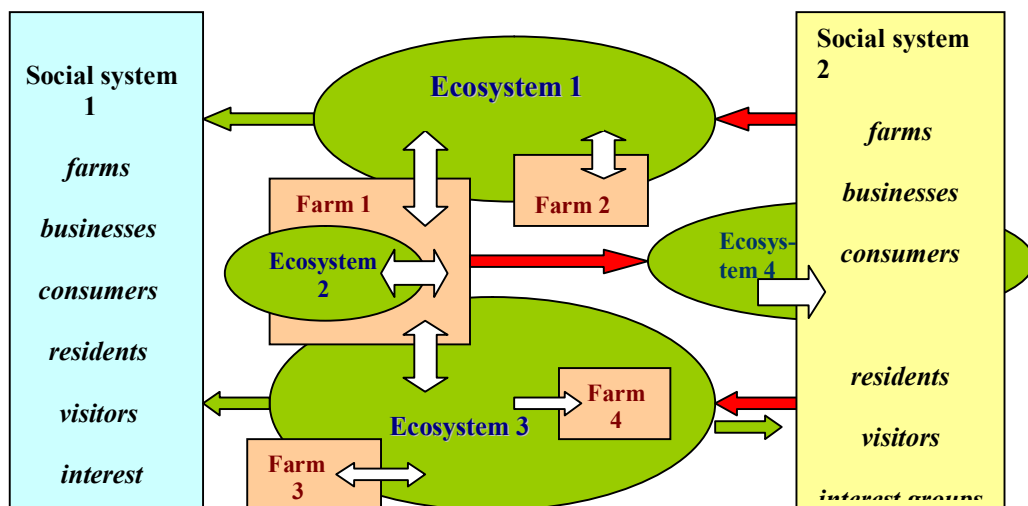


Figure 2. Governance needs for effective supply of agro-ecosystem services

Therefore, the *second* step of the analysis is to identify specific *management needs* for each agro-ecosystem service. They depend on particular characteristics of ecosystem (services, scale, interactions with other eco-systems), and the number and interests of related agents. Simultaneously *trends*, *factors*, *problems* and *risks* associated with services of agro-ecosystems are to be clarified. Modern science offers precise methods to evaluate trends and risks in the evolution of various ecosystems, and to identify driving ecological and social factors for their progression (MEA, 2005). In any case *persistence of serious eco-problems and risks is an indicator that an effective system of management is not put in place*.

The *third* step is to identify *available and other fusible modes* for management of agro-ecosystem services, and assess their *efficiency* and *complementarities*. Individuals' behaviour (actions) are affected and managed by a number of *distinct* modes and mechanisms including:

- *institutional environment* (“rules of the game”) – that is the distribution and evolution of formal and informal rights and obligations between individuals, groups, generations, and system(s) of enforcement of these rights and rules (Furuboth & Richter, 1998; North, 1990). The spectrum of rights could embrace material assets, natural resources, intangibles, certain activities, labour safety, clean environment, food security, intra- and inter-generational justice etc. A part of the rights and rules are constituted by the *formal* laws, regulations, standards, court decisions etc. In addition, there are important *informal* rules and rights determined by tradition, culture, religion, ideology, ethical and moral norms. Enforcement of rights and rules is done by the state, community pressure, trust, reputation, private modes, and self-enforcement.
- *market modes* (“invisible hand of market”) - those are various decentralized initiatives governed by free market price movements and market competition – e.g. spotlight exchanges, classical contracts, production/trade of organic products, origins etc.
- *private modes* (“private or collective order”) – those are diverse private initiatives and special contractual and organizational arrangements – e.g. voluntary actions, codes of behaviour, eco-contracts, eco-cooperatives etc.
- *public modes* (“public order”) – these are various forms of public (community, government, international) intervention in market and private sectors - e.g. public guidance, public regulation, public taxation, public assistance, public funding, public provision, property right modernization.
- *hybrid forms* – a combination of other modes.

Efficiency of different forms of management will depend on *personal characteristics* of agents (preferences, beliefs, capability, risk aversion, bounded rationality, tendency for opportunism, trust), and *specific* features of each eco-system (type, scale, services, interactions, risks etc.). Divers management modes are to be assessed in terms of *absolute* and *comparative potential* (limits) of protect eco-rights and investments of agents, assure socially desirable level of agro-ecosystem services, minimize related costs, coordinate and stimulate eco-activities, reconcile conflicts etc. in the *specific* economic, institutional and natural environment.

Analysis is to include the *overall* (private and public) *transaction costs*³ associated with individual management forms. However, assessment of precise levels of transaction costs in eco-activity is often not possible or very expensive (Bachev, 2009). That is why the analysis is to focus on *combination of critical dimensions* of eco-activity and transaction⁴ - the factors responsible to the variation of transacting costs between alternative modes of management (Figure 3).

³ Transaction costs have two *behaviour origin* – agents *bounded rationality* and *tendency for opportunism* (Williamson, 1996).

⁴ “*Frequency*”, “*uncertainty*”, and “*asset specificity*” are identified as critical factors of transaction costs by Williamson, 1996 while “*appropriability*” added by Bachev and Labonne, 2000.

Generic modes	Critical dimensions of transactions								
	Appropriability								
	High								Low
	Assets Specificity								
	Low				High				
	Uncertainty								
	Low		High		Low		High		
	Frequency								
	High	Low	High	Low	High	Low	High	Low	
Free market	Y	Y							
Special contract form			Y			Y			
Internal organization					Y		Y		
Third-party involvement				⚠				⚠	
Public intervention									⚠

Y - the most effective mode; ⚠ - necessity for a third party involvement

Figure 3. Principle modes for governing of ecosystem service transactions

For instance, eco-activity (transactions) with good appropriability, high certainty, and universal character of investments could be effectively managed by *free market* through *spotlight* or *classical contracts*. There are widespread market modes for selling *pure* “ecosystem services” (eco-visits, hunting, fishing, harvesting wild plants and animals) or “ecosystem services” *interlinked* with other products and services (e.g. organic, fair-trade, special origins, on-farm sale, self-pick, eco-education, eco-tourism, horse-riding, eco-restaurants etc.).

Transactions with low specificity and high appropriability could be effectively managed through a *special contract*. For example, eco-contracts and cooperative agreements between farmers and interested businesses⁵ or communities are widely used including a payment for ecosystem services, and leading to production methods (enhanced pasture management, reduce use of agrochemicals, wetland preservation) protecting water from pollution, mitigating floods and wild fires etc.

