DETERMINATION OF INDICATORS OF SUSTAINABLE DEVELOPMENT OF THE PLOPŞORU COMMON RURAL AREA AFFECTED BY THE RESTRUCTURE OF THE MINING INDUSTRY

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Abstract: Plopşoru commune is integrated in the development sub-area of Gorj County, being the locality with the largest communal areas. Determining the indicators of sustainable development for the rural area Plopşoru will lead to the identification of the development solutions for the rural area. The paper aims to identify the weaknesses by determining the human development indicators in Plopşoru commune affected by the restructuring of the mining industry.

Key words: Mining industry, sustainable indicators.

1. OVERVIEW

Administrative-territorial commune Plopşoru has an area of 8002 ha, being considered the locality with the largest communal areas in Gorj County. It comprises 11 villages: Piscuri, Deleni, Olari, Plopşoru, Sărdăneşti, Izvoarele, Ceplea, Broșteni, Cursaru, Broșteni de Sus, Văleni, with about 6,703 inhabitants. [Irimie, I.I., 2003, Popescu, C.R., 1998]

Gorj county has several development sub-areas, of which are also the communes Câlnic, Fărcăşeşti, Balti, Urdari, Plopşoru, Bănești, Ionești and Țânțăreni, together with the cities Rovinari and Turceni, being classified in the 5B development sub area (Vladu, B., 2018).

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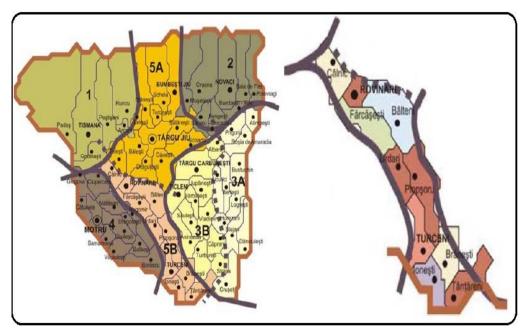[4] *Student Ec. at the University of Petroşani,iuliagrigorie99@gmail.com*

Fig. 1. *Plopşoru village location - Sub zone development 5B*

The main features of this development sub-area are:
- easily accessible major roads, roads and railways;
- the size of the communes and the importance of the two cities (Rovinari and Turceni);
- the relatively young population and the positive natural growth; heavily industrialized sub-area;
- average levels of development and tendencies to maintain/stabilize the population [Irimie, I.I., 2003].
In addition to these positive characteristics there are also negative phenomena:
- serious environmental problems (landscape changes, pollution and atmospheric aggression);
- high degree of dependence on mining activities and electricity production;
Specific to this development sub-area 5B are social and environmental issues.
The climate of Plopșorul commune is in the type of temperate-continental climate. The average annual temperature is within the range of + 10.2° C, and the absolute minimum temperature is -31.0° C and the maximum absolute temperature is + 40.6° C.

2. POPULATION

The population of Plopșoru commune consists of 49.99% women and 50.01% men, figure 1.2 [Popescu, C.R., 1998].

At present, there are a total of 6787 inhabitants, which have about 2200 households and a number of 2300 dwellings.

The labour force from Plopșoru commune indicates an active population occupied in the year 2012 of 1798 employees and an unemployed number of approx. 438.
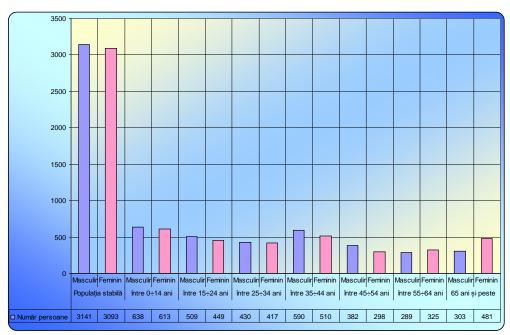
	Populația stabilă		între 0÷14 ani		între 15÷24 ani		între 25÷34 ani		între 35÷44 ani		între 45÷54 ani		între 55÷64 ani		65 ani și peste	
	Masculin	Feminin	Masculin	Feminin	Masculin	Feminin	Masculin	Feminin	Masculin	Feminin	Masculin	Feminin	Masculin	Feminin	Masculin	Feminin
Număr persoane	3141	3093	638	613	509	449	430	417	590	510	382	298	289	325	303	481

Fig. 2. Population distribution by age

3. OCCUPATION OF LAND IN THE AREA

Plopșoru commune occupies a total area of 8002 ha, of this area approx. 643 ha is located in the town and 7359 ha is in the town. According to the operating licenses, the perimeters of the Roșia de Jiu, Peșeana North and Peșeana South Quarries are also included here. In order to extract the lignite reserves from the economically exploitable mining fields, the working quarries will finally occupy the land areas presented in table 1. [Government of Romania, 2008, Popescu, I., 2003].

Table 1. Areas occupied by mining, ha

Quarry	Roșia de Jiu	Peșteana North	Peșteana South
The area currently occupied	1738,8 ha	732,8 ha	476,7 ha
The area future occupied	2187 ha	859 ha	553 ha
Total	**3599 ha**		

4. QUALITY OF ENVIRONMENTAL COMPONENTS

As a result of the exploitation of the lignite deposit in the Roşia de Jiu, Peșeana North and Peșeana South quarries, the groundwater canvas was affected.

The main sources of air pollution with suspended particles in the Roşia de Jiu, North and South Pit quarries (fig. 4.1.), Especially at the points of discharge and at the loading points on the haulage machines or on the conveyor belts front; transport and storage of dumped material in waste dumps, using waste disposal facilities, etc.

Fig. 3. Storage of sterile material in dumps

The air currents draw dust from the quarry and from the transport roads, as well as the dust and even the tailings from the slopes and excavation steps polluted the atmosphere. They are transported at a great distance, on the lands and in the neighbouring localities, which is why the suspended powders have been determined.

From the periodic measurements made „*in situ*" it was found that in certain work points the concentration in dust is higher than the allowed CMA (fig. 4.2.)

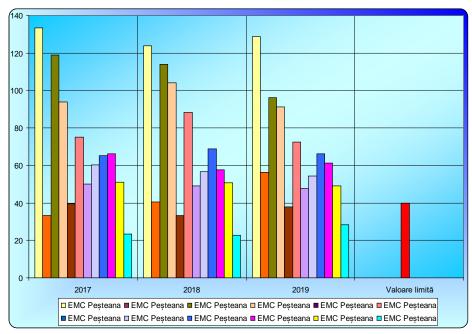As a result of the mining activity, about 51.47% of the surface of Plopșoru commune is affected by slip phenomena.

Fig. 4. Variation of PM 10 content in the area of the Peșteana mining perimeter

5. THE EDUCATION SYSTEM

It is observed that the number of children of preschool age has decreased by 32.83%, which will also lead to the reduction of general school students in the years to come from figures 5.1. and 5.2. About 75% of the students who finish high school attend high school.

6. THE TOWN HALL OF PLOPȘORU COMMUNE

In accordance with the Strategy for economic-social and environmental development of Plopșoru, the mayoralty of Plopșoru commune proposes the following strategic objectives:

- raising the standard of living of the inhabitants of Plopșoru commune;
- ensuring a high degree of competitiveness of all sectors of activity;
- supporting economic development by promoting the public-private partnership and creating attractive opportunities and facilities for potential domestic or foreign investors;
- promoting a performing agriculture and reviving the rural area, as a socio-economic alternative of the urban environment;
- development and diversification of public services offered to citizens; modernization and development of physical infrastructure and other public utilities;

- protection of the environment, development and rehabilitation of the environmental infrastructure;
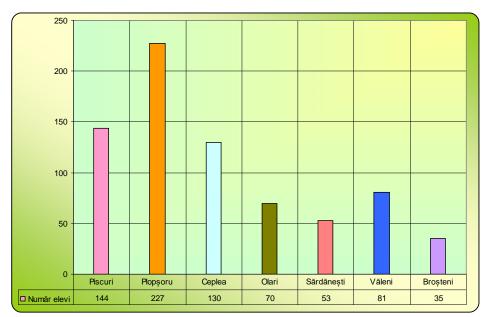- business infrastructure development; capitalizing on the local tourism potential.

	Piscuri	Plopșoru	Ceplea	Olari	Sărdănești	Văleni	Broșteni
Număr elevi	144	227	130	70	53	81	35

Fig. 5. The situation of students enrolled in primary school

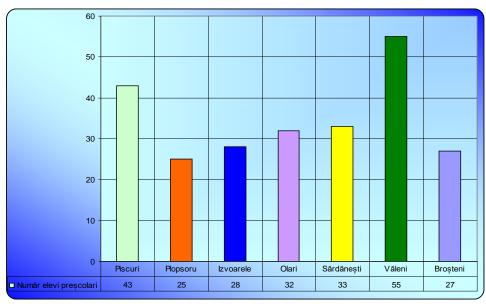|	Piscuri	Plopsoru	Izvoarele	Olari	Sărdănești	Văleni	Broșteni
Număr elevi preșcolari	43	25	28	32	33	55	27

Fig. 6. Situation preschool students enrolled in kindergarten

7. DETERMINING SUSTAINABLE DEVELOPMENT INDICATORS

The degree of recovery (GC) of the income from a tax is determined as the ratio between the actual receipts obtained from a particular tax and the totality of the payment obligations of the citizens related to that tax, and is calculated with the relation (Vladu, B., ș.a., 2018, Vladu, B., 2018):

$$G_C = \frac{\hat{I}_n}{D_b} \tag{1}$$

Where:
$\hat{I}_n$ – realization proceeds, in lei,
D_b – debit or payment obligations of taxpayers in lei.
Thus, for 2017, the degree of recovery of income from property taxes is (Zamfir C, ș.a., 2007):

$$G_C = \frac{\hat{I}_n}{D_b} \times 100 = \frac{287.63}{1119.71} \times 100 = 25.69\% \tag{2}$$

For the collection of all local taxes (Gca), the degree of local tax collection is used, which is calculated as a weighted average of the collection rates for different taxes in relation to the tax collections, which is determined by the formula:

$$G_{ca} = \frac{\sum (G_{ej} \cdot I_j)}{\sum I_j} \tag{3}$$

Where:
G_{ej} – the degree of recovery of the various taxes,
I_j – takings tax
For 2017 was calculated with the equation, the recovery of all taxes, it is:

$$G_{ca} = \frac{\Sigma (G_{ej} \cdot I_j)}{\Sigma I_j} = \frac{(1903247 \cdot 25{,}69) + (8273301 \cdot 60{,}16)}{1903247 + 8273301} = 53{,}71\% \tag{4}$$

For Plopșoru commune the level of taxation (N_f) was determined (Vladu, B., 2018). At a certain tax it is calculated as a ratio between the effective level of taxation and the maximum level of taxation allowed by law for that year, and is determined by the formula:

$$N_f = \frac{N_{ef}}{N_{max}} \tag{5}$$

Where:

N_{ef} - level of taxation actually made,

N_{max} - maximum charge allowed by law for the current year.

In Plopşoru common in the 2017 tax changes for tax collection are calculated with the equation 3:

$$N_f = \frac{N_{ef}}{N_{max}} \times 100 = \frac{1903247 + 8273301}{18282007,04} \times 100 = 55,66\% \qquad (6)$$

In order to calculate the level of approved taxation (N_{fa}) from all local taxes, it is determined as a weighted average for the level of taxation at local taxes according to the tax collections (Vladu, B., 2018), namely:

$$N_{fa} = \frac{\Sigma\left(N_{fj} \cdot I_j\right)}{\Sigma I_j} \qquad (7)$$

Where:

N_{fa} – the level of taxation agreed;

N_{fj} – the level of taxation for local taxes;

I_j – takings tax.

In common Plopşoru to determine the agreed taxation for 2017 is used:

$$N_{fa} = \frac{\Sigma\left(N_{fj} \cdot I_j\right)}{\Sigma I_j} = \frac{\left(1903247 \cdot 55,66\right) + \left(8273301 \cdot 55,66\right)}{1903247 + 8273301} = 14,93\% \qquad (8)$$

From the calculations made it can be seen that the level of taxation achieved in the village of Plopşoru does not fall within the level of taxation approved [Irimie, I.I., 2003, Popescu, C.R., 1998].

Currently, there are no prospects for making investments, as every five years the local council's management structure and development ideas change.

By determining the indicators of sustainable development, information is obtained regarding the periodic changes that take place locally in the village of Plopșoru. It also indicates the degree of achievement of the objectives set by the development strategies, of the indicators that can be determined and numerically.

By determining the human development index (I_{DU}), other indicators can be calculated:

- life expectancy (I_{SV});
- educational level (I_{NE});
- standard of living (GDP / capita - I_{PL}).

The human development index, according to the specialized literature (Vladu, B., 2018), has values between 0 and 1, and calculates with the relation:

$$I_{SV} = \frac{S_{med} - S_{min}}{S_{max} - S_{min}} = \frac{71,39 - 25}{72,25 - 25} = 0,98 \qquad (9)$$

Where:

S_{min} – is the minimum life expectancy, in years;
S_{med} – is the average life expectancy, in years;
S_{max} – is the maximum life expectancy, in years.

$$I_{NE} = \frac{2I_{GA} - I_{GCI}}{3} = \frac{2 \cdot 0,593 - 0,62}{3} = 0,18 \qquad (10)$$

Where:

I_{GA} – is the index of the degree of literacy,
I_{GCI} – is the index of the degree of inclusion in education.

$$I_{GA} = \frac{G_{A_{med}} - G_{A_{min}}}{G_{A_{max}} - G_{A_{min}}} = \frac{75 - 55}{85 - 55} = 0,66 \qquad (11)$$

$$I_{GCI} = \frac{I_{GCI_{med}} - I_{GCI_{min}}}{I_{GCI_{max}} - I_{GCI_{min}}} = \frac{75 - 50}{90 - 50} = 0,62 \qquad (12)$$

Where:

G_{Amin} – minimum literacy,
G_{Amed} – average literacy,
G_{Amax} – maximum literacy,
I_{GCImed} – the average degree of inclusion in education,
I_{GCImin} – the minimum degree of inclusion in education,
I_{GCImax} – the maximum degree of inclusion in education.

$$I_{PL} = \frac{\lg\left(\dfrac{PIB}{loc}\right) - \lg\left(\dfrac{PIB_{min}}{loc}\right)}{\lg\left(\dfrac{PIB_{max}}{loc}\right) - \lg\left(\dfrac{PIB_{min}}{loc}\right)} = \frac{4,5448 - 4,5440}{4,5563 - 4,5440} = 0,065 \qquad (13)$$

$$I_{DU} = \frac{I_{SV} + I_{NE} + I_{PL}}{3} = \frac{0,98 + 0,18 + 0,065}{3} = 0,408 \qquad (14)$$

From the calculations made the result for Plopșoru commune the value $I_{DU} = 0.408$, this indicates to us, a human development is low the rural area.

In determining the Human Development Index for the rural area, the causes that led to its degradation were identified as:

- dependence of the inhabitants on the mining and energy industry;
- destruction of agricultural areas by mining activity;
- lack of well-developed infrastructure;
- lack of investors in the area;
- a migration of the population to other areas or abroad.

8. CONCLUSIONS

The researches highlighted the possibilities of sustainable development of the rural area Plopșoru, influenced by the restructuring of the extractive industry.

The determination of the indicators of sustainable development could identify the weaknesses regarding the rural development, these are:

- dependence of the inhabitants on the mining and energy industry;

- serious environmental problems (landscape changes, pollution and atmospheric aggression);

- destruction of agricultural areas by mining activity;

- lack of well-developed infrastructure;

- lack of investors in the area;

- a migration of the population to other areas or abroad.

It is found that there are no prospects for investments in the rural area, because every five years the management structure of the local council and the ideas of development change.

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