Zoning of agricultural territory as an approach for rational use of soil resources and protection of agricultural land

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Abstract: *Zoning is a major component of spatial planning. While urban land use planning receives much attention in the literature, agricultural land use planning has been significantly neglected. The contemporary challenge is how to balance the development of agriculture with environmental protection, while maintaining both productivity and the quality of natural resources. The article examines contemporary practices for land zoning in rural areas and agricultural territories. The experience of a number of countries in Europe is reviewed, as well as the experience of the USA, Canada, Australia, etc. countries. The problems of construction permits, land categorization systems, and assessment of the suitability of land for growing agricultural crops are examined. Some gaps in Bulgarian agricultural land management are revealed. Conceptual proposal for spatial structuring of agricultural territories in Bulgarian planning documents is given.*
Keywords*: AGRICULTURAL LAND PLANNING, ZONING, SOIL CAPABILITY*

1. Introduction

Modern science has registered two main negative processes resulting from insufficient commitment to the problems of agricultural territories: 1) the amount of arable land and green areas from which food is produced is decreasing; 2) soil fertility is deteriorating. The quantity and quality of food produced are decreasing, which threatens the survival of the socio-ecosystem.

Humanity partially counteracts these processes, making attempts to control the growth of cities, excessive grazing, soil cultivation by minimizing them and maintaining the ecological balance of agricultural lands. Scientists have repeatedly stated that these issues are difficult to solve and unsolvable separately. Their conclusion is that they must be components of a comprehensive policy, management and system of actions in one direction - the protection of land as a resource.

The intensification of agricultural activities during the state planned economy in Bulgaria and neighboring countries in the last century contributed to deterioration of the ecological conditions of the lands. After the subsequent Agrarian Reform, negative aspects of a physical and legal nature such as small land ownership, ineffective ownership and abandoned agricultural lands, lack of restrictions on the further fragmentation of ownership, weak control over the implementation of planned measures for sustainable agriculture, an easy procedure for changing the purpose of agricultural lands for construction purposes, etc. hinder both the environmentally friendly use of land and future sustainable land use. The modern call for sustainable intensification of agricultural production, including those reflected in European documents [1], activates scientific and research thinking towards integrated land use planning. The latter, as the most important element of land policies, is the basis for solving problems in the economy and the social sphere. This is shown by historical facts about dealing with economic crises. One of the tools has always been, including in Bulgaria, the use of the potential of land as a means of production and increasing the capacity of agricultural production.

Currently, the world is also experiencing a cataclysm as a whole. It is associated, on the one hand, with the depletion of natural resources and the deterioration of their quality, including land resources, and on the other, with the impossibility of reconciling the interests of food production in a sustainable manner with the need to expand living space. Both interests are being resolved at the expense of the planet's arable land. A rescue area for dealing with this conflict, as well as combating negative natural and anthropogenic impacts on soil and environment, is integrated planning, in which land, water, climate and agricultural strategies are harmonized, while protecting public interest. Properly applied and synchronized with contemporary priorities for sustainable development, spatial planning is included in the family of approaches for balanced and integrated use of land resources. The most important challenge, according to Art. 191 of the Treaty on European Union, is to preserve land as a precious and limited resource, to use it "wisely and rationally" [2], in order to preserve the life of plants, animals and humans.

The objective of the paper is to make a review of the world known practices in spatial planning of agricultural territory and on its base to give a conceptual proposal for spatial structuring of agricultural territory in Bulgaria.

2. Policies for the protection of agricultural land trough zoning of rural area, categorization and intrazoning of agricultural area abroad

Rural and Agricultural zoning

The concept of the **"new rural paradigm"** was described by the [3] as a new approach to rural competitiveness, emphasizing the multifunctionality of rural areas [4]. Agricultural land is seen as a valuable resource that must be preserved to ensure the continuous production of agricultural goods [5].

The **rural zone** provides a broad range of permitted land uses that are required for operational reasons, such as extractive industries, resource processing, and certain types of manufacturing, processing, and storage. Farms and ranches typically fall within the rural zoning district. The rural zone is designated to:

- provide land use in rural areas where: a) agricultural land use is limited or insignificant due to topographic, environmental, or local or regional characteristics; b) operational reasons require the location of activities and facilities in rural areas; c) the coexistence of non-agricultural and agricultural uses; d) the need to minimize adverse impacts on land uses in contact with agricultural land uses.
- minimize the conversion of agricultural land to non-agricultural uses.
- ensure that land use is appropriate to the rural area and does not compromise the function of surrounding settlements.

Rural Zones typically include residences that are zoned to allow for the raising of horses, cattle, and other livestock [8].