Transactions with high frequency, big uncertainty, great assets specificity, and high appropriability, have to be governed *within* internal organization. Very often the effective scale of specific investment in agro-ecosystem services (minimum required for eco-impact, exploring economies of scale and scope) exceeds borders of traditional agrarian organizations (family farm, small partnership). If specific capital (knowledge, technology, equipment, funding) cannot be effectively organized within a single organization⁶, then effective external form(s) is to be used - joint ownership, interlinks, cooperative, lobbying for public intervention. For instance, environmental cooperatives are very successful in some EU countries (Hagedorn, 2002). Nevertheless, costs for initiation and maintaining collective organization for

⁵ e.g. drinking water companies in Germany (Hagedorn, 2002), mineral water company Vittel in France (Hanson, et al., 2008)

⁶ coalition made, minimum scale of operations reached, economy of scale/scope explored.

overcoming *unilateral dependency* are usually great (big number of coalition, different interests of members, opportunism of “free-riding” type) and it is unsustainable or does not evolve at all.

Furthermore, transaction costs analysis let us identify situations of *market* and *private sector failures*. For instance serious problems arise when condition of assets specificity is combined with high uncertainty and low frequency, and when *appropriability* is low. In all these cases, a *third part* (private agent, NGO, public authority) *involvement* in transactions is necessary (through assistance, arbitration, regulation) in order to make them more efficient or possible at all. Emergence and unprecedented development of special origins, organic farming and system of fair-trade, are good examples in that respect. There is increasing consumer’s demand (price premium) for these products but their supply could not be met unless effective *trilateral governance* (including independent certification and control) is put in place.

Respecting others rights or granting out additional rights could be managed by “good will” or *charity actions*. For instance, a great number of voluntary environmental initiatives (“codes of behaviour”) have emerged driven by farmers’ preferences for eco-production, competition in industries, and responds to public pressure for a sound environmental management. However, environmental standards are usually “process-based”, and “environmental audit” is not conducted by independent party, which does not guarantee a “performance outcome”. In any case, voluntary (charity) initiatives could hardly satisfy the entire social demand especially if they require considerable costs.

Management of most ecosystem services requires large organizations with diversified interests of agents (providers, consumers, destructors, interest groups). Emergence of special *large-members* organizations for dealing with low appropriability is slow and expensive, and they are not sustainable in long run (“free riding” problem). Therefore, there is a strong need for a *third-party public* (Government, local authority, international assistance) *intervention* to make such eco-activity possible or more effective (Bachev, 2009).

Various modes for public intervention in eco-activity (transactions) is to be assessed in terms of correspondence to the needs of third-party involvement (Figure 3) and comparative (coordinating, stimulating, costs-minimization) efficiency to other feasible modes of public intervention (assistance, public-private partnership, property rights modernization etc.) (Bachev, 2009). The overall implementation *and* transaction costs are to be taken into account. The later would depend on uncertainty, frequency, and necessity for specific investment of public involvement (Figure 4).

<i>Level of Uncertainty, Frequency, and Assets specificity</i>					
<i>Low</i>	←-----→				<i>High</i>
New property rights	Public regulations	Public taxation	Public assistance	Public funding	Public provision

Figure 4. Principle modes for effective public intervention

The analysis will let define efficiency and potential of divers mechanisms and modes of management (institutions, market, private, public) to deal with problems and risks for sustainable flow of agro-ecosystem services. It also unable us to predict likely cases of new public (local, national, international) failures due to impossibility to mobilize sufficient political support and resources or ineffective capability for implementation of otherwise “good” policies in the specific economic and institutional environment of particular ecosystem and region. Since public failure is a feasible option its timely detection permits foreseeing persistence or rising of certain eco-problems and conflicts, and informing (local, international) community about associated risks.

3. BULGARIAN EXPERIENCE IN ENVIRONMENTAL GOVERNANCE

Post-communist transformation and EU integration has been associated with significant challenges and opportunities for agro-ecosystems and their services. During most transition diverse eco-rights (on clean and athetic nature; preservation of natural resources, biodiversity) were not defined or badly defined and enforced (Bachev, 2009). Inefficient public enforcement of laws and contracts has been common. Outdated system of public regulations and control dominated until recently which corresponded little to the contemporary needs of eco-management. There was no modern system for monitoring state of soil, water, and air quality, and credible information on the extent of eco-degradation. There existed no social awareness of “concept” of eco-sustainability and ecosystem services or “needs” them to be included in public policy and private and community agenda. Lack of eco-culture and knowledge has impeded evolution of voluntary measures, and private and collective actions for effective management of ecosystem services.

Before EU accession (January 1, 2007), country’s laws and standards were harmonized with immense EU legislation. The later introduces modern framework for eco-management including new rights/ and restrictions on protection of environment, preservation of traditional varieties and breeds, biodiversity, animal welfare. EU accession established and enforces “new order” - strict regulations and control; tough quality, food safety, eco-standards; financial support. External monitoring, pressure, likely sanctions by EU improve enforcement of laws and standards.

Good part of new “rules of the game” is not well-known or understood by various authorities, private organizations, individuals. There is not enough readiness for effective implementation of new public order because of lack of experience in agents, administrative capacity, and possibility for enforcement of novel norms (comprehension, deficient court system, corruption).

Often enforcement of eco-standards is difficult/impossible since detection and penalizing costs are high, or there is no direct links between performance and eco-impact. For example, although burning fields is banned this harmful for environment practice is widespread. Permanent deterioration of soil quality, wasting accumulated (photosynthesis) soil energy, extermination of soil micro-flora and habitats, significant contribution to green-house emissions, multiplying forests fires, diminishing visibility, increasing traffic accidents, come out as result (EEA, 2007).

Harmonization with EU legislation and emergence of eco-organizations generate new conflicts between private, collective, public interests. Results of public choices are not always for effective eco-management – e.g. strong lobbying efforts of particular individuals/groups led to 20% reduction in numbers and 50% reduction in area of initially identified sites NATURA 2000.

Newly evolving market and private structures were inefficient in dealing with various eco-issues. Privatization of farmland and assets of ancient public farms took 10 years to complete. During much of that period, management of farmland and eco-resources was in ineffective “temporary” structures (Privatization Boards, Liquidation Councils, Land Commissions). Sales and long-term lease markets for farmland did not emerge until 2000, and annual leasing was form for extension of farm size until recently. That was combined with high economic and institutional uncertainty and big inter-dependency of agrarian assets.

