

THE JIU VALLEY HOLLOW ENVIRONMENT – PROBLEM OF THE SUSTAINABLE DEVELOPMENT

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Abstract: The sustainable development suppose satisfying the necessities and the expectations of the present without compromising the chances for survive the future generations, in the conditions that the economic growth and preserving of a clean environment must be sustained reciprocal. In this general frame, the authors desire to present o series of solutions of the environmental crisis from Jiu Valley hollow. After emphasizing the existing of a general crisis in the area, European settlements and environmental co-ordinates from Jiu Valley are being analyzed. The creation of a clean environment in the region supposes a correlative set of strategic actions. Reckoned on internal and external settlements, as well as on other specialty studies, a series of environmental improving objectives are being formulated.

INTRODUCTION

The human society has proposed, during the time, the achievement of a major objective, searching in the same time for the proper means to realize it. During the 19 century, it has been talking more and more about economic growth, the well balanced economic development, extensive or zero economic growth. In the economic theory and practice, especially after the World War II, there have been imposed a series of new concepts, like sustainable economic growth, and recently, sustainable economic growth and human development.

In the vision of the greater economists, the economic durable development ensure the satisfaction of the present consumption demands without compromising those of the future generations, the economic prosperity and the preservation of the environment needing to support reciprocally. The national economy evolution according to the theoretical coordinates of the durable development implies the knowledge of internal conditions, as well as the position of the economy in the world context. Relying on such an analysis and on taking in consideration the concordance of the national interest with the demands of the international cooperation, The National strategy for durable development establish as objectives the following: a) increasing individual prosperity and welfare on the basis of development in the bearable limits of the human capital; b) the insurance of the population's health status; c) the establishment of the sectors with competitive potential as development priorities; d) the re-admeasurement and the restyling of the social-economic structure in order to stop the deterioration process of the natural capital; e) the developing of coherent legislative and institutional system; f) permanently monitoring and evaluating the social-economic performances.

The changes from the end of the last century mark the whole later evolution of the states involved in these transformations. The Eastern-European bloc was submitted to a "transition shock", because of the pressures, political and economical, manifested on the mentalities and on the habits of the citizens of these countries.

Jiu Valley represents the greatest exponent of the difficulties of coal-bearing industry in transition of Romania. Located in the south of Hunedoara County, the Petroșani Depression covers an area of 95.430 ha including de towns: Petroșani, Lupeni, Vulcan, Uricani, Petrila, and Aninoasa. The crisis of the social-economic system of the region is also amplified by the surrounding crisis, being known that the environmental problems from Jiu Valley are severe. The most important problems of the environment are: the effects of coal industry (abandoned mines, sterile dump heaps, the pollution of Jiu river), the coal combustion (gas emissions by the power station Paroșeni, the factory chimneys, coal home combustion etc.), junk scrap home administration.

MATERIAL AND METHODS

In the European Union, the environmental management, presume the existence of numerous directions, regulations and conventions, all assigned on categories, such as: the general background of the environment, air, junk scrap, water. The evaluation of the effects of some public and private projects on the environment is settled through the *85/337/CEE Direction*, modified through *97/11/CE* and *2003/35/CE Directions*, having as main objectives the analyze of the impact on the environment of the projects and the participation of the public in taking decisions. Through the *93/389/CEE Decision* and the *280/2004/CE Decision*, regarding the monitoring and the report of CO₂ emissions and other gas with green house effect, follow the accomplishment of the commitments assumed through the Kyoto Protocol at the Framework-Convention of the United Nations on climatic changes, but also the achievement of national and regional plans and programs in the domain of reducing green house effect gas and for realizing the accommodation measures for the effects of climatic changes.

