

The General Urban Plan of Casimcea territorial administrative unit, map of natural and anthropogenic risks

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ABSTRACT: The General Urban Plan represents the legal ground for any development action proposed. After endorsement and approval as required by law, GUP is act of authority of local government for the area in which it applies. The aim is to establish priorities regulations applied in land use planning and construction of structures. In terms of geographical location, the administrative territory of Casimcea, Tulcea county, falls in the central Northwest Plateau Casimcei. This is the second unit of the Central Dobrogea Plateau. Geographical location in southeastern Romania, climatic and relief conditions and anthropogenic pressure, expose the village administrative territorial unit Casimcea, permanent susceptibility to produce natural and antropogenical risks. In this context, we identified the following categories of natural and anthropogenic risks: i) natural risk phenomena (earthquakes, strong winds, heavy rains, floods caused by overflowing or precipitation, erosion of river banks and torrents, gravitational processes, rain droplet erosion and surface soil erosion); and ii) anthropogenic risk phenomena (overgrazing, chemicals use in agriculture, road transport infrastructure and electricity, wind turbines for electricity production, waste deposits, agro-zootechnical complexes, and human cemeteries). Extending their surface was materialized by creating a map of natural and anthropogenic risk on Casimcea territorial administrative unit, explaining the share of potentially affected areas as territorial balance.

KEY WORDS: Risks, Casimcea Plateau, General Urban Plan

1. Introduction

Central Dobrogea Plateau is the oldest in Romania morphostructural unit that has arisen through erosion by leveling the action of denudation processes and pediplanation, an old orogen become stable since the early Paleozoic (about 540 million years ago).

Composition of solid rock (shale green) resulted in the formation of large areas of a relatively homogeneous and uniform relief with wide valleys, shallow, uneven insignificant current presence faded loess deposits of Quaternary age.

Plain erosion (pediplain) thus formed was fragmented and transformed the river into a series of hills and plateaus relatively uniform that the relief is low (40-80 m). Landforms resulting surfaces such as leveling or residual character: outliers, pediments etc.

In Romania, Dobrogea has a diverse range of risk phenomena, a large share of these are climate risks. In the following chapters, we will make a preliminary and succinct presentation of the main natural and anthropogenic hazards.

2. Natural risks

2.1. Meteorological and climate risks

The most important climate features of the Dobrogea Plateau are climate risks. They are severe and they are result of correlations between high temperatures, low rainfall, hot dry winds due to geographical location, atmospheric circulation and relief configuration.

The analysis of temperature variation correlated with rainfall using climograma Walter-Lieth in double and triple scale (figure 1) for the period 1986 – 2000 reveals dryness, or drought. Dry period is usually between mid May and late October, but in the analyzed period (1986-2000) there is an extension of three months (mid-March to end of November).

In administrative territory Casimcea the risk climatic and meteorological phenomena are:

- 1) Drought and dryness phenomenon due to the highest average temperatures, low rainfall, hot dry winds
- 2) Heavy rains of short duration, hail, convective storms, high risk of tornadoes,
- 3) The wind - in the summer there are hot dry winds and in the winter the are snow storm

Drought and dryness occur during the period of maximum temperature and minimum rainfall. It begins usually in May with a period of dryness which it amplifies in July-August and becomes the real drought. The dry period ends in October. In the last 10 - 15 years due to global warming, there is an intensification of these phenomena so that drought period was extended to 6 months, it begins in April and it finishes in October.

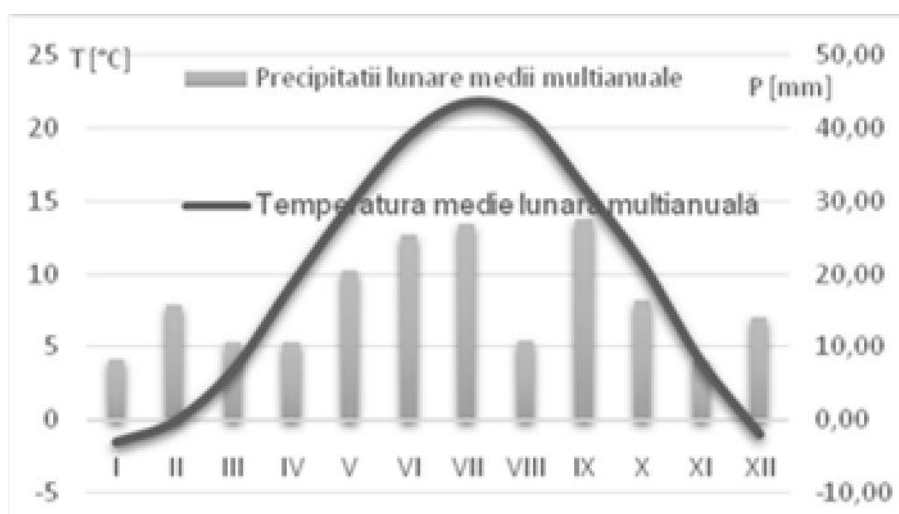


Figure 1. Multiannual monthly average temperature and monthly average precipitation annual at Corugea station (220 m altitude). Climograma Walter-Lieth in dual scale (1986-2000).

Torrential rains occur in conditions of thermal convection during the warm season, due to mediterranean cyclone which develops in west of Black Sea. Sometimes the heavy rains are accompanied by hail and wind intensification (for example, the amount of 102.11 mm of rain fell in Corugea in July 7, 1997).

Due to the large amounts of rainfall in a short time, morphodynamic phenomena occur with the following characteristics:

- ❑ High potential for development of processes pipping and compaction;
- ❑ High potential for producing fluvial processes especially in the spring when there is a surplus of water from snowmelt;
- ❑ Acceleration of the wash process on the loess substrate surface (raindrop impact processes and runoff).

The lightnings which accompanying torrential rains can cause damage or even loss of life. Average annual number of days with thunder and lightning is about 12 days. Hail can cause substantial damage to agricultural crops.

Local wind regime is particularly influenced by the location of Casimcea administrative territory on the ways of strong winds and very active.

Strong winds are very active. In winter they cause air temperature decrease. The wind named "Crivăț" discovers fall crops, and when this is associated with snow causes strong snowstorms. The summer, winds increases soil water evaporation, accelerates evapotranspiration and thus accentuates droughts.

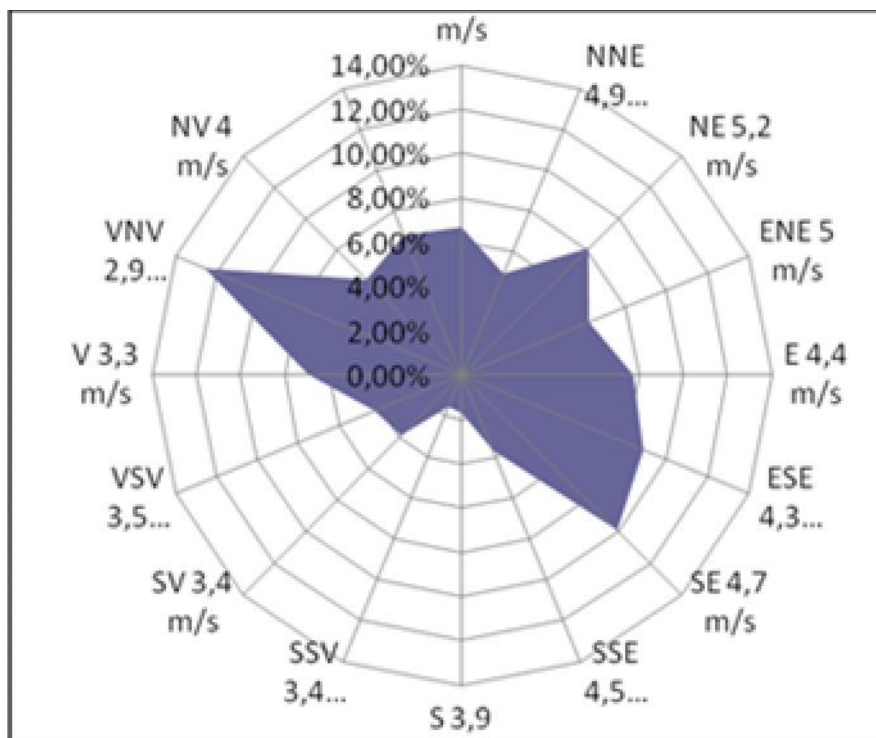


Figure 2. Wind frequency and wind average speed in the direction at the meteorological station Corugea (2008-2012).

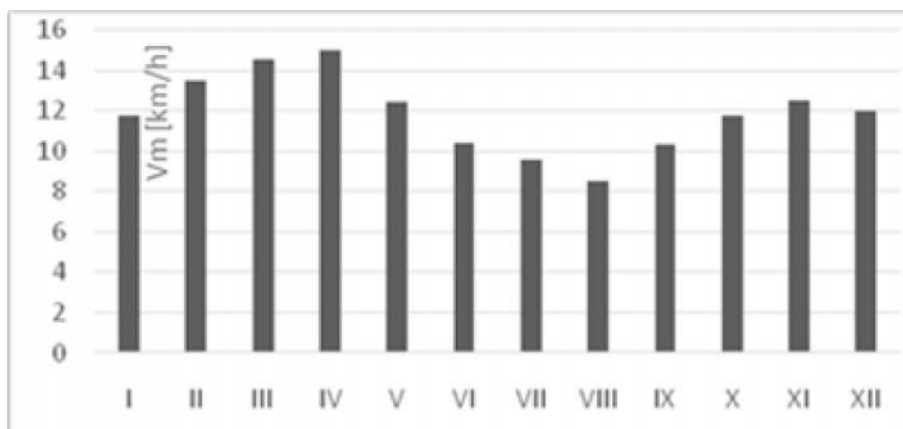


Figure 3. Monthly average wind speed, 1986-2000 at the meteorological station Corugea.

Strong winds are a risk phenomenon when the wind gusts over 17 m/s wrest trees and roofs of houses and cause disruption of power supply. Forecasters issue warnings to an average wind speed over 10 m/s for hazardous weather and when the wind speed are over 15 m/s warnings are for worsening hazardous weather.

At the same time, the wind transports the soil particles or dusty loess from the top of hills and hillocks and then these particles are deposited in sheltered places against the wind, thus affecting the crops. In sectors where thickness of loess deposit was thin the intense actions of strong winds led to partial loss of topsoil.

The phenomenon of deflation until base rock is encountered in the west part of administrative territory Corugea, from Stâncea sector to the left side of Topolog river, on the plateau from the northern limit of Războieni village area to the edge of Alecsandri Forest, on the plateau from south of Războieni village, on the Rahman Hill in north-eastern village Rahman et.

Floods caused by overflowing or precipitation: Casimcea administrative territory overlaps the river basin Casimcea and Topolog. Watershed between Casimcea and Topolog crosses the north-south direction the middle part of the administrative territory, and it overlaps on the line of highest altitudes.

The rivers and tributaries flows are strongly influenced by climatic conditions which they reflect both on the water resource and the drainage process. Average annual flows are low, like all rivers on the Dobrogea area.

Casimcea river basin has 755 km² surface and 58,5 km length. It is a basin well developed but only its upper course belongs to administrative territory Casimcea. Its annual average flow is 0,083 m³/s, and has variations between 0,03 m³/s and 0,180 m³/s.

Topolog River basin has 755 km² surface and 38 km length. Its multiannual average flow is 0,29 m³/s, and has variations between 0,04 m³/s and 0,75 m³/s.

The two rivers have their valleys formed on a geological syncline axle. The transverse profile has „U” shape. They have a permanently flow and their level grows during the spring time or late summer and/or after heavy rains. Their water resources are from springs and rainfall.

Most of the year the water flow is low and does not cause floods. Torrentiality degree is generally low, so it is possible that the floods occur the median sector of Casimcea commune by overflowing of torrent Casimcea or its tributaries downstream of Războieni village, only after important

rainstorms. Also, Mahomencea brook, left tributary of Topolog river, has a lot of undeveloped torrents which can produce floods in Casimcea commune.

Topolog River has caused periodically accidental floods in the southern territory, downstream of Rahman village, which has lead to some improvement works and protections of its banks.

In the south-eastern sector of Rahman village, the Topolog River overflows during the rainfall periods. These floods produce damage to some households and buildings so it is necessary recalibrating minor bed of the river in a sector relatively reduced.

Flashfloods highlight the torrential nature of rainfalls, when the level of the river increases rapidly, sometimes only in few minutes. The winter floods last more than 30 hours and the summer floods up to 12 – 14 hours. They are different because in the winter the floods are produced from sudden melt of snow and in the summer the flood are produced by heavy rains of big intensity. In 2005, when level precipitation arrived to historical precipitation levels, Casimcea River exceeded flood quotas by more than 3 m on administrative territory Casimcea.

2.2. Geological and geomorphological risks

2.2.1. Earthquakes

Casimcea administrative territory, Tulcea county, belongs to zone 7 degrees MSK of seismic intensity according intensity zoning of Romania (STAS 11100/1-93), having a return period of 50 years (Figure 4).

Periods of producing of earthquakes, manner of expression and their effects on buidings are unforeseeable.

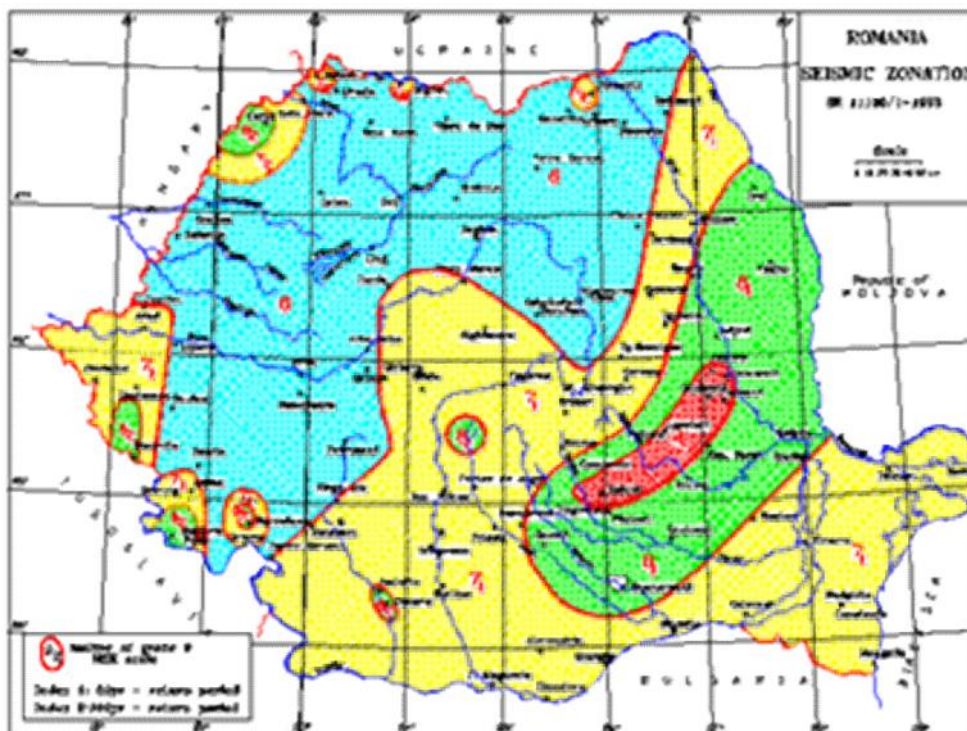


Figure 4. Seismic Zoning of Romania in MSK degrees of intensity (by UTC, București).

Official data show that on Casimcea administrative territory two important earthquakes had occurred but without significant damage:

- earthquake of 4 March 1977, with the epicenter in Vrancea
- earthquake of 3 November 1977, with the epicenter in Beștepe administrative territory, Tulcea county;

Consequences of these earthquakes were the damage to existing buildings, most of them without be affected their structure of resistance, but in the future new buildings must be properly designed taking appropriate constructive measures in accordance with the requirements of Law no. 10/1995 on the quality of construction.

2.2.2. Gravitational processes

Gravitational processes occur in the areas where hard rock is over the loess deposits of low cohesion with appreciable thicknesses and high slopes. Rainwater are infiltrates and undermines the above deposits through underground flows.

The compaction and pipping are the result of undermining of above deposits by water infiltration and water circulation in poorly cohesive permeable deposits. The process is enhanced by specific semiarid climat, the drought favors the appearance of cracks in soil and the rainfall produce erosion and removal of particles. Other forms of this process are: pipping pits and chimneys, pipping galleries and tunnels and pipping valleys.



Figure 5. Gravitational processes (rockfalls – Colțanu Mare, falls of bank river-Mahomencea Valey).

The falls of bank rivers are frequently due to uncohesion of deposits of the valley. They meet along the steep banks of valleys Topolog, Casimcea and Mahomencea.

Rockfalls is natural risk factor which can act only local in outside villages zones, where the green schists are at surface (Colțani), in sectors of Topolog River (Rahman and Haidar) with its tributary brook Mahomencea (Corugea village and the area of former village Stâncea) and Casimcea River (Războieni and Casimcea).



Figure 6. Compaction and pipping.

2.2.3. Riverbank erosion and torrential erosion

The river basins Topolog and Casimcea are eroded fluvial and torrential. The erosions are by different intensity thereby modifying the landform. From this point of view, Topolog basin is more affected than Casimcea basin due to the bigger difference of level. The difference of level is about 300 m and is produced on a distance of about 15 – 20 km, and for Casimcea basin it is 45-50 km. So, it notes in particular Mahomencea basin, left tributary of Topolog River has torrential erosion forms and regressive erosion forms.

Torrential erosion is favored by climatic factor by torrential rainfall and it is accentuated by the declivities and fragility of superficial deposits (loess deposits on the interfluves and slopes). Torrential erosion affects valley slopes, their contact with interfluves (here displaces material – regressive erosion) and thalwegs (here alluviation and forming alluvial cones and flat-bottomed valleys).

Under torrential intensity process, quaternary deposits have been eroded, the thalweg was deepened to base rock, bringing on surface the green schists.

Torrential flows called „seluri” look like mudflows due to the large amount of sediment after that they are deposited and give the flat-bottomed valley character to all the river beds.

The banks of Topolog River, which crossing approximately from North to South the villages Cișmeaua Nouă, Rahman and Haidar, are strongly affected by erosion accentuated. The absence of plants which fix the soil from built-up space and the vulnerable to erosion of loess deposits contribute to the increase of bank erosion.

Banks of Casimcea Rivers on short sectors near Războieni village and Casimcea commune and Mahomencea Brook, tributary of Topolog River are more affected. Be noticed that there are deep and active torrents for exemple the torrent Valea cu Piatră of southern extremity of Casimcea built-up area. In the center of Casimcea common the erosion of the banks of Casimcea River has generated a flooded and partially clogged sector with alluvial deposits. In this direction it has been improvement and consolidation with stone revetment to the sector of the river next

to local church. Also in the souther sector of the Războieni village there are several torrents which have been arranged against the erosions of banks river and the bridge over Casimcea River is protected against scouring.

This natural risk is very active in Casimcea commune so it should consider carefully the delimitation of construction areas.

3. Anthropogenic risks

3.1. Overgrazing

Since ancient times in Dobrogea area an important occupation was livestock, especially sheeps due to large areas of grasslands. About 7% of the national sheeps are in Dobrogea.

The main cause of degradation habitats of natural steppe and secondary meadows is the grazing. Thus the habitat of valuble and protected species (*Stipa capillata*, *Astragalus cornutus*, *Dianthus pallens* etc.) are affected and replaced by other resistant and invasive species (secondary associations of *Poa bulbosa*, *Artemisia austriaca* and *Euphorbia steposa*), resulting from overgrazing.

Most of the original vegetated was removed by consumption or mechanical destruction and the ecosystem cannot be regenerated so rapidly. Vegetation is gradually reduced so the processes of soil runoff and erosion are favored and these processes are accentuated in moisture deficit conditions.

On the administrative territory of Casimcea, livestock is one of the most important occupations, but it was reduced lately. Sheepfolds or zootechnical units are in proximity of villages (Casimcea, Corugea, Cişmeaua Nouă, Rahman, Haidar, Războieni).

3.2. Soil degradation by the use of chemicals in agriculture

The sheet-flow erosion phenomen is very active in Dobrogea central because of its semiarid climate. This removes the fertile soil horizon, so it is necessary adding of the artificial nutrients.

Using different chemicals for increasing the plant productivity and soil fertility as: chemical fertilizer, substances for pest species control.

When these substances are using without taking into account the type of soil, weather conditions and plants needs can cause disturbances to the ecological balance. Accumulation of nitrates and phosphates in the upper horizon of soil has a toxic effect on soil microflora and can facilitate the development of other plant which have a bigger ability to accumulate them. These phenomena washing soil and drain lead to accumulation of these chemical substances in rivers thus causing excessive growth of algae that causes axfixia of fishes.

3.3. Overhead power lines 400 kV, regional 110 kV and local 20 kV

Overhead power line of 400 kV is an important anthropogenic risk factor. It crosses approximate on north – south direction the territory of west extremity of Casimcea commune, respectively the settlements Rahman and Haidar. Regional overhead power line 110 kV intersects on a lengthh about 1,5 km the western corner of Casimcea commune and provides power supply by

connecting with local overhead power line all the settlements including the transformation stations.

3.4. Wind turbines

According to the study of wind potential map of Tulcea County, elaborated by Danube Delta National Institute for Research and Development results that Casimcea administrative territory is a significant area for location of wind turbines an/or wind farms. The wind farm in the north-east sector of Casimcea commune is under construction. It is a anthropogenic risk factor by the wind turbines position in site but more important by network cables buried.

The total surface of influence area is approximately 150 km² and it is calculates at 758 m in the dominated wind direction (nort-west) and 455 m in the perpendicular direction to the vertical axis of the turbine. Of this area 14,2 km² overlaps the site of Community importance ROSCI0201 Dobrogea Plateau and 59,5 km² overlaps the site ROSPA0100 Casimcea Steppe and even some wind turbines have axis in their perimeters.

According to the documentation of construction and operation, the impact of wind turbines on the environment are low risk or nor risk at all.

3.5. Waste deposits and domestic waste

In Casimcea admnistrative territory is not an ecologic deposit of waste and/or domestic waste. Also in the list approved by Order of Ministry of Environment and Water and the Ministry of Agriculture, Forests and Rural Development no. 241/196 in 2005, for approve the list of localities in counties where there are sources of nitrates resulting from agricultural activities (areas vulnerable and potentially vulnerable), the commune Casimcea is not on the list as NVZ (nitrate vulnerable zone) according to the number of inhabitants and concentration of livestock or the existence of waste deposits.

Noted that villages of Casimcea commune don't have a centralized sewerage system and wastewater treatment and have not adopted yet any one. The project will have to comply with the minimum legal distance of protected sanitary between treatment plant and the nearest house (300 m) in accordance with the Ministry of Health No. 536/1996.

The program of Tulcea county for management of waste deposits and domestic waste for Casimcea admnistrativ territory did not provided a centralized platform with the requirements of the EU Nitrates Directive which should respect the minimum distance of sanitary protection to the nearest house of 1000 m.

On the admnistrativ territory are not located industrial units generating pollution and there were no reported cases of pollution of the ground water which are the source of water supply to existing systems.

3.6. Zootechnical units

Inthe administrative territory Casimcea were several zootechnical units as: Resorts Agricultural Machinery, sheep, cattle and pig farms, stalls, state farms. Now, some of them were dissolved but most of them were limited or privatized and modernized.

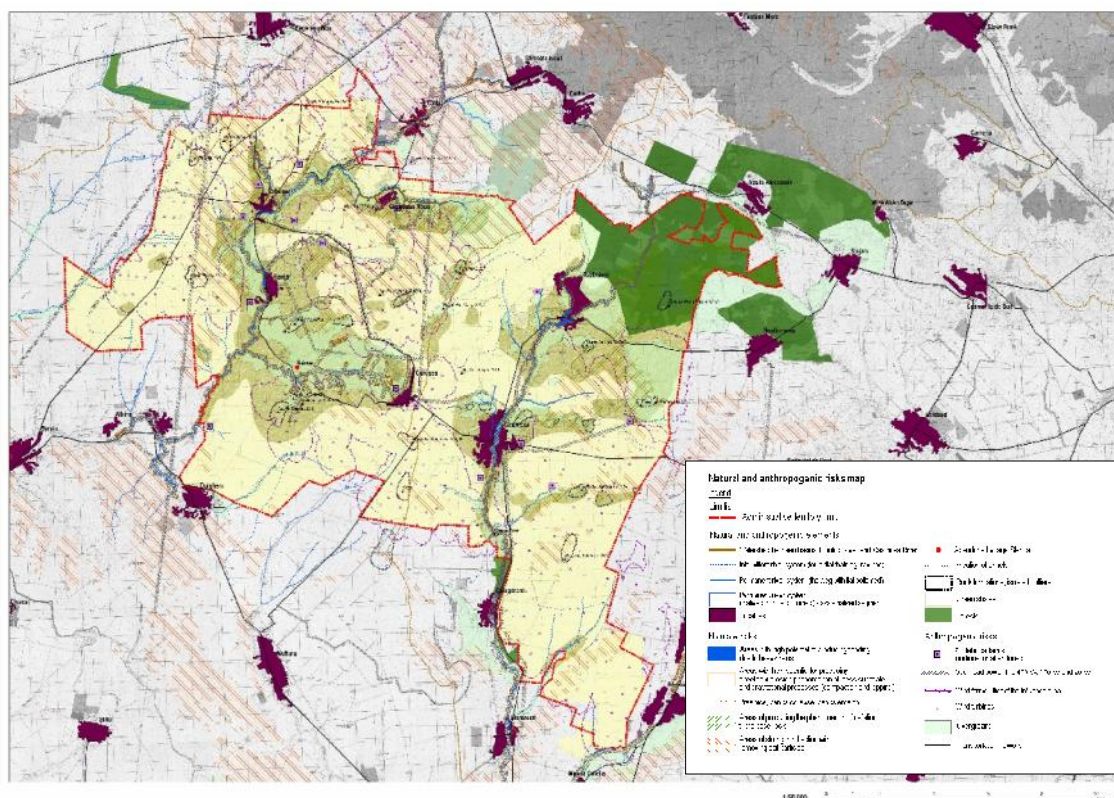


Figure 7. Natural and anthropogenic risks map.

4. Conclusions and preliminary recommendations

Preliminary recommendations on the possibility of building on land based on the study of natural and anthropogenic risks.

In the administrative territory Casimcea can be identify areas with high potential for natural and anthropogenic risks with following conditionings:

- Zones with temporary forbidden constructions, conditioned by drawing of geotechnical studies for determining the the depth of foundation construction. In this category there are the free lands in centre, west and south of administrative territory, now agricultural used and previously unbuilt. Foundation terrain in these areas consists of loess yellow, macroporous, hard, dry, sensitive to wet damping with very different thicknesses which fall into different categories of Normative Design NP125-2008.
- Unfavorable zone for building, terrain fundation is affected by erosion and/or flooding after heavy rainfall, such as some sectors unimproved or incomplete improved on vicinity of banks of Topolgi River and its tributary Mahommencea Brook, in Rahman village and Casimcea River in central part of Casimcea commune.

- c. Zones with definitive forbidden constructions, represented by protected areas of overhead power lines 400kv, 100 kv, 20 kv crossing the administrative territory
- d. Zones with definitive forbidden constructions, represented from the former waste deposits in the villages of Casimcea commune backfilled or not, contaminated with organic and/or inorganic waste, where the foundation terrain is inadequate.
- e. Unbuilt areas, represented by wind farms and photovoltaic centrals designed specified in existing PUZ.
- f. Unbuilt areas, represented by the steep slopes of torrents and/or rocky scarps potential harnessed to be transformed into touristical attractions situated in southern of Casimcea commune, Mahomencea Brook, some sectors of villages Războieni and Corugea.

Recommendations for measures to be taken to prevent and reduce exposure to natural and anthropogenic risks of villages of Casimcea administrative territory:

- a. Measures against flooding resulting from heavy rainfalls – it is necessary to establish the natural risks studies to establish the opportunity a systematizing of flooding areas. The areas of flooding risk are particularly sectors of confluence of rivers: Casimcea River and its right tributaries - in built-up area Casimcea; in northern and southern part of Războieni village;
 - Topolog River in Rahman village downstream of the point of confluence with Rahman Valley and in Haidar village downstream of the point of confluence with Curamea Valley.
 - Osâmba River in north of Cișmeaua Nouă village.
 - Upper sector of Mahomencea valley in south of Corugea village.
- b. Measures against torrentiality, collapses and banks erosion: arranging erosion dams, retainer decks, dams fixed on cones of dejection, damming and arrangements of river bed. In building area are required elaboration of specialized geotechnical studies. Erosion and collapse of the banks are present along the main river system: Casimcea, Topolog, Osâmba, Mahomencea.
- c. Protection against deflation is necessary to protect crops and settlements against wind erosion and in particular to prevent entrainment, transport and deposition of loess during the summer and snow in winter time. Will be arranged Protection curtains natural or antropoc against wind especially in areas exposed to prevailing atmospheric circulation (NW, NE, E, SE).
- d. Measures against the risk of contamination due to zootechnical farms, cemeteries and waste deposits – it will determine the area of protection according to the WHO 593/1997. In these areas it is possible to build with the agreement / opinion of specific authorities who have established restriction regime.
- e. Measures to reduce the impact of wind turbines in the settlements, by establishing minimum distance of location of wind turbines.

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