Most farming activities were carried-out in less efficient and unsustainable structures - reorganizing public farms, part-time and subsistence farms, production cooperatives, huge business farms based on provisional lease-in contracts (Table 1). Market adjustment and intensifying competition has been associated with a significant decrease in number of unregistered farms and cooperatives since 1995.

Table 1. Number, size and importance of different farms

	Public farms	Unregistered	Cooperatives	Agro-firms	Total
Number of farms					
1989	2101	1600000	na	na	1602101
1995	1002	1772000	2623	2200	1777000
2000	232	755300	3125	2275	760700
2007		458617	1281	5186	465084
Share in number (%)					
1989	0.13	99.9			100
1995		99.7	0.1	0.1	100
2000		99.3	0.4	0.3	100
2007		98.6	0.3	1.1	100
Share in farmland (%)					
1989	89.9	10.1			100
1995	7.2	43.1	37.8	11.9	100
2000	1.7	19.4	60.6	18.4	100
2007		32.2	24.7	43.1	100
Average size (ha)					
1989	2423.1	0.4			3.6
1995	338.3	1.3	800	300	2.8
2000	357.7	0.9	709.9	296.7	4.7
2007		2.2	613.3	364.4	6.8

Source: National Statistical Institute

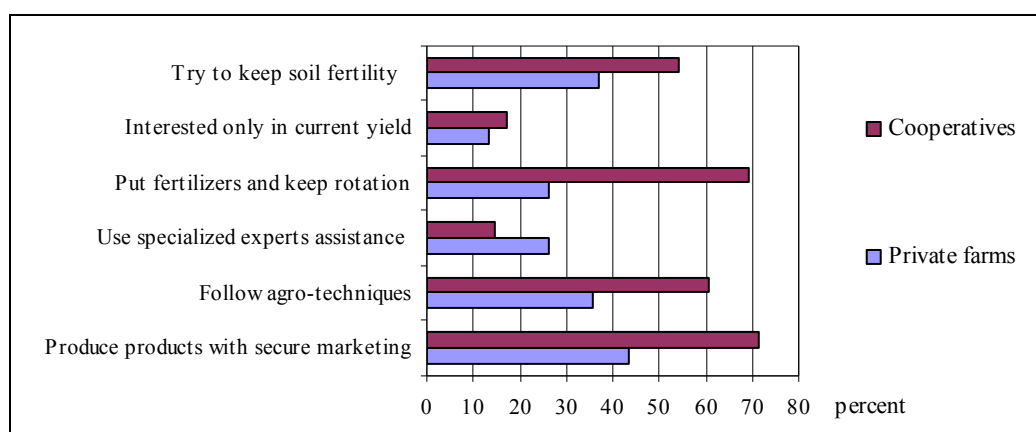
Larger business farms operate mainly on a leased land and concentrate on high pay-off investment with a short pay-back period (cereals, sunflower). That has been

coupled with ineffective outside (authority, community) pressure for respecting standards for ecology, crop rotation, nutrition compensation, and biodiversity. Survivor tactics (“concentration on products with secure marketing”) rather than a long-term strategy toward sustainability (preserving soil fertility, observing crop rotation and agro-techniques requirements) are common among commercial farms (Figure 5).

Table 2. Number and size of livestock holdings, 2008

Type of holdings	Share		Share		Share		Average heads
	farms	heads	farms	heads	farms	heads	
	1-2		3-9		20 and >		
Dairy cows	79.8	36.1	16	25.2	1.6	26.8	2.7
	1-9		10-49		100 and >		
Ewes	85	37.1	12	24.5	1	23.4	8.6
She-goats	97.1	75.3	2.7	17.4	0.1	3.2	2.8
	1-2		3-9		200 and >		
Breeding pigs	78.8	12.8	14.9	8.8	0.5	57.4	7.8

Source: Ministry of Agriculture and Food



Source: Survey data

Figure 5. Share of farms implementing different strategies (%)

During transition agrarian long-term credit market was practically blocked while newly evolving farming left unassisted by government. Despite progress in public support in recent years (SAPARD, CAP) the overall support to agriculture rests very little (Table 3). A small proportion of farms benefits from public aid most of them large enterprises from regions with less socio-economic and eco-problems.

EU accession brings new opportunities for a public support for private and collective activities related to agro-ecosystem services. The National Plan for Agrarian and Rural Development 2007-2013 (NPARD) provides significant funding for area-based and agro-environmental payments (organic farming, management of agricultural lands with high natural value, traditional livestock, protection of soils and water, preservation of land shaft); modernization of farms, processing, marketing;

diversification of activity; infrastructural development; keeping traditions; training. Cross-compliance (with safety, animal-welfare, eco-standards) for receiving public support is introduced. Funding for projects related to eco-system services is also available from Fund LIFE+, Operational Programs “Environment”, “Fishery and Aquaculture”, “Regional Development”.

Table 3. Share of EU and national support in Net Income of farms, 2008 (%)

Type of farm	Share of subsidies in Net Income	
	Current	Investment
Field crops	63.2	2.1
Horticulture	1.3	1.8
Permanent crops	0.4	2.2
Livestock	0.3	0

Source: Ministry of Agriculture and Food

Mostly bigger farms participate in public programs because they have a superior entrepreneurial experience, available resources, capability for adaptation to requirements, and winning projects. It has been impossible to reform inefficient system of management of public programs and significant EU funding was blocked by EC (2008) while Special Assistance Pre-accession Program for Agrarian and Rural Development (SAPARD) support lost. A minor amount supported farms (agro-ecosystems), deficiency of clear criteria for eco-performance, and lack of effective control led to little contribution of public measures to improvement of eco-situation.

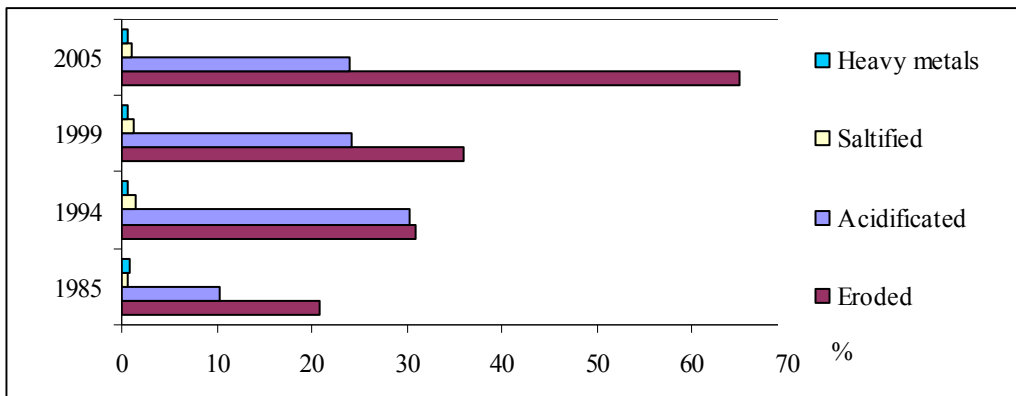
Market management has led to sharp decline in all crop (but sunflower) and livestock (but goat) productions comparing to 1989. Smaller size and owner operating nature of most farms avoided certain problems of public enterprises such as lost natural landscape, biodiversity, nitrate and pesticide contamination, huge manure concentration, and uncontrolled erosion. Subsistent and small-scale farming has also revived some traditional and more sustainable technologies, varieties, and products.

Private mode has introduced incentives and possibilities for integral eco-management (including revival of eco/cultural heritage; anti-pollution, esthetic, comfort measures) profiting from inter-dependent activities such as farming, fishing, agro-tourism, recreation, processing, and trade. There are also good examples for foreign investment in cereals, oil crops, integrated with farming vine and food processing, which introduce modern governance, technologies, quality, and eco-standards.

A by-product from dominating “market and private management” has been considerable disintensification of agriculture, ease of general eco-pressure and pollution comparing to pre-reform level. The total amount of used chemical fertilizers and pesticides has declined considerably, and now their per hectare application represent 22% and 31% of 1989 level (MAF, Annual reports). A sharp reduction in chemical use has diminished drastically the risk of chemical contamination of soils, waters, and farm produce. A good part of farm production has got “organic” character obtaining reputation for high quality and safety.

A negative rate of fertilizer compensation of N, P, K intakes dominate and average of 23595,4 t N, 61033,3 t P₂O₅ and 184392 t K₂O have been irreversibly removed annually from soils since 1990 (MAF, Annual reports). Monoculture or simple rotation is constantly practiced by large operators concentrating on few profitable crops (sunflower, wheat). These practices further contributed to deterioration of soil quality and organic matter.

There has been considerable increase in farmland affected by acidification (Figure 6). That is a result of long-term application of specific nitrate fertilizers and unbalanced fertilizer application without adequate input of phosphorus and potassium. Besides, since 1990 no effective measures are taken to normalize soil acidity and salinity.



Source: EEA

Figure 6. Share of degraded agricultural lands

Erosion is a major factor for land degradation. Due to ineffective management one-third of arable lands are subjected to wind erosion, 70% to water erosion as total losses varies from 0,2-40t/ha in different years. Progressing level of erosion is affected by agro-techniques, anti-erosion measures deficiency, uncontrolled deforestation (EEA, 2007).

There is a reduction of irrigated farmland since 1990 as 2-5% of irrigation network has been used. Consequently, irrigation impact on erosion and salinization has been diminished considerably. Decline in irrigation has a negative effect on crop yields and rotation. Irrigation is not effectively used to counterbalance adverse effect of global warming on farming (extension of season, increased water requirements, rainfalls fall) and degradation of farmland.

There has been a significant reduction of overall GHG emissions from agriculture. N₂O emissions comprise 59% of total agriculture emissions, as sector is the major ammonia source accounting for two-third of the national (EEA, 2007). Most NO₂ emissions come from agricultural soils (87%), manure management and burning fields (13%). Methane emission from agriculture represents about quarter of national. Biggest portion of CH₄ comes from fermentation from domestic livestock (72%) and manure management (24%).

Private management has been associated with less concern to manure and garbage management, over-exploitation of leased and common resources, contamination of air and groundwater. Illegal garbage yards in rural areas have noticeably increased. Farms contribute extensively to waste “production” with organic and industrial materials, leading to negative changes in beauty of scenery, and air, soil, and water pollution. Pollution of soil and water from industrial activities, waste management, and improper farming activities is a serious environment and health risk - in 7% of soils concentration of pollutants is higher than the critical limits (EEA, 2007).

Around a quarter of river length does not meet standards for water quality (MAF, Annual reports). Monitoring of water for irrigation shows that in 45% of samples, the nitrates concentration exceeds contamination limit 2-20 folds. Nitrates are most common polluter of underground water with slight excess over ecological limit (EEA, 2007). Lack of effective manure storage capacities and sewer systems in most farms contribute significantly to the persistence of problem. Livestock activity is carried out by a great number of small and primitive holdings often located within residential borders - 0,1% of livestock farms possess safe manure-pile sites, around 81% use primitive dunghills, 116 thousands holdings have no facilities (MAF, Annual reports). That contributes significantly to pollution of air, water, soils, and disturbing population comfort (noise, odour, dirty roads).

There is significant degrading impacts of agriculture on biodiversity - all 37 typical animal breeds have been endangered during the last decades, among them 6 are irreversibly extinct, 12 are almost extinct, 16 are endangered, and 3 are potentially endangered (MEW, 2007).

Since 1990 a considerable portion of farmlands have been left uncultivated for long time or abandoned, and significant part of agro-ecosystem lost “agro” character turning into natural ecosystems. That has caused uncontrolled “development” of species allowing development of some and suppressing others. Some of most valuable ecosystems (natural grassland) have been severely damaged. Part of meadows has been left under-grazed or under mowed, and intrusion of shrubs and trees took places. Some fertile semi-natural grassland has been converted to cultivation (crops, vineyards, orchards). This has resulted in irreversible disappearance of plant species diversity. Certain public (municipal, state) pastures have been degraded by unsustainable use (over-grazing) by private and domestic animals. Besides, a reckless collection of valuable wild plants (berries, herbs, flowers) and animals (snail, snakes, fish) have led to destruction of all natural habitats.

Market driven organic farming has emerged recently. It is a fast growing approach but it is restricted to 432 farms, processors, and traders, and covers less than 3% of Utilized Agricultural Area (UAA) (MAF, Annual reports). There are few livestock farms and apiaries certified for bio-production. In addition, 242677 ha are approved for gathering wild organic fruits and herbs. Organic form has been introduced by business entrepreneurs who managed to organize and fund this new venture arranging independent certification and finding buyers for highly specific output. Produced bio-fruits, vegetables, oil plants, herbs, spices, and honey are for export since a tiny internal market for organic products exists. Slow development of organic market is caused by the high prices of products, and limited consumer

confidence in authentic character of products and certification. Eco-labelling of processed farm products (self-regulation) has also appeared but it is perceived more as a part of marketing strategy of companies rather than genuine eco-action.