Air problems are settled through *The Council's Direction nr. 96/62/CE regarding the evaluation and the management of air quality* and the “daughters” directions (*The Council's Direction nr. 1999/30/CE* regarding the limit values for sulphur dioxide, nitrogen dioxide and nitrogen oxides, particles in suspension and lead in the atmospheric air, *The Council's Direction nr. 2000/69/CE* regarding the limit values for benzene and carbon monoxide in the air and *The Council's Direction nr. 2002/3/CE* regarding ozone air pollution). In Jiu Valley, the pollution with powders in suspension and sedimentary powders record a considerable decrease between 1995 and 2005. Thus, if until 1994 the average concentration values for powders in suspension were over the limit imposed by STAS 12574/87, during 1995 and 2005 it takes place a decrease of the values until 0,074 mg/m³/24 hours - the 2005 average. Also, annual average concentrations for sedimentary powders decreased until 7.10 g/m²/month in 2005.

The Junk Scrap Framework Direction 75/442/CEE has in view, especially, the elaboration of a National Plan of Junk Scrap Administration and the establishment of a settlement system in the junk scrap administration domain. Storage is the main method of elimination (about 57%), this quantity including stored junk scrap and stocked for elimination. The elimination through storage of the junk scrap from the coal extractive industry aims the following aspects:

- the junk scrap storehouses resulted on the basis of projects, foreseen with stabilization, monitoring and closing working – remained in function only the sterile dump heaps, the decantation ponds changing their function as a result of modifying specific technologies;

- sterile dump heaps frames in the category of the storehouses for inactive-undangerous junk scrap - they are concordant storehouses, and for 2005 there were inventoried 551 sterile dump heaps, from which 94 active, and 457 in different stages of closing.

The task of closing some mining unities from Jiu Valley Coal Basin came to the National Agency for Development and Implementation of Reconstruction Programs in Mining Areas. Within the closing program are comprised a series of unities (table 1).

Table 1

The unities programmed for closing

The unity	The year when the production activity was ceased	The perimeter expands on a surface:	Including:
Livezeni Preparation	1990	2,4 hectares	mining precincts, sterile dump heaps (243.000 cubic meters) and other auxiliary activities
Iscroni Mine	2001	18,5 hectares	mining precincts, sterile dump heaps (54.000 cubic meters) and other auxiliary activities
Lupeni Preparation	2004	78 hectares	mining precincts, sterile dump heaps (4.700.000 cubic meters) and other auxiliary activities
Petrila Preparation	2003	113 hectares	mining precincts, sterile dump heaps (6.000.000 cubic meters), decantation ponds (1.110.000 m ³) and other auxiliary activities
Uricani 5 East Mine	2001	1,52 hectares	mining precincts, and other auxiliary activities; there are no sterile dump heaps
Uricani Preparation	1990	40 hectares	mining precincts, sterile dump heaps (55.000 cubic meters) and other auxiliary activities
Uricani South Quarry	2001	2,2 hectares	mining precincts, sterile dump heaps (40.000 cubic meters) and other auxiliary activities

The environmental events that can occur in the area, tacking into account the projected works, the equipment and the proposed methods, are presented function the causes in the table 2.

Table 2

The different environmental events may occur

The cause	The environmental event produced
▪ the building equipment	➔ noise, dust, mud and smoke
▪ the shooting operations	➔ noise, dust, smoke and vibrations
▪ the equipment or the means of transport	➔ the potential pollution of the ground with lubricants
▪ the equipment working near or in the waters	➔ the potential pollution of waters with lubricants
▪ activities from the site (offices, storehouses, workshops etc.)	➔ the potential pollution of the ground or waters
▪ the filling of underground works, of quarry gaps or undermining gaps	➔ the potential pollutions of the underground waters with contaminated materials
▪ the negligent use of the equipment	➔ the affectation of the existing vegetation in the site or adjoined to it
▪ the equipment or transport machines for worksite traffic	➔ the damage of public roads
▪ the contaminated material trickling resulted from the decantation ponds	➔ the ground or water pollution

The 1999/31/CE Directive regarding the city storehouses impose the insurance of the conditions necessary for a clean environment near the largest urban concentrations. A number of six junk scrap city holes, more other small garbage holes situated in rural space, as well as illegal junk scrap storehouses, cause damages to the environment by polluting water, air and ground. The impact of the city storehouse it's analyzed on different domains (table 3).