Agricultural zoning is a specialized form of zoning used by communities that seek to preserve their agricultural base. Agricultural zoning is the most common method for directly protecting agricultural lands from conversion [6, 7]. The basic element of an agricultural zoning scheme is the agricultural zone, with a regime that strictly restricts the construction of all buildings and structures not related to agricultural land use and activities [8]. Agricultural zoning is a land management tool used to encourage agriculture and discourage any non-agricultural use that is incompatible with agricultural use. Agricultural zoning is developed for incentive, subsidy, and tax relief programs. According to [5], the objectives of zoning are defined as:

- separating agricultural land from non-agricultural land uses and keeping agricultural activities at a distance from non-agricultural activities;
- preserving critical integrity of agricultural land;
- protecting prime agricultural soils

An **agricultural zone** is designated to:

- having all the requirements for sustainable agriculture;
- being strategically important from a local, regional or national point of view. The agricultural area is defined in order to:
- ensure the use and development of land for agricultural production.
- protect land for agricultural use by minimizing: a) conflicts or encroachments of non-agricultural uses; b) non-agricultural uses that exclude the return of the land to agricultural land use; c) use of land for non-agricultural purposes in irrigation areas.
- ensure land uses that support agricultural land use.

The key difference between "Agricultural" and "Rural" is in the approaches to non-agricultural land uses: "Agricultural" applies strict control on non-agricultural uses to protect agricultural land from unnecessary conversion to non-agricultural. Residential uses must either be required as part of agricultural use or be located on land that cannot support agricultural use, and must not restrict or inhibit any adjacent agricultural use [9]. [10] consider *rural land use planning* as a supplement to urban planning, i.e. they pay attention to the complexity of this planning in terms of economic, physical, social and environmental impact. For example, protection of arable land is treated in the Spatial Planning Act of **Switzerland** [12] - buildings are compatible with the agricultural zone when they are mainly used for soil-dependent production; spatial planning in **Ghana** caters to urban agriculture: since it is difficult to reverse urbanization, its government outlines zones for urban agriculture [11]. **Tasmania's** state planning regulations [9, 16] outline two zones:

- *Agricultural*, which provides a broader scope for identifying and protecting agricultural land
- *Rural*, which has limited potential for agricultural use and is not otherwise designated to protect specific values.

In the **United States**, there is a concept of *"protected open space",* which is also associated with agricultural land. Open space is land that is not intensively developed for residential, commercial, industrial or institutional use. It includes agricultural and forest land, undeveloped shorelines, undeveloped scenic lands [14]. A protected open space is an area of protected land or water on which development is prohibited for an indefinite period of time. Protected open spaces can be *urban, suburban or rural*. They are applied to the so-called cluster development, which is a practice for low-impact development (LID = Low Impact Development). It encourages the construction of buildings concentrated in specific areas in order to preserve open space [15]. Lands that directly contribute to the ecological and economic health of a region through active management to produce agricultural crops, or that are opened up and used for purposes that directly support public health, safety, and well-being, are called *"working landscapes."*

In the rural areas of USA, two zoning alternatives are implemented [5, 6]:

- *exclusionary* agricultural zoning - all non-agricultural buildings and most non-agricultural activities (in the agricultural zone) are prohibited. This type of agricultural zoning is rarely used.
- *non-exclusionary* agricultural zoning - allows non-agricultural (residential) buildings, but strictly limits their number. Here, conditional uses of low-quality lands are allowed.

Similarly, in the rural areas of the state of **Victoria, Australia**, the following zones are distinguished [13]:

- *Zones in which agriculture is the main land use activity* (including agricultural zone, etc.).
- *Zones in which agriculture is subordinate*
- to other land uses or to the ecological values of the land

The purpose of the first one (the primary agricultural zone) is: to ensure the use of land for agriculture - primarily to preserve land for agricultural production and to avoid land uses that could limit future agriculture or limit agricultural activities; to promote the preservation of productive agricultural land; to ensure that non-agricultural land uses, including housing, do not adversely affect agricultural land use. This zone provides a minimum plot size of 40 hectares. The zone encourages agriculture based on comprehensive and sustainable land management practices. When describing the agricultural zone, the term "productive agricultural land" is used and it represents the core and motivation for the zoning of rural areas. Productive agricultural land is a limited resource that makes a significant contribution to the economy of the state and individual municipalities. Productive agricultural land should be clearly identified and protected in the planning scheme, especially if it is of primary strategic importance. Productive agricultural land usually has one or more of the following characteristics: suitable soil type, suitable climatic conditions, suitable agricultural infrastructure, in particular irrigation and drainage systems, current zoning pattern conducive to sustainable agricultural production.

Levels and instruments of rural planning

USA

The functions of land use planning in the rural areas in the **USA** are the responsibility of regional and local governments, which have subdivisions in their structure for planning, zoning of territories and control over land use. They develop:

- *comprehensive plans* for land use development.
- *local development plans* that determine *zoning* of the territory of a municipality or rural settlement, incl. the total area of agricultural land, its location and purpose. These plans also determine agricultural lands that are subject to future seizure for construction, for the placement of infrastructure facilities or included in the reserve fund. Individual development projects (use and protection of agricultural lands) are prepared for agricultural lands.

Canada

Land use planning in Canada has several levels:

- *federal* (established by regulatory legal acts (directives) of the state in the field of future land use development, improvement of the settlement, urban development, infrastructure, etc.);
- *provincial* (determined by general provincial, regional and city plans);
- *local* (established by development plans for municipal territories). Land use planning at the local level carries out ***zoning*** of the territory, highlighting industrial, residential, commercial, recreational, agricultural and other zones. The municipal council has the right to prohibit one or another action that changes the purpose of the land property. The provincial government has a special commission, which functions include determining the amount of public investments in improving agricultural land, collecting funds for the state budget when registering the sale of land, pursuing policy on the creation of agricultural land reserves and land classification. When allocating land for agricultural and other purposes, land development projects (plans) are prepared.

China

According to Zhejiang LMB (Land Management Bureau) (1999) in China, farmland protection is regulated through two mechanisms [17].

- A three-category provincial land classification scheme influences the conversion of farmland to non-agricultural purposes.
  - *Class (1)*, first-class farmland, with strict protection and requires national approval to be used for non-agricultural purposes.
  - *Class (2)*, construction land, consists of land for built-up (urban) areas.
  - *Class (3)*, common land, can be used for any purpose after its use is approved by Zhejiang LMB.
- Land compensation system – expropriated farmland is replaced with reclaimed land of the same quantity and quality.

Australia

Land management in Australia is carried out through a land management system, which includes multifunctional interconnected state, public and private structures that have a common goal - organizing the rational use and conservation of land. This applies to various spheres of public relations: legislative, executive, judicial, local government, public and private initiatives. An ecological approach is being introduced into practice, based on planning, coordinating and organizing the rational use of land, water, vegetation and other natural resources, ensuring a balance between

the conservation and use of natural resources [18]. *Local plans* for rural development and environmental protection set out principles such as *zoning* the territory to prevent the seizure of productive land for non-agricultural purposes; ensuring maximum benefit for society when using agricultural land with minimal economic and social costs, which is achieved as a result of the implementation of environmentally friendly agricultural practices; preventing land fragmentation; promoting new uses of agricultural land and development of rural areas that take into account environmental requirements.

Great Britain

The planning system in Great Britain [18] is carried out at the state, regional and local (municipal) levels. Two types of plans are developed:

- *Comprehensive Plan.* It is a description of the general directions of policies in the field of land use and urban development, including measures to protect natural values. It determines the functional *zoning* of the territory.
- *Municipal Plan.* It is developed for all territories at the municipal level. The plan does not set functional zoning, but the main requirements for the types of land use and development of the territory.

The intended use of the lands is determined at the zoning level, not reaching the level of individual property. Zoning of the territory is carried out by local authorities (development committees). Owners do not have the right to change the primary purpose of land and its intended use without the permission of the authorities.

Germany

Spatial planning in Germany is carried out at the following levels:

- *federation*
- *federal provinces (16)*
- *municipality* - The main document, determining the development of the territory of a municipality is the *Land Use Plan* of the municipality. In this plan, lands are divided by primary purpose of use, and on their basis, development plans are elaborated. Agricultural areas are specified in this plan.
- *investor (developer).*

Land development projects are developed when solving environmental problems, land reclamation, road construction, etc. These projects are complex.

Netherlands

Land use planning in the Netherlands is carried out at three levels:

- *State - State land use development plans* are long-term - for a period of 10-20 years. The basis for their compilation are political decisions related to planning the spatial basis for the development of the economy and individual sectors and the protection of nature.
- *Province - Provincial land use development plans* are more detailed. *Zoning* approaches are used: ecological, natural-agricultural, water management, etc.
- *Municipality - Municipal plans* are the basis for land use development in specific municipalities and subsequent land management, for obtaining building permits, for carrying out land protection actions. Land management projects are developed. These projects often affect large territories, the basis of which are agricultural territories. Land development projects are complex. They address the following issues: land consolidation; carrying out development, land reclamation and improving the cultural and technical condition of agricultural lands; designing infrastructure elements; developing nature conservation measures; and organizing the territory of farms.

Denmark

The basis for land development work in Denmark [18] are

- *regional*
- *urban*
- *municipal plans*

In the territorial structure, the land is divided into *zones*, including agricultural, defined with a specific purpose and use of the land in the future.

Spain

The *General Plan* in Spain [18] includes *zoning* of the territory, including an agricultural zone. In the land legislation of Spain, there is a generally accepted minimum size of the land plot, which is not subject to division in the process of land turnover.

Finland

Land use planning in Finland is carried out at three levels:

- *state* - State land use objectives are determined by government decrees.
- *provincial* (district) - The *Provincial Land Use Development plan* determines lands for various industries, as well as territories with different purposes.
- *regional* (municipal) - The *General Plan* (at the municipal level) carries out *zoning*, determining areas intended for habitation, industry, transport, services, recreation, agriculture. It serves as the basis for determining the prospects for land use development in the region and its organization. In rural areas, building permits can be issued in accordance with the General Plan, since there is no obligation to develop development plans.

France

Spatial planning in France [18] is indicative. The indicators are not mandatory for the private sector. There is a large state sector and a nationwide economic planning. The plans are divided into:

- *general* (for a region) - long-term - 15-25 years, local. In each plan, *zoning* is observed in the following zones: agricultural, forestry, built-up, for building for individual and public purposes, etc. These plans are mandatory for implementation.
- *regional* (for a group of municipalities)
- *local* (municipal) (for the territory of one municipality) - medium-term - 5-15 years. *Zoning* in these plans is mandatory for implementation. The categories of land that include are: *zones and sectors* - urban, natural and special zones and sectors; *other areas* or facilities with specific use.

In land development, a comprehensive development of rural territories is envisaged on the basis of plans and projects for the development and protection of their lands. The development of "projects for agricultural enterprises" is encouraged, which pay significant attention to the rational use and protection of land. For the purposes of the state land policy for "harmonious development and balance between urban and rural territories", it is envisaged:

- a new zoning of rural territories with intensive maintenance of farms in areas with unfavorable land use conditions;
- revival and development of rural areas, creation and improvement of the infrastructure of rural settlements, etc.

Switzerland

Land use planning in Switzerland [18] is carried out at:

- *State level* - it is mandatory for all authorities at all levels. But it has no direct impact on individual owners.
- *Regional level* - At the cantonal level, *comprehensive plans* are developed. Their main part is the *zonal* plans. The zones that are determined are: agricultural, residential and industrial development, reserve, etc. The zonal plan is drawn up for the entire territory of the canton. They also do not have a direct effect on the specific land owner.
- *Local level.* Three main types of plans are developed at the municipal level:
  - *Zonal plans* - it is revised every 15 years. It is mandatory for owners; it establishes the permitted use of the land. Agricultural zones are only marked in this plan without defining building and zoning rules.
  - *Landscape plans*- it is developed primarily for rural areas. The main attention is paid to the differentiated use of agricultural and forest lands. The application of fertilizers and chemicals, land reclamation and erosion protection, regulation of the water regime of the territory, nature conservation measures, development of rural infrastructure, restoration of forest plantations are regulated.
  - *Transport plans.*

Sweden

Land use planning policy in Sweden is determined by local authorities (municipalities). State authorities may intervene only in

conflicts and territorial disputes between municipalities; when necessary to comply with national interests in the field of land use; in cases of location of natural sites or infrastructure elements of regional or national importance. Each municipality draws up a *Municipal Comprehensive Land Use Plan* for its territory, but it has no legislative character and is not a legal document. The *Detailed Development Plans have legal force*. They are developed for 5-15 years and regulate land use and development. Plans for Area Regulations are developed for these plans [18].

Land capability and zoning of the agricultural territory

Agricultural land use allocation, which is a special case of land use allocation, consists of the allocation of different types and activities to different zones in agricultural landscapes [19, 20].

OECD countries

In OECD countries (Organization for Economic Co-operation and Development), where Bulgaria is a member [3], a typology of three spatial categories of agricultural land has been developed:

- the urban periphery or *peri-urban zone*. In this zone, urban activity has a strong influence on land use and the nature of agriculture
- the *core agricultural zone* includes the majority of agricultural land in most countries. In this zone, agricultural land has very low opportunity costs and the chance that market forces will cause significant changes in land use is small.
- the *distant, or extensive, margin*. In this zone, agriculture is a marginally profitable activity and declining returns from agriculture lead to a halt in production. If urban fringes face pressure to convert agricultural land to higher value uses, the problem at the far boundary is whether agriculture can be sustainable.

USA

When determining the types of permitted land use in the USA, a classification is used for the most significant lands for agriculture, distinguishing two main categories of land [21]:

- *First category* (exclusive agricultural zone) – the best agricultural lands – for intensive agricultural production.
- *Second category* – unique agricultural lands for specific crops.
- *First additional* category (Significant for the state agricultural lands) – for agricultural purposes with permitted use of areas for forestry, recreation of the urban population, tourism, etc.
- *Second additional* category (Agricultural lands of local importance) – limitedly suitable for agricultural production (soils with light mechanical composition, sloping and erosion-hazardous lands, termination of agricultural use is possible, in its place – nature conservation, soil conservation forestry, meadow farming with haymaking, controlled grazing, etc.
- *Auxiliary category* – Unsuitable for agricultural production, for construction of industrial and other non-agricultural sites, for urban development.

In this system, potential assessments reflect not only soil productivity, but also a whole range of other operational properties: the need for reclamation measures, sensitivity to degradation, environmental damage, etc.

The USDA Soil Suitability Classification [22] groups soils according to their limitations for growing crops. Soils are usually grouped into three levels - *class, subclass, and unit*. Classes are the broadest groups and are designated by the numbers 1 to 8. The numbers indicate increasing limitations and narrower practical uses. The classes are defined as follows: Soils in classes 1-4 have slight, moderate, severe, and very severe limitations for use. Soils in classes 5-8 are not suitable for agricultural production. Subclasses are soil groups within a class that indicate the influence of erosion risk, water, soil characteristics, and climate, respectively. Units are soil groups within a subclass. Soils within a production unit are similar enough to be suitable for the same crops and forage plants, require similar management, and have similar productivity.

In California [23] the designation of agricultural land and the way in which they are applied are as follows.

- *Agricultural zone for intensive agricultural activities*, Property areas between 20 and 40 acres (8 and 16 ha, respectively).
- *Agricultural zone for agricultural activities* on soils of medium to high quality, water availability, and larger parcels (40 acres (16 ha)),
- *Exclusive agricultural zone* for less soil-dependent activities, often associated more with foothills and wetlands; pastures and rangelands; and wildlife habitats and recreation areas. Activities are carried out to support agricultural activities - expanded agricultural enterprises, which require large plots of land (minimum 160 acres (65 ha)).

Ontario [24] designates *prime agricultural areas*, meaning that they are protected and designated for long-term agricultural use. The province's preferred approach to designating prime agricultural areas in official plans is to have a "prime agricultural area" layer as a land use category identified in a land use regime or map, with associated policies in the official plan.

Canada

The **Canadian land inventory** is built on the principle of assessing the potential of land for various types of economic use and includes the assessment and classification of lands according to the possibility of their use in agriculture. It also includes a review of modern land use, socio-economic classification of lands, etc.

All soils in Canada are grouped into:

- *7 classes* depending on the potential for agricultural use
- *13 subclasses* depending on the nature of the limiting factor.

Spain

When valuing land in Spain, agricultural land falls into the following classes:

- *Arable land*
- *Meadows or pastures*
- *Wooded and shrubby land*
- *Uncultivated land*
- *Land with perennial crops* (vineyards, orchards, olive groves, etc.)

United Kingdom

In the United Kingdom, according to [25], government policies and legislation, when considering development proposals that affect agricultural land and soils, aim to protect:

- the best and most versatile agricultural land from significant, inappropriate or unsustainable development proposals
- all soils, by managing them in a sustainable way.

The Agricultural Land Classification scores are from 1 to 5:

- *Grade 1* - agricultural land of excellent quality. Yields are high and less variable than those grown on lower quality land.
- *Grade 2* - agricultural land of very good quality. Yield levels are usually high, but may be lower or more variable than Grade 1.
- *Grade 3* - agricultural land of good to average quality. When more demanding crops are grown, yields are usually lower or more variable.
- *Grade 4* – Poor quality agricultural land. Suitable mainly for grass. This grade also includes arable land that is very dry due to drought.
- *Grade 5* – Very poor quality agricultural land. Land for permanent pasture or rough grazing.

The planning scheme for Loddon, England, includes national and local policy that will affect the future of rural areas. The planning policy position relevant to this project [26] includes *protection of productive farmland* that is of strategic importance in a local or regional context; promotion of high quality, sustainable, intensive farming on high quality farmland; promotion of the efficient use of irrigation water for high return commodities; *zoning* of land with the purpose for rural living only or rural housing where it can be serviced and will not encroach on high quality productive farmland. The Framework for Agriculture states that "productive agricultural lands of strategic importance in a local or regional context should be protected".

The agricultural use regimes are:

- *Regime 1* - Growth - to support large-scale agricultural operations and expansion of existing agricultural enterprises (e.g. dry land, green fields with access to irrigation network), Housing - no, minimum size of structural unit – 250 ha - dry land and 100 ha - under irrigation.

- *Regime 2* - Consolidation of ownership - to support the expansion and consolidation of existing agricultural enterprises (e.g. areas for irrigation of soldiers), Housing - no, minimum size of structural unit – 160 ha - dry land and 40 ha - irrigation.
- *Regime 3* - Niche - to support agricultural business on smaller properties (e.g. areas for gardening), Housing - yes, minimum size of structural unit – 40 ha.

Philippines

In the Philippines, an agricultural zone includes areas intended for tillage, crop planting, tree growing, livestock, poultry, fish or aquaculture production, including the harvesting of such agricultural products, as well as other agricultural activities and practices carried out in connection with such agricultural operations [27]. The agricultural zone includes:

- *Agricultural Protection Areas* - include a network of protected areas for agriculture and agro-industrial development to ensure efficient land use for agriculture and agro-industrial development and to promote sustainable growth.
- *Agricultural Production Areas* - areas that are outside the agricultural protection areas and have been declared by the city/municipality for agricultural use.

Italy

Agricultural marginality in Italy is a multifaceted problem linked to site-specific socio-economic contexts and highly variable technological conditions [28]. Land sustaining yields up to 40% of its potential is classified by [29] as marginal. [28] perform a spatial analysis of the profitability of agricultural land and the constraints to agricultural activities (topography and biodiversity conservation) and propose three classes of agricultural land: *unsuitable, supramarginal and marginal lands***.** The physical threshold for identifying marginal land is determined by the slope of the terrain, which can strongly hinder agricultural mechanization, thus limiting future farm income.

The physical threshold is a slope of 30% [30]. An additional limitation is determined by the presence of territories officially declared as nature conservation areas (i.e. Protected Areas). Four classes of land have been identified:

- *unsuitable* agricultural land: land with a slope > 30%, unsuitable for agricultural production due to limitations in mechanization and higher production costs (labor costs).
- *supramarginal* agricultural land: land with high profitability for agricultural production and limitations for nature conservation;
- *marginal* agricultural land: land with low profitability for agricultural production, which will probably mean their future abandonment.

Australia

In Australia, areas identified as Prime Agriculture are designated primarily for agricultural use in large holdings. They are characterized by extensive agricultural use, a wide variety of crops and the absence of significant areas for non-agricultural purposes:

- *The Exclusive Farm Use (EFU) zone* applies to areas for priority agriculture. These are predominantly high-soil class I to IV lands. In these areas, the maintenance of land in large tracts is preferred over increasing productivity in smaller management units. Smaller areas are used for ancillary farming activities [41]. In this zone, control over subdivisions is important to maintain adequate plot sizes for agricultural activity. Unless a smaller minimum plot size is determined to be appropriate, but not less than 80 acres (325 da).
- *The "Special Farming" zone* is intended for more intensive and specialized agricultural areas. The lands in it cover small farms or areas with a mixture of good and poor agricultural soils. These lands are characterized by poorer hilly, with soils with a smaller selection of crop types, often including specialized crops; plot sizes between 5 and 40 acres. Crop types are mainly orchards, grass mixtures and cereals, pasture and a few specialty crops such as wine grapes and Christmas trees. There is no irrigation.

One of the objectives of the New South Wales Rural Land Use Strategy [31] is to review land use zones in rural areas. The following land use zones are applied:

- *Prime Zone RU1* includes the highest quality agricultural land in the state.
- Other rural zones that can also contribute to agricultural production:
  - *RU2 Rural Landscape*,
  - *RU4 Small Primary Plots*,
  - *RU6 Transitional Zones*

The small plot size zone predisposes the area to residential use. Care is taken in strategic planning to prevent the area from becoming a rural residential area. The NSW Land Strategy prioritizes agricultural land for agricultural production, particularly State Significant Agricultural Land (SSAL) and limits rural land fragmentation, avoiding non-agricultural uses on or near significant agricultural land.

Classification of rural lands in the state of New South Wales according to their potential suitability:

- *Lands suitable for permanent cultivation* - I, II and III classes
- *Lands unsuitable for permanent cultivation, but suitable for livestock farming* with periodic cultivation - IV and V classes - require reclamation and controlled use
- *Lands unsuitable for cultivation, but suitable for pastures* - VI class - reduction of soil load, possible construction of anti-erosion facilities
- *Other lands* - VII and VIII classes - for forest plantations and unsuitable for agriculture and livestock farming

Possible agricultural zones in the state of Victoria [32] include:

- *horticultural areas*
- *intensive livestock areas*
- *irrigated areas*
- *dairy*
- *forest plantations*
- *other large-hectare areas*
- *areas where consolidation, intensification or consolidation of agricultural activities is encouraged*
- *areas where non-agricultural use* and development must be strictly controlled so that potential land use conflicts can be avoided.

Tasmania

The Grose (1999) Guide to Land Suitability for Cropland in Tasmania defines the following land classes:

- *Class 1.* Land suitable for a wide range of intensive cropping and grazing activities - highly productive.
- *Class 2.* Land suitable for intensive farming and grazing. This land is highly productive but has an increased risk of soil resource damage or yield loss.
- *Class 3.* Land suitable for farming and intensive grazing. Soil conservation practices and good management are required to overcome cropping constraints.
- *Class 4.* Land suitable primarily for grazing but which can be used for cropping.
- *Class 5.* This land is unsuitable for cropping. The effects of constraints on grazing potential can be reduced by implementing appropriate soil conservation measures and land management practices.
- *Class 6.* Land poorly suited to grazing due to severe constraints. This land should be preserved under its natural vegetation cover.
- *Class 7.* Land with very severe to extreme limitations that make it unsuitable for agricultural use.

3. *Economic incentives for rational land use.*

To protect against the seizure of valuable agricultural lands for housing and industrial construction and other non-agricultural needs, economic regulatory methods are used in many countries, mainly at the state level. The most common method is the preferential taxation of agricultural land. The basic idea is that agricultural land is valued for tax purposes not at its real value (as for all other types of real estate), but at its actual use. Through this taxation, the potential profit for a farmer who wants to sell the land for subsequent non-agricultural use is significantly reduced.

USA

In New York State, the Agricultural Development Program allows farmers who have included their land in an agricultural fund to apply for preferential land valuation for tax purposes. At the same time, they undertake not to change the land's primary purpose of use. In case of violation, they are required to compensate five times the tax benefits received. Preferential taxation of agricultural land achieves its goal only in conditions of medium and low demand for land.

Another method used for the same purpose (in the states of New York and Massachusetts) is called "buying development rights". Its essence lies in the fact that local authorities buy the right to develop, while reserving all other rights to the plot for the landowner. As a result, he does not have the right to independently make decisions about development and the land is preserved for agricultural use. Participation in such programs is voluntary, but it is assumed that the farmer is interested in selling the development rights to reduce his debts. The main levers for such stimulation are:

- Compensation of costs for the introduction of soil protection technologies and the implementation of land management measures: anti-erosion, reclamation, introduction of crop rotation, land rehabilitation, etc. (loans, grants, subsidies).
- Implementation of environmental measures for land management and sustainable development of territories.
- Compensation of costs (losses, damages) during the withdrawal of land for non-agricultural purposes.

Canada

The government of **Canada** is taking steps to encourage farmers to reclaim abandoned land and reforest unsuitable land. The Soil Control Act, originally passed in 1938, prohibits farmers from using certain cultivation practices to prevent erosion. Special laws are in place to allow for fair compensation for land taken from owners for the purpose of building drainage systems, water mains, or creating community pastures. For effective management of agricultural land, the government has adopted special programs that create certain incentives. Farmers are provided with:

- subsidies to remove degraded land from agricultural use
- funds to relevant organizations for soil mapping, conducting scientific research, and for educational activities

Australia

In **Australia**, restrictions on individual freedom in the field of land use have been established and mandatory land management measures have been outlined in private landowners. The state, applying the environmental policy, forces landowners to manage the land on their plots. In this way, the behavior of the private landowner is regulated in the interest of the whole society, using the following financial mechanisms and resources:

- investments allocated in the implementation of state, regional and local programs in the field of land management;
- exemption from taxes for farmers who have spent their funds for land management projects (construction of dams, drainage; anti - erosion measures; combat weeds, enemies and agricultural diseases, relocation of pasture fences, etc.) in the amount corresponding to 100% of the cost;
- Cash granted by landowners themselves.

4. Agroecological zoning of Bulgaria and gaps in agricultural land management

In agro-ecological zoning (AEZ), a given area is divided into smaller units that have similar characteristics related to land suitability, potential production and environmental impact [33].

The agro-ecological zone is a unit for mapping land resources, defined in terms of climate, landform and soils and/or land cover, and having a specific set of potential opportunities and limitations for land use. In [34, 35] Bulgaria, there are large differences in the natural, demographic and economic conditions that affect agricultural production. Natural conditions are one of the most important for zoning agricultural production. Of greatest importance are soil and climate. For the purposes of agricultural production, agro-climatic and soil zoning of the country has been developed.

Agro-climatic zoning is carried out according to:

- temperature conditions - regions of thermophilic, medium thermophilic and slightly thermophilic crops have been formed;
- humidification conditions - according to the humidification conditions during the period June-August, 6 zones were formed: dry, very arid, arid, slightly arid, normal, humid. According to wintering conditions, 3 areas were defined: with mild, moderately cold and cold winter.

Temperature conditions, in combination with humidity, are the basis for determining 8 agroclimatic regions in the sub-belt of heat-loving crops, 6 - in the sub-belt of medium-heat-loving crops and 8 - in the sub-belt of slightly heat-loving crops.

In soil zoning, the main systematic unit is the bioclimatic zone. The systematization of soil-geographical conditions includes zones, sub-zones, provinces and regions.

Based on the agroclimatic and soil zoning and some socio-economic characteristics added to them (labor resources, material and production base, working capital, economic results of production in the then farms), an analysis of production and efficiency was made for 84 structural units covering the territory of the country. For each region, conclusions have been drawn and specialization in agricultural production has been recommended, both for cultivated crops and for livestock industries, including their interrelation and interdependence. Thus, a picture of the territorial distribution of agricultural production in the country has been outlined with a view to utilizing natural potential, increasing the output and reducing production costs, i.e. increasing the efficiency and profit from production based on its proper specialization and concentration. [34] note that the main indicators that will improve when the recommendations are followed will be the average yields; the cost of production and the quality of production.

Sill there are difficulties in managing of the agricultural areas in Bulgaria [36]:

- The state in Bulgaria does not perform a full regulatory function for the preservation of the natural land resource. Agricultural land use planning in Bulgaria does not receive the necessary attention in the regulatory framework. There is no comprehensive vision for agricultural territory planning. The legislation is fragmented by territory. There are different laws on planning of different territories by permanent use. Some of them a very detailed, e.g. for the urban territory. The regulatory framework lacks a regulatory document that would systematically and purposefully develop, synchronize and the complex of issues of agricultural territory. In a set of regulatory documents there are separate statements that concern only some planning issues. For the agricultural territory, only the most pressing problems of modern times are affected by legislation, there are no strategic regulations for future scientifically based land use, protecting the public interest. For the agricultural territory, spatial planning documents reflect only the existing land use [37]. The Law on the Ownership and Use of Agricultural Land [39] regulates the pressing problems of ownership, the annual land use and partly the consolidation of land properties.
- Agricultural land ownership is small, fragmented, and scattered. The regulatory framework does not help limit its further fragmentation.
- There are large abandoned areas in conditions of land degradation, the quality of reclaimed lands is poor.
- There is no graphical system for reflecting the planned structure and activities within the scope of agricultural territories in the current planning instruments.
- Actually, legal zoning of a municipality territory is regulated in General Development Plan [37]. It determines the boundaries of the territories by primary purpose of use, incl. the agricultural territory. There is no any perspective drawn for future development of agricultural territory.
- Bulgaria doesn't differentiate a building zone in the rural areas but regulates only certain cases of construction in agricultural territoriy, dependent on the area of the landed property [38].
- Zoning of Agricultural Production, scientifically developed in the past [34], is totally abandoned. Agricultural production in

Bulgaria is elemental and chaotic. Soil potential and the potential of the built up irrigation and drainage systems is neglected. The income from Agriculture is low.

- The current state of Agricultural Territory Development Plan is uncertain. Such plans are currently not being prepared on administrative-territorial level. Some activity for agricultural land planning within the agricultural holdings for organizing crop rotations is currently being observed. There is no clearly defined legal framework for creating Agricultural Territory Development Plan. ALOUA [39] partly regulates land consolidation. However, there is not a single regulatory document that would reflect the functions of agricultural territory in zoning regimes and that would regulate the content, scope, rules and norms of development of zoning plans for agricultural territory, as it is with the other types of territory.
- At all hierarchical levels of land resources management, there is a need for clear criteria for planning and development of land use in AT.

5. *Conclusions with conceptual proposal for spatial zoning of agricultural territory in Bulgaria*

Abroad, in the approaches to spatial planning of rural areas, there are two concepts related to land use – about what is "agricultural" and what is "rural". In the first, agriculture is the main land use activity, in the second – agriculture is subordinate, allowing non-agricultural (residential) buildings and activities. This is related to the quality of the land. The first covers all the requirements for sustainable agriculture, including soil fertility, physical characteristics of the terrain and meteorological conditions. The second is related to limited potential for agricultural use and allows conditional use of low-quality lands. In this sense, two zoning alternatives are applied, taking into account buildings and non-agricultural activities – exclusionary and non-exclusionary (USA).

The agricultural area itself is also subject to categorization, depending on the quality of the land and following its potential. Different countries provide different levels of categorization, but in general they all include several classes of land, covering different criteria, mainly related to their possibilities for agricultural production. In general, the prime agricultural area is designated and protected for long-term agricultural use. This is an area with very high quality land and is intended for intensive agricultural production. Other areas are intended for raising livestock, pastures, etc., due to good or poor quality and/or adverse meteorological conditions. The theory of land marginality distinguishes between supermarginal, marginal and unsuitable agricultural land, based on criteria related to natural factors.

Agricultural lands are included in all levels of spatial planning. These levels are usually differentiated on an administrative basis. The state and provincial levels are the strategic ones, whose objectives are determined by the state and provincial governments. At these levels, spatial plans are developed such as Comprehensive Plans, State Land Use Plans, and other names. Next are the regional and local (municipal) levels, which follow the directives of the higher levels, but the municipal level is the one that deals with the territorial predictions. Usually, zoning at this level is mandatory and affects all types of territories, including agricultural territory. General Development Plans, Municipal Plans, Zonal Plans at the local level, etc., are developed, which have a direct impact on landowners.

Bulgaria, as a member of the OECD countries, has adopted the spatial categories: peripheral, main agricultural zone and remote, extensive, marginal zone. Bulgaria does not differentiate building zones in rural areas, but regulates certain cases of construction, depending on the area of the land property, without changing its primary purpose of use. Agricultural territory is outlined by the General Development Plan at the municipal level. Zoning of agricultural production, scientifically developed in the past, is not applied today. There are many legal gaps in the agricultural territory management in our country.

Many economic incentives for rational land use are applied abroad, mainly preferential taxation, preferential land valuation, compensation for the costs of land reclamation and for the implementation of environmental measures, etc.

Spatial plans in Bulgarian legislation are legal acts of specific category. Their specificity is that they contain mandatory predictions and perspectives performing bindings. Their legal features are specific and mandatory for enforcement. The protection of agricultural land and its production functions through strategic spatial planning can be achieved through a flexible approach. Due to the natural and dynamic nature of agricultural production, zoning should be of a recommendatory nature. The implementation of its forecasts can be stimulated through financial mechanisms such as subsidy policies, land tax policies, etc. Zoning should correspond to local soil and climatic conditions and take into account the cultivation of appropriate crops, the implementation of appropriate farming systems, land reclamation, etc.

As a general zoning of the agricultural territory, three zones are suggested:

- *A zone for market-oriented agricultural production.* Its characteristics will be: long-term regime as foreseen by the General Development Plan and no permission of changing the permanent purpose of use for construction. This zone should be subjected to the entrepreneurship for primarily commodity production for the market. It should include the following main methods of permanent use: cropping fields, perennial plantations, pastures and meadows. The diversity of land quality and climatic conditions over the country predisposes differentiation of development zones, namely on the above mentioned methods of permanent use and others with recommendatory regimes. Also: non-farm territory - unused land with developed shrubs and forest vegetation, ravages, gullies, slopes and other non-agricultural land; territory for restoration from soil degradation; territory of irrigation/drainage system; terrain under reclamation, etc. This presupposes regional specialization of the agricultural production. The purpose is to use each location productive potential of the agricultural land. The information background for zones designation should be: 1) the traditional zoning of the agricultural production; 2) the land quality assessments; 3) the existing soil varieties; 4) the availability of technical infrastructure (mainly ameliorative) that serves the agricultural production process, etc.

The adherence of the recommendatory regimes should be stimulated through different financial incentives.

- *A zone of suburban agriculture***,** according to the specific regional and settlement conditions. It should be outlined for the big cities and for settlements with forecasts for economic and social activity increasing. It should be designated where there are appropriate physical-geographic conditions and availability of land resource. The suburban agricultural area is a transitional area between the urbanized and agricultural territory. It is of ecological importance for creation of natural environment and providing for quick contact of the citizens to the natural life factors. This zone is intended for direct self-supply with fresh food. A particular terrain with a specific regime (areas suitable for linking the agricultural activities with recreational activities – villa zones) should be part of this territory.

The need for contact with nature and also for fresh immediate food has brought to the idea of *urban farming zone within the urbanized territory*, mainly in the big cities. It is a contemporary tendency to plan suitable urban landed properties for small agricultural production, being at the same time part of the city's green system. In the economic sense, such area should be foreseen for private and family entrepreneurship for subsistent agriculture and rarely for the market. The anthropogenic impact should not be in conflict with the urban functions [40]. This zone is not part of the agricultural territory but urban territory.

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