Evolution of farmers and eco-associations has been hampered by the big number and diversified interests of agents – a different ownership size, operation, type of farming, preferences, age, and horizon. There are few examples for effective organizations mostly with small-membership and strong common interests of participants. Government and local authority involvement in eco-governance has not been significant, comprehensive, sustainable, or even related. Budget of the Ministry of Water and Environment accounts for 1,5% of National, and agriculture is getting a tiny portion of total public eco-spending (MEW, 2007). Recultivation of degraded farmlands by MAF is under way recently accounting for 200-250 ha per year (MAF, Annual reports). Serious eco-challenge is caused by state deficiency in storing and disposal of out-of-dated pesticides of ancient public farms – currently 82% of all polluted localities in the country are associated with these dangerous chemicals.

In passed years a number of national programs have been developed to deal with specific eco-challenges - preservation of biodiversity and environment; limitation of emissions of Sulphur Dioxide, VOC, Ammonia; waste management; development of water sector; combating climate change; developing organic agriculture; management of lands and fights against desertification; agrarian and rural development. National monitoring systems of environment and biodiversity are set up and mandatory eco-assessment of public programs introduced. Nevertheless, actual eco-policies rest fragmented and largely reactive to urgent eco-problems (natural disasters, floods, storms, and drought) rather than based on a long-term strategy for sustainable development. There have been a numerous international (UN, EU, NGO) assistance projects to “fill the gap” in local failures but they are limited in scale, unsustainable in time; often overtaken by local groups, funding improperly used; and with no significant impact. Moreover, the National Agricultural Advisory Service (NAAS) does not serve majority of farms, and include rural development and eco-issues. As a result of inefficient priority setting and management (bad coordination, incompetence, corruption), and insufficient administrative capacity a minor impact of public programs prevails.

4. THE CASE OF ZAPADNA STARA PLANINA (ZST)

ZSP⁷ is a mountainous region in North-West Bulgaria (Map 1). Agro-ecosystems in ZSP are a part of the unique ecosystem of ZSP providing a wide range of services (Figure 1). A great number of agents from and outside region benefit from and affect services of ago-ecosystems – natural resources owners⁸, farmers, residents, businesses, visitors, consumers, scientists, interest groups.

Approximately 70% of the farmland comprises meadows and pastures (MAF, Annual reports). They provide abandon feed for farm and household animals creating

⁷ ZSP region covers 4043 km² (2099 km² in Bulgaria and rest in Serbia) of which 60% is forests and rest is farmland (Grigorova & Kazakova, 2008).

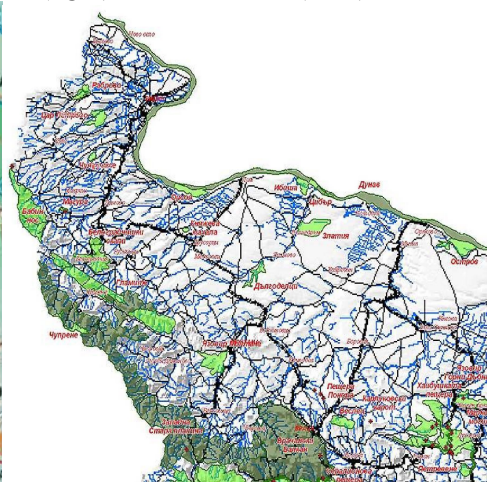
⁸ 50% of the population own farmlands.

good conditions for grazing livestock (sheep, goats, cattle, buffalos, horses) and domestic animals (poultry, rabbits, pigs). There are plenty of wild flowers and herbs which favour a herbal honey production, and collection of natural medical plants.

Map 1. ZSP ecosystem



Map 2. Natura 2000 Habitat directive (light), Bird directive (dark)



A wide range of farm products is produced used for provisioning of population and marketing. Local farm-based produces are well-known for quality, unique taste, original character (strawberry, raspberry, blackberry, berry jams, herb honey, sheep yogurt and cheese, lamb meat, wool, fur, prune, plum brandy) and marketed at regional, national, and international markets. They favour development of related productions and services being important income source for population – (jam, dairy, brandy, leather) processing, dyeing wool, weaving and crafts making, on-farm and direct marketing, agro and rural tourism.

For many local and not-permanent residents interactions with agro-ecosystems are favourite mode of recreation (part-time and hobby farming, short and longer-term visits) or life-style (weekend and summer houses). Traditions and ethnic culture of Torlaks and Karakachans are closely related to agro-ecosystems and farming system – specific agricultural and related products (Chiprovtsi hand-made carpets), crop varieties and animal breeds, production methods and technologies, festivals, cuisine, and crafts. Unique shape and quality of landscape is a critical feature of agro-ecosystems dominating by natural and semi-natural mountain pastures, riparian meadows, stony and rocky terrains. All these attract many visitors from region, country, and abroad.

Agro-ecosystems contribute significantly for maintaining soil quality - vegetation cover reducing soil loss, degradation, promoting water infiltration. Carbon sequestration is important service of grasslands, berry bushes, orchards, and vineyards storing considerable amount of CO₂. Agro-ecosystems provide combined services with the larger ecosystem of ZSP. A great variety of wild fruits, herbs, chestnuts, mushrooms, birds, animals, and fish are picked up or hunted by population and visitors. Some are commercially gathered for processing and sells bringing additional incomes for 20% of population (Grigорова & Kazakova, 2008).

Ecosystem ZSP is a source of clean mountain and mineral water used by farmers (animals, irrigation), residents (drinking, household needs), businesses (inputs, bottling), and health centres (balneotherapy) in the region and neighbouring areas. It purifies water and air, and regulate climate making region one of the destination for tourism, recreation, and treatment. Well-known mountainous resorts like Berkovitza, Varshetz, and Izketz are located there. Some of country's most popular natural wonders (Belogradchik Rocks, Iskar Gorge), and a number of picks, waterfalls, and caves is situated there enhancing cultural services of the ecosystem.

Territory of ZSP is with a high ornithological and botanical importance designated as NATURA 2000 site (Map 2). Maintaining this rich biodiversity is a great service of the ecosystem. These increase educational and scientific services of this ecosystem as well. Various market, private and public modes are used for managing agro-ecosystem services (Figure 7). Reforms transferred agrarian and agro-ecosystem services related activity from large public farms into market and private governance.

Market	Private	Public
Informal branding Organic (berry) farming Organic apiaries Organic livestock Organic wild fruits, herbs gathering Specific origins (lamb, cheese, berries, carpets, crafts) Organic processing (berries, milk, herbs) Eco-labeling On farm and direct marketing Clientatlisation (cheese, meat, berries) Agro and eco-tourism	Voluntary initiatives Long-term supply contracts (milk, berries) Vertical integration of farming into processing, services, marketing (shops, hotels, restaurants, export) Interlink organization (dairy) Diversification of production/services Cooperatives NGO's Organic alliances	Environmental regulations Eco-information, monitoring, assessment Promotion or joining eco-initiatives (festivals, networks, ads) Designated zones of eco-importance (natural parks, NATURA) Area-based direct payments Leasing out public land for private management Cross-compliance requirement Agro-ecological payments (voluntary contracts) Support to traditional, original productions Support to farms, processing modernization Support for semi-market farms Support to young farmers Support for adaptation of quality, safety, eco-standards Support to collective actions (producers groups, cooperation) Support for diversification of activity (eco-tourism, heritage) (Mandatory) eco-training Program for development of agriculture North-West Bulgaria Fox vaccination Recultivation of degraded farmlands Garbage taxation State company Vratza Natural Park Support to trans-border initiatives

Figure 7. Modes of management of agro-ecosystem services in ZSP

Private management and market adjustments have been associated with domination of small-scale and subsistence holdings (Table 4), a sharp decline in crop and livestock productions, and general disintensification of activity. Private ownership introduced better incentives for environmental stewardship while small size led

overcoming eco-problems of public enterprises. It also revived some traditional and sustainable technologies, varieties, and products.

Table 4. Major characteristics of farms in ZSP

Indicator	Value	Indicator	Value
Number farms	12151	Share farms with cattle (%)	17,2
Average UAA (ha)	0,997	Average cattle per farm	2,9
Share arable land (%)	33,6	Share farms with sheep (%)	51,1
Share cereals (%)	18,4	Average sheep per farm	5,5
Share horticulture (%)	4,3	Share farms with goats (%)	62,7
Share grassland (%)	58,7	Average goats per farm	2,6
Share permanent crops (%)	4,9	Share farms with pigs (%)	47,2
Share farms with bees (%)	6,3	Average pigs per farm	1,5
Bees colonies per farm	7,1	Share farms with poultry (%)	69,0
		Average poultry per farm	14,2

Source: MAF, 2005

A positive result of market and private management has been the overall improvement of agro-ecosystems services. Farm and related productions have got “organic” character obtaining a reputation for products with high quality and safety. Region has become attractive destination for many tourists willing to experience genuine nature, traditional cuisine and lifestyle, or buy authentic farm products.

Market-driven certified organic production has also emerged but it is restricted to few farms, processors, and traders. Country’s biggest producers of organic raspberries and bee honey are located in ZSP. Informal branding of fresh and processed farm (eco, origin, quality, low costs) produces has been increasing and marketed though farmers and street markets or clientalisation between individual sellers and buyers (on-farm sells, home delivery).

A number of effective private modes have evolved and manage relations between farmers, processors, food stores, and consumers. High specificity and capacity dependency are widely safeguarded by cooperation (services, processing), long-term contracts (marketing of milk, organic berries), interlinked organization (milk marketing against free-provision of cooling vanes, credit), or a compete integration (diversification of farming into processing, agro-tourism). Often non-agrarian agent (processor, food store, restaurant chain and exporter) driven by market or institutional demand initiates, funds, and integrates eco-farming. That is the case with Danon buying milk from big dairy farms (enforcing safety, quality, animal-welfare, eco-standards), a Japanese investor financing organic apiaries and exporting bio-honey, a leading restaurant-chain (from Sofia) integrating dairy farming and processing.

There are cases of informal small-scale (milk, meat) processing and marketing enterprise developed for petit-producers aiming to overcome missing-market and monopoly situation, and (more recently) significant institutional (milk and meat safety standards, quotas) restrictions. Output is mostly for households consumption or marketed though informal channels.

The cooperatives have been typical mode having a great potential to organize highly specific to members transactions (critical inputs and services, processing,

marketing), explore economies of scale and scope, manage common resources, diversify in new businesses (eco-tourism), mediate relations landowners-users, adapt to requirements of banks and public institutions.

Market, private, voluntary, non-for-profit, and for-profit forms contribute significantly to improvement of eco-governance but their scope is restricted to a portion of agro-ecosystems (services). A fifth of agricultural lands is abandoned which caused expansion of some species, and suppressing others. A part of permanent natural and semi-natural meadows have been left under-grazed or under-mowed, and intrusion of shrubs and trees took places putting pressure on priority species (like Souslik) and related chain (Marbled Polecat). Some of fertile semi-natural grasslands are converted to cultivation (crops, berries, vineyards, orchards) which caused irreversible disappearance of plant species diversity. Communal and private pastures close to settlements have been degraded by unsustainable use (over-grazing). Uncontrolled collection of wild plants (berries, herbs, flowers) and animals (snail, snakes) have jeopardized natural habitats.

Erosion has been a major factor for land degradation as a result of land abandonment, inappropriate agro-techniques, deficiency of anti-erosion measures, and uncontrolled deforestation. Lack of effective manure storage capacities in most farms and modern sewer and garbage collection systems in the rural areas bring about air, soil, water pollution, and affect the beauty of scenery.

Furthermore, a great number of smaller commercial farms and agricultural cooperatives have ceased to exist due to inefficient management, low adaptability to market competition, aging population, and labour exodus. Most dairy farms and processors have failed to adapt to tough EU (safety, environment etc.) standard and had to stop commercial activity. What is more, private interests have harmed legitimate public rights to ecosystem services due to restricting access, conversion of proper use (farmland and forest into construction), or escaping public order on natural resource management.

Due to restricting criteria⁹, complicated procedures, bad design, and high transacting costs, most farms (small-scale, subsistent holdings) can not participate in public support schemes. Less than 5% of farms comprising 18% of grasslands and 8% of arable land are registered in Land Parcels Identification System (land eligible for CAP support). From SAPARD agro-ecological measures benefited less than 100 farms (MAF, Annual reports). Due to limiting requirements and insufficient funding few farmers got support under measure “Young farmers”. Insufficient “demand” is responsible for few applications and low utilization of funds for “Semi-market farms”, and “Organizations of producers”.

Introduction and enforcement of most biodiversity and eco-standards is difficult in remote mountainous region with insufficient administrative, financial, and training capacities. Often costs for detection of offenders are extremely high and formal enforcement unproductive – e.g. prohibited marketing of fresh milk, uncertified cheese and meat is common; fake labelling, certification is widespread; forbidden

⁹ For direct and agro-ecological payments minimum farm size is 1ha (permanent crops 0.5 ha) and 0.5 ha (landless livestock holdings are not-eligible). NPARD does not provide support for restoration of abandoned farmland, and organic livestock (but forage) production.

fields burning is practiced; minimum-maximum numbers of animals on pastures, milk quotas are not respected; and illegal lodging common.

5. PROSPECTS OF ECO-MANAGEMENT IN CONDITIONS OF EU POLICIES IMPLEMENTATION

EU integration and CAP implementation provides new opportunities for Bulgarian farms. EU funding which agriculture receives from 2007 on is 5.1 times higher than the overall support to farming before acceding. Huge EU markets are opened which will enhance competition and let local farms explore comparative advantages (low costs; high quality, produce specificity and purity). Novel conditions of market competition and institutional restrictions give strong incentives and pressure for new investments for increasing productivity and conforming to higher product, technology, and eco-standards.

Larger and business farms are most sensitive to new market demand and institutional regulations since they largely benefit or lose from timely adaptation to new eco-regulations. They have a higher capacity to generate resources and find outside (credit, equity, public) funding to increase competitiveness and meet institutional requirements. Process of adaptation is associated with appropriate land management and intensification of production. The later could revive or deepen some eco-problems (erosion, acidification, pollution) unless a pro-environmental management (public order, enforcement) is put in place.

Small-scale producers and most livestock farms are having hard time adapting to new competition, investment needs, new food safety, animal-welfare, and eco-standards. Significant EU funds for rural development would let more and smaller farms to get access to public support and invest in modernization. New essential activities are also effectively funded allowing a diversification and pro-environmental activity. These would bring additional employment and income increasing economic and eco-sustainability of farms.

Mostly bigger farms participate in public programs and get bulk of public support because of superior entrepreneurial capability, resources, possibilities for adaptation, and potential for winning projects. Thus, agrarian and rural development funds will less contribute to decreasing economic and eco-discrepancy between different farms, sub-sectors, and regions.

CAP implementation will improve eco-performance of commercial farms. There is “eco-conditionality” for participating in public programs. Besides, direct payments are inducing farming on previously abandoned lands, and improve eco-situation. There is huge budget allocated for special eco-measures and the number of farms joining agri-environmental programs gradually increases. CAP measures would affect positively eco-performance of large business farms and cooperatives. These enterprises (potential big polluters) are under constant administrative control and punishment (fines, losing licenses, ceasing activities) for obeying new biodiversity, eco-standards. They are strongly interested in transforming activities according to new eco-norms making necessary eco-investments, and changing production structures. Larger producers are motivated to participate in special agro-environmental programs,

since they have lower costs (economies of scale and scope) and higher benefits from long-term public contracts.

Experience of old EU states demonstrates that some terms of eco-contracts are very difficult to enforce (Dupraz, et al., 2004). The rate of compliance with these standards would be even lower in Bulgaria because of the unawareness, insufficient control, “personal” relations, and bribes. Therefore, more farms than otherwise would enroll will participate (including biggest polluters) and outcome of implementation would be less than desirable (“European”) level.

Costs for conforming to requirements of eco-programs in different farms vary considerably, and they have unequal incentives to participate. Voluntary character of most support instruments would leave biggest producers of negative impacts (large polluters, non-compliant) outside of schemes (highest eco-enhancement costs). Moreover, Government is less likely to set up high performance standards because of perceived “insignificant” eco-challenges, strong political pressure from farmers, and possible problems (punishment) with EU control on cross-compliance. Therefore, CAP implementation will probably have a modest positive impact on eco-performance of farms.

Public support and demand will push further development of market modes such as organic farming, industry driven eco-initiatives (eco-labelling, standards, codes of behaviour), protected high-quality products, system of fair-trade, alternative (wind, manure) energy at farm etc. Significant EU market and lower local costs create strong incentives for investment in organic and specific productions by large enterprises - farms, partnerships and joint ventures (including with non-agrarian and foreign participants). New incentives for production of bio-fuel and clean energy would induce development of a new area of farm activity to meet that new market and public demand.

Small farms have less capacity to put together necessary capital and expertise for initiating, developing, certifying and marketing in these ventures. Coalition (development, management, exit) costs between small-scale producers are high to reach effective operations (economies of scale and scope, required minimum inputs). The later either stay out of these new businesses or have to integrate into larger ventures. Assuring (origin, quality) traceability for small farms is costly and they are not preferable partner for integrators (processor, retailers, exporters). Internal market for organic and specialized farm products would unlikely develops fast having in mind low income of population and confidence in public and private system of control.

Some economic and ecological needs (economizing on scale and scope, high interdependency of assets) would continue to bring about change in size and management of individual farms, evolution of group organization, cooperation, and joint ventures – e.g. a big interdependency of activities require concerted actions for achieving a certain eco-effect; a high asset dependency between livestock manure supplier and nearby organic crop farms necessitate a coordination etc.

A special management size or mode is imposed by some institutional requirements – a mandatory minimum scale of activities for joining certain public programs (marketing, agri-ecology, biodiversity, organic farming, tradition, cultural heritage); signing a 5 year public eco-contract dictates a long-term lease or purchase of

land. Our survey proves that 41% of non-cooperative farms and 32% of cooperatives are investigating possible membership in professional organization. Besides, producers grouping are stimulated by available public support (training, advising, funding) for farmers association.

Some production cooperatives profit from comparative advantages (interdependency and complementarity to individual farms, potential for exploring economy of scale and scope on institutionally determined investment, adapting to formal requirements for support, using expertise, financing and executing projects, non-for-profit character), and extend activities into eco-projects, eco-services, and eco-mediation. Immediate result of new market and public opportunities for getting additional benefits from eco-products and services will be amelioration of economic and eco-performance of number of farms and households and augmentation of agro-ecosystem services.

CAP implementation pushes modernization of farms structures through widening contractual and organizational innovations - specific sort contracts, new types producers associations, spreading vertical integration etc. Special forms emerge allowing agents to take advantage of public programs - specialization in project preparation, management, and execution; investing in "relations capital" and "negative" entrepreneurship; forming lobbying modes and representation; making coalitions for complying with formal criteria (minimum size of UAA for direct and agro-ecology payments, membership requirements for producers' organizations etc.).

CAP and competition foster restructuring of commercial farms according to modern market, technological, and eco-standards. A large part of agrarian inputs, technologies, and outputs increasingly has mass and standardized character, and market transacting dominate at farm gates. There is a parallel tendency toward specialization into productions for niche markets and products with special quality - specific technologies, special time of delivery, special origins etc. That requires investments with higher specificity to particular buyer(s), and "integrated" management in farming, eco-conservation, processing, retailing, exporting. Moreover, diversification of enterprises into related activities (trade with origins, agro-tourism) for dealing with market risk is growing. All these bring more special modes for private management - long-term contracts, collective agreements (codes of behaviour), trilateral modes (independent certification and control), "quasi" or complete integration.

Many livestock farms are unsustainable because of the low productivity, competitiveness, compliance with safety, animal welfare, and eco-standards. That is particularly truth for small-scale producers dominating the sector. Few livestock farms will be able to adapt through specialized investment for enlargement and conforming to institutional restrictions and will be closed or restrict to subsistency. Reduction of farms and animals, and improved manure management, will be associated with a drop of eco-burden by the formal sector (less over-grazing, fewer manure production and mismanagement).

Few semi-market farms would undertake market orientation and extend present scale because of the high costs for farm enlargement and adjustment - no entrepreneurial capital and resources available, a low investment and training capability of aged farmers, insufficient demand for farm products etc. The specific

support to “semi-market” farms would have no considerable impact on subsistence because of the inappropriate criteria¹⁰ and insufficient level of support. Besides, this measure focus on less prospective structures with low potential for adaptation to volume, quality, safety, animal welfare, eco-requirements, and needs of processors and distributors. For two years of implementation of that measure only few thousands applications are made (merely 5% of the projected potential beneficiaries). For authority is practically (technically, politically) impossible to enforce the official standards in that huge informal sector of economy. Therefore, massive (semi)subsistence farming with primitive technologies, food safety, animal welfare, and eco-standards will exist in years to come.

Enforcement of most labour, animal welfare, and eco-standards is very difficult (or impossible) especially for the informal sector (high political and economic costs). Here “punishments” do not work well while the overall damages from in compliance are immense. Thus policies should be oriented to market orientation of subsistence farms, support for collective modes, and eco-programs for informal farms and groups. Principally public support to voluntary eco-initiatives of farmers and rural organizations (informing, training, assisting, funding) and hybrid modes (public-private; public-collective) would be more effective than mandatory or pure public modes (given incentive, coordination, enforcement, disputing advantages). Besides, involvement of farmers, farmers organizations, interests groups in priority setting and management of public programs at all level is to be institutionalized in order to decrease information asymmetry and possibility for opportunism, diminish costs for coordination, implementation and control, and increase overall efficiency and impact.

Many of EU regulations are not known by the implementing authorities and majority of farmers – 47% of non-cooperative farms and 43% of cooperatives are still “not aware or only partially aware” with support measures of CAP different from direct payments (Bachev, 2009). Furthermore, 62% of farms will not apply for public support due to the “lack of financial resources” (26%), “not compliance with formal requirements” (18%), and “clumsy bureaucratic procedure” (17%). Most farm managers have no adequate training and managerial capability, or are old in age with small learning and adaptation potential¹¹. Improving education and training of agents (farmers, residence, consumers, administrators) and relaxing of (some) eligibility criteria for public support is essential. Furthermore, improving organization (access, efficiency) and programs (environmental, project management) of NAAS is crucial.

Some “blank points” in national legislation must be filled – e.g. terms “agro-ecosystem services” have to find adequate place; the “whole farm” is a subject of support in agri-environmental measures but its borders are not defined. The later creates serious difficulties since land and resources of most farms are considerably fragmented and geographical dispersed. Lack of readiness, experiences, and potential for adaptation in public and private sectors alike would require some time-lag until “full” implementation of CAP in “Bulgarian” conditions. The later will depend on pace of building effective public and private capacity, training (learning by doing experience) bureaucrats, farmers, and other agents. Consequently, farms modernization

¹⁰ EU criteria for defining “semi-market farms” (1-4 ESU) is quite big for Bulgaria.

¹¹ Average age of farm managers is 61, 70% are older than 55 (MAF, Annual reports).

and adaptation will be delayed, and their competitiveness and contribution to agro-ecosystem services diminished. Besides, there will be inequalities in application (enforcement) of laws and standards in diverse regions, agrarian sectors, and farms of different type and size.

Finally there is a growing competition for eco-resources between different industries and interests. That push further overtaking natural resources away from farm governance and change into non-agricultural (urban, tourism, transport, industry) use. What is more, needs to compete for and share resources would deepen conflicts between various interests and social groups, regions, and states. That would require special management (cooperation, public order, hybrid form) at local, national and transnational scales to reconcile conflicts related to ecosystem services.

6. CONCLUSION

Post-communist transition and EU integration has brought about significant changes in state and governance of agro-ecosystems services. Newly evolved market, private and public governance has led to significant improvement of part of agro-ecosystems services introducing modern eco-standards and public support, enhancing environmental stewardship, disintensifying production, recovering landscape and traditional productions, diversifying quality, products, services. It is also associated with some new challenges such as unsustainable exploitation, lost biodiversity, land degradation, water and air contamination.

Implementation of common EU policies is having unlike results in “Bulgarian” conditions. In short and medium term it will enlarge income, technological, and eco-discrepancy between different farms, sub-sectors, regions. In a longer-term eco-hazard(s) caused by agriculture will enlarge unless effective public and private measures are taken to mitigate existing eco-problems. Specific structures for management of farming activity (small commercial, semi-market, subsistence farms, production cooperatives, large business firms) will continue to dominate in years to come. Significant improvement of public (Government, EU) interventions is needed to enhance sustainability of prospective farms and sustainable agrarian development. Implementation of EU common (agricultural, environmental, regional) policies would have no desired impacts (on socio-economic development, regional and sectoral discrepancies, flows of agro-ecosystem services) unless special measures are taken to improve management of public programs, and extend public support to dominating small-scale and subsistence farms.

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