Table 3

The impact of the city storehouse

The domain	The impact
▪ public health	➔ accidental poisonings, respiratory, infectious, bacteriologic and dermatologic diseases
▪ quality life	➔ unpleasant smell and the impossibility of using the areas affected for pleasure and tourism
▪ environment	➔ ground degradation, increasing the risk of landslides and the negative influence on flora and aquatic fauna

In order to respond to the demands of the *1999/31/CE Direction*, a closing program was elaborated for the inconcordant city storehouses in Jiu Valley, as it follows (table 4):

Table 4

The impact of the city storehouse

The city	The year
Aninoasa	2016
Lupeni	2009
Petrla	2008
Uricani	2009
Vulcan	2016

Other objectives specific to the implementation of this Direction are:

- until July 16, 2010 must be reduced the quantity of biodegradable junk scrap stored at 75% from the quantity stored in 1995 (reference year);
- the achievement of transfer stations;
- the expansion of the areas served by the sanitation services;
- the expansion of selective gathering;
- closing and making ecological the storage spaces from the rural areas until July 16, 2009 and realising gathering centres for these areas, by connecting to the transfer stations;
- reports and bringing up/education campaigns.

The demands of the *Direction 2000/76/CE regarding the cremation of junk scrap* are followed through the program of closing the medical unities' crematories from the Jiu Valley (table 5).

So far, none of the crematories scheduled for 2004 was closed, existing in the same time the alternative solution that supposes: thermal disinfection, the authorised existing crematories and the cremation of medical junk scrap together with the dangerous industrials junk scrap in new capacities (realised until 2008).

Table 5

The program of closing the medical unities' crematories from the Jiu Valley

The Hospital	The year
The City Hospital Lupeni	2004
The Chronic Diseases Hospital Petrla	2004
The Emergency Hospital Petroșani	2008
The City Hospital Vulcan	2008

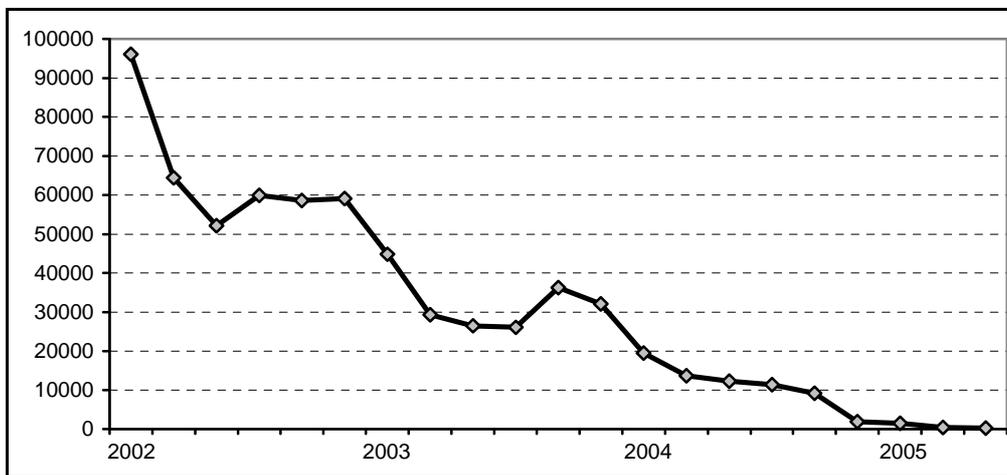
The *2000/60/CE Direction* it's *The framework direction in the domain of waters* which have as application domain the internal surface waters, transition waters, coast waters and underground waters. Coal exploitation in the CNH (The Pitcoal National Company) units represents a threat for the environment, first of all by inadequate treatment of residual waters.

The impact of dirty waters it's analyzed on domains (table 6).

Table 6

The impact of dirty waters	
The domain	The impact
▪ public health	➔ accidental poisonings, as well as infectious and dermatologic diseases
▪ quality life	➔ both the impossibility of using the board rivers for pleasure and the landscape impact as a result of the water colour
▪ environment	➔ the influence on flora and aquatic fauna

Regarding the pollution of the river Jiu through the coal washing in Jiu Valley Coal Basin we noticed the substantial improvement of the quality of these waters. Although, we have to mention the reducing of mineral suspensions in the waters of the river Jiu, from an average of 64.000 mg/l, recorded until 2002, with tops of 96000 mg/l, to an average concentration below 100 mg/l starting with April 2005 (figure 1).



Source: CNH Petroșani

Fig. 1 The evolution of polluting concentrations due to the mining activity on Jiu River, between 2002 and 2005

Eloquent for the improvement of the Jiu water quality it's an image of samples from the river in the years 1993, 1997, 2004 (figure 2), presented by the Jiu Waters Direction Craiova at Symposium dedicated to purge Jiu river waters, in May 2004.



Sursa: www.cnh.ro

Fig. 2 The water samples from Jiu river in the years 1993 (right), 1997 (middle), 2004 (left).

These good results were obtained following the running of the stages from the reorganization program of the dressing activity, which required the following:

- stopping the inefficient and polluting activity from the preparation Plant Petrila (in 2002);
- accomplishing the re-technology and modernization program from the preparation Plant Coroești (in 2002 and 2003);
- ceasing the inefficient and polluting activity from the preparation Plant Lupeni (in 2004);
- reorganizing the whole activity of the former Exploitation of Preparation Petroșani;
- concentrating the activity of mining exploitations on the sorted coal production;
- concentrating the preparation only in the preparation Plant Coroești.

The 98/83/CE Direction regarding the quality of water fated to human consumption has as objectives the protection of public health from the effects of any type of contamination of water fated to human consumption, and the guarantee of the quality of water meant for human consumption. The costs for the implementation of this Direction rise to over 5.600 million Euro, and it hints series of detailed elements (table 7).

Table 7

The costs for the implementation of the 98/83/CE Direction

Purpose	Sum (mil. €)
Monitoring the quality of drinking water at country level, new analysis equipment for 5 regional labs and 42 territorial labs of the Health Ministry	2,5
Investments in equipment at the producers, drinking water operators, for realizing the checking monitoring	5,6
Improving technologies and extending drinking water treatment	2000
Rehabilitating and extending the distribution network	3600
Changing the internal distribution plumbing	Is not estimated
TOTAL	5608,1

Source: www.apmhunedoara.ro

The demands' achievement of *The Council's Direction 91/271/CEE regarding the purification of urban used waters*, presume the following costs (table 8):

Table 8

The costs for the purification of urban used waters

The direction	Sum (milliard €)
▪ the investments, of which:	9.5
- the purification stations	5.7
- the sewerage system	3.8
▪ the exploitation expenses (in the transition period)	3.4
TOTAL	22.4

At this chapter, collecting and purifying the city used waters from Jiu Valley needs almost 90 million Euros, the situation recouped for cities and working categories being presented in table 9.

Table 9

The situation of collecting and purifying city used waters in Jiu Valley

Place	Sewerage network (Km)		Necessary workings/actions	Cost (mil. €)	Term
	existing	necessary			
Petroșani (I)	36,1	48	Sewerage network-E	10,980	2010
			Purifying station-R,E,M	17,157	2004
Lupeni*	17,5	24	Sewerage network -R,E	7,101	2010
			Purifying station -R,E,M	11,095	2004

Petrila*(I)	12,7	20	Sewerage network -R,E Purifying station -R,E,M	7,016 10,963	2010 2004
Vulcan* (I)	13,1	29	Sewerage network -R,E Purifying station -R,E,M	6,858 10,716	2010 2004
Uricani	6,2	9	Sewerage network -R,E Purifying station -E,M	2,256 3,525	2013 2015
Aninoasa*	0,9	7	Sewerage network -R,E Purifying station -R,E,M	0,843 0,632	2010 2004

Source: www.apm.ro

*It is purified in the purifying station of Petroșani city;

NOTE: I=Project ISPA; R=rehabilitation; E=expansion; N=new; M=modernization.

The European Network of protected areas NATURE 2000 represents an ecologic network of special conservation areas, having as purpose the maintaining or the restoration of the favourable preservation status of some species and types of natural habitats in their areas. In the Hunedoara County are declared and recognized 44 natural protected areas of national interest, including a biosphere reservation which also includes an important national park, The Biosphere Reservation – The National Park Retezat. In the National Park Retezat there is also the Scientific Reservation “Gemenele”.

The Direction 96/61/CE regarding the prevention and total control of pollution statued through the implementation of certain measures of preventing and reducing the emissions in the atmosphere, water and soil, including measures regarding the junk scrap management, in order to reach a high level of protection of the environment as a whole.

The Direction 96/82/CE regarding the control of major accidents in which dangerous substances are implicated (SEVESO II) is applied to the activities in which are present dangerous substances (toxic, very toxic, oxidant, explosive, inflammable, very inflammable, extremely inflammable, dangerous for the environment).

The Direction 2001/80/CE regarding the limitation of the emission of certain polluting agents in the air resulted from big combustion equipment aims the thermo energetic equipment having a thermal installed power bigger than 50 MWt and which delivers electric energy and thermal energy to the population. The purpose of the Direction consists in the limitation of the emissions of certain polluting agents (sulphur dioxides, nitrogen oxides and powders) in the air, resulted from big combustion equipment (no matter the type of fuel used). In the Jiu Valley is present a great air polluting source, which is FEE Paroșeni. Also, there are two local heating systems, one in Petrila (21 boilers for dwellings, based on coal) and another one in Aninoasa (3 boilers for dwellings, based on coal). The main stress factor is given by the air pollution caused by fuels and dust. The influence on public health includes respiratory diseases, weakening the immunity system and increasing cancer incidence. Black smoke is a discomfort for the population. The impact on environment includes acid rains.

Information about the great combustion equipment from Jiu Valley, respectively the technological measures that will be undertook for the insurance of the concordance of this equipment to the demands of the Direction, and the costs due to the implementation of these measures, as well the emission limits allowed for sulphur dioxide, nitrogen oxides and powders are presented in table 10. At the Energetic Complex Paroșeni the accordance must end in 2015, differently in accordance with the unity for which it's realized, and needs investments only for the unities 2 and 3 (totally 37,52 mil. €).

Table 10

The limitation of the polluting agents' emissions in the air at the Energetic Complex Paroşeni

Unity	Accordance		Limits of the emissions (tones/year)						
	Investments (mil. €)	Year	2007	2008	2009	2010	2011	2012	2013
<i>Accordance NOx</i>									
CEP nr. 1		2015	2708	2708	2708	2708	2708	2708	2708
CEP nr. 2,3	2,7	2006							
<i>Accordance Powders</i>									
CEP nr. 1		2015	409	409	409	409	409	409	409
CEP nr. 2,3	0,82	2006							
<i>Accordance SO2</i>									
CEP nr. 1		2015	16998	20338	22240	2440	2440	2240	2240
CEP nr. 2,3	34	2010							

Source: The Agency for Environmental Protection Hunedoara

Another polluting source of the air is constituted by the charcoal production, developed in 3 unities situated at Iscroni (Aninoasa), Uricani and Câmpu lui Neag. Also, there are many individual heating sources which rely on coal (dwellings) and which affect especially the air quality. The impact of the air polluting it's analyzed on domains (table 11).

Table 11

The impact of the air polluting

The domain	The impact
▪ public health	➔ respiratory diseases, weakening of the immunity system and increase of cancer incidence
▪ quality life	➔ the smoke and its facings, low visibility and unpleasant smell
▪ natural ecosystems	➔ vegetation damages

Sonorous pollution within the cities supposes surpassing of the noise level during day time due to the productive activities of some private persons, owning carpentry workshops, tinkers' trade, processing of building materials or soda shops located at the ground floor of the blocks of flats, bakeries.

RESULTS AND DISCUSIONS

A clean environment in the Jiu Valley can be obtained through many strategic actions, destined to be the reification of some general durable development objectives. The information generated as part of the environment analysis will be used for identifying specific actions, like: training and educating the public, economic stimulants, common programs, technologic measures, legislative or legal action.

Settlement of the durable development objectives, referring directly to the environment, it is necessary the qualitative evaluation of the risk for the environmental matters from Jiu Valley. In table 12 we present the evaluation of the environmental risks in Petroşani hollow, starting from the studies performed at a county level by the Agency for Environmental protection Hunedoara.

Table 12

The qualitative evaluation of the risk for the environmental matters from Jiu Valley

The pollution source	Water			Ground			Air		
	health	environment	quality life	health	environment	quality life	health	environment	quality life
I. Mining and processing									
1. Coal	R	R	M	R	M	E	S	C	S
2. Coal processing	E	E	M						
II. The energetic sector									
1. Thermal power stations	R	R	C	R	S	C	E	C	M
2. Charcoal output							M	R	C
3. Individual heating sources							E	R	M
III. Infrastructure									
1. Home solid junk scrap	S	S	S	M	M	M	M	M	M
2. Industrial solid junk scrap storehouses	S	M	M	M	M	M	M	M	M
3. Water purifying stations	C	C	E					C	
4. Traffic							E	L	E

Note: R-reduced, C-considerable, S-significant, M-major, E-extreme.

Based on the internal settlements (Laws, Governmental Decisions, Environmental Ministry's Orders) and external (European: Directions, Conventions, Regulations), but also with the help of The Local Plan of Action for Environment (elaborated by APM Hunedoara) and of the study "Jiu Valley Region – Multidimensional Assessment" (World Bank Report), a series of objectives were proposed for the getting of a clean environment, respectively their measures of fulfilment. We consider that the proposals referring to the quality of the environmental factors presented in table 12 are satisfactory.

Table 12

Environmental objectives in Jiu Valley

General Objective	Responsibilities	Term
WATER		
1. Reducing the quantities of the polluting agents resulted from the economic agents' overflows	County Council, Local Councils, APM	2007
2. Improving the infrastructure in order to increase surface water quality	County Council, Local Councils, APM, RAAVJ	2006-2012
3. Improving water feeding management	County Council, Local Councils, APM, Romanian Waters	2004-2015
AIR		
1. Framing the noxa emissions – from the extractive industry and the industries working useful mineral substance – between the limits allowed by the legislative settlements in vigour	County Council, Local Councils, APM, The Economic Agent, CNH, IPM	2005-2015
2. Efficient system of monitoring air quality	County Council, IPM	2007
GROUND		
1. Reducing the impact of the industrial activities on the ground	Local Councils, APM, CNH	2006-2007
2. Reducing the impact of the energetic sector produced on the ground	Local Councils, The Economic Agent	2005-2007
3. Reducing the impact of the industrial junk scrap dump	County Council, Local Councils,	2006-

heaps on the ground	The economic Agent	2010
4. Keeping the forest funds	Local Councils, The Forest Department	2010
5. The alignment to the EU directions regarding the junk scrap administration system	County Council, Local Councils, APM	2010-2025

CONCLUSIONS

The identification of the solution of the environmental crisis in Jiu Valley must have in view the durable development rigors, in generally but also the objectives of the national strategy of the durable development. Thus, although the economy is strongly dependent of the extractive industry, the solution for the way out from the crisis is, further on, tied to the relapse of this branch in the close-up of the national economy, but also to the development of the alter-native zonal economy. One of the alternative solutions is the tourism, respectively the capitalization of the beauties of environment. As a consequence, we consider that the reconstruction of the environment and its cleanly maintenance conditions the durable development of Jiu Valley Hollow.

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