

Risk Management A Key Factor in Sustainable Regional Urban Planning (Case Study Hunedoara County Development Plan - Romania)

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Abstract: - An uncontrolled development of a region (case study – Hunedoara County development plan) can lead to crises with later on difficult to manage effects. Only through a sustainable development which includes proactive risk, both natural and manmade, management, can be achieved a holistic territorial planning strategy. This involves acquiring data referring to all types of risk, natural, social and economical, diagnosing them and forming scenarios offered to the local administration and the private initiative to slowly reduce their effects.

Key-Words: - sustainable planning, urban planning, risk management, mitigation, ecologic, social, economic.

1 Introduction

Hunedoara County was the industrial jewel of the Romanian 50-70's communist social-economic system. Its peak was reached during the forced industrialization, brought upon by soviet concepts, through the building of the iron and steel works in Hunedoara and its auxiliary adjacent industries and later on enforced by the socially orientated Romanian national administration of 1979-1989. This forced growth suddenly stopped after 1989 once the economy switched to the free market leaving behind an ecological, social and economical disaster. Furthermore these misbalances accentuated during the 1997-1998 economical crisis and especially after the one in 2008.

In the zero or negative growth experienced nowadays in the studied area, sustainable economical growth must be supported by increasing the efficiency of resource usage, coordinating development conditions to available resources, according to a study of He L. Nie [1], which involves efficient risk management. These local misbalances overlap global ones.

To demonstrate this let us take for example the change in local climate included in the global climate change issue. In the studied area from 1961 till 2009 the average temperature increased by 1°C, the maximum temperature by 3°C and the minimum by 5°C, while the average quantity of precipitations increased from 553 l/m² in 1961-1970 to 627 l/m² in 2001-2009, according to the following chart.

	1961-1970	1971-1980	1981-1990	1991-2000	2001-2009
Average yearly temperature (°C)	9.4	9.5	9.7	9.8	10.4
Maximum yearly temperature (°C)	37.7	35.7	39	38.4	40
Date	9/7/1968	8/9/1971	25/7/1987	11/8/1994	24/7/2002
Minimum yearly temperature (°C)	-31.6	-21.6	-25	-20.4	-22.3
Date	24/1/1963	15/1/1980	14/1/1985	26/1/2000	1/3/2002
Average number of days with frost	112.2	106.7	101.6	108	98.1
Average yearly quantity of precipitations (l/mp)	553	622.4	520	554.5	627.9
Average quantity of precipitations in the warm season (l/mp)	339.7	421.8	318.1	364.3	408.6
Average quantity of precipitations in the cold season (l/mp)	213.3	200.6	201.9	190.2	219.3
Maximum quantity of precipitation fallen in 24 h (l/mp)	50.8	65.3	35.2	38.8	64.2

Date	29/7/1966	10/5/1973	19/6/1981	26/8/1994	3/7/2001
Maximum width (cm)	40	28	31	30	16
Date	31/1/1963	29/1/1976	11/1/1985	13/2/1999	2/2/2005
	1/2/1963	30/1/1976	12/1/1985	14/2/1999	28/2/2005
	2/2/1963	30/1/1976	13/1/1985		1/3/2005
	3/2/1963		14/1/1985		
Average yearly number of days with snow cover	54	28	39.9	35.2	30.3
Average amount of sunlight (hours and tenths)	1859.1	1825.4	1927	2041	2005.4

No data for amount of sunlight in 1961

Source: Banat-Crisana regional meteorological centre

Table 1. Meteorological data from the weather station Deva

1.1 A short analysis of these changes

These local climate changes are within the global average. Global temperature increases registered 8 of the warmest years after 1998, and 14 of the warmest in history since 1900, according to Snow R., Snow M. [2] and along the increases in precipitations cause an increase in floods, landslides, etc.

The present article is based on data from the PATJ (County development plan) Hunedoara created by the Research Centre for Sustainable Development, "Politehnica" University of Timisoara, which also contains the county's development and mitigation strategy for the next 5 to 10 years.

2 Current situation

To achieve Hunedoara County's sustainable development it is necessary to act on all three composing levels, namely ecologic, social and economic.

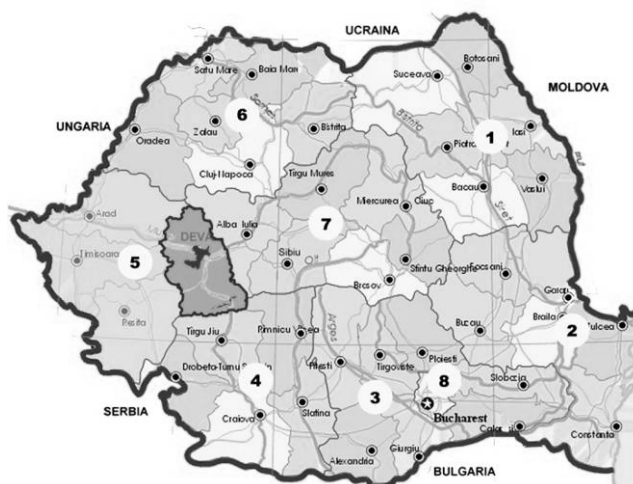


Figure 1. Hunedoara County in Romania

It is worthy of note that on the territory in question can be found remarkable natural and built preserves. Through the analysis of various individual layers

(floods, landslides, pollution, natural and built reserves, accessibility, utilities, demographic evolution, degree of education, wealth and health, unemployment, economic resources such as agriculture, industry, tourism, etc.) holistic scenarios arise which need to be inserted in the final strategy for sustainable development. This conclusions lead to the necessity of radical change in our social and political life to the non human world, according to Dobson A. [3]

In this article from the layer by layer analysis of the entire territory a few are presented in short as follows:

2.1 Ecologic component

The phenomena included in this component produce landscape chances as a result of the interaction between various natural or man-made factors: geological, climatic, hydrological and seismic.

2.1.1 Natural hazards

2.1.1.1 Land slides

In Hunedoara County landslides occur due to a very fragmented relief, a soft rock geological structure and a favourable litological structure.[4]

The most recently affected areas – due to periodical reactivations – are: Deva, Geoagiu, Ilia, Hațeg, Petrila, Hunedoara, Lupeni, Brad. Landslides have a major effect on traffic blocking county and communal roads for various distances and cutting of farms or even cities as was demonstrated in the study carried on by Murarescu O-M, Pehoiu G. [5]. They can affect both the natural and the man-made relief, namely refuse-heaps.

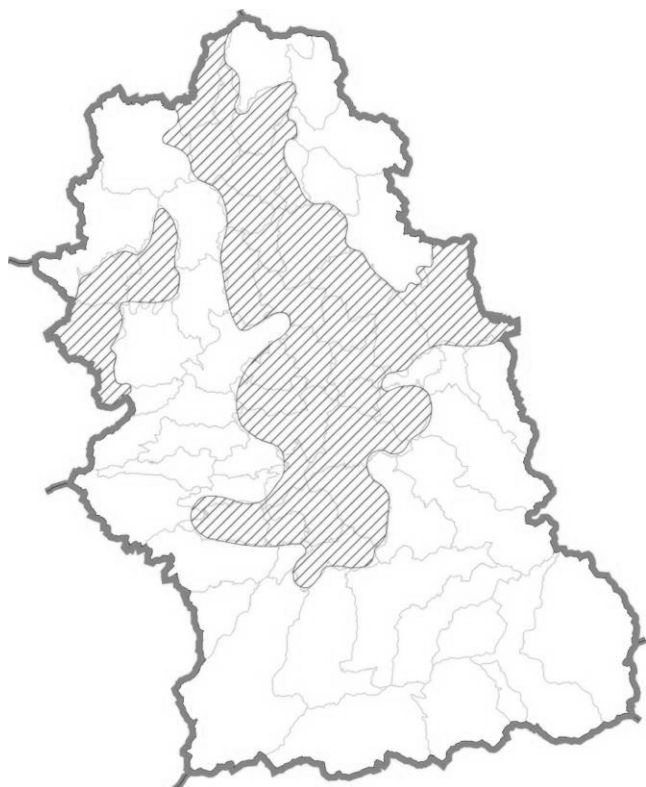


Figure 2. Landslide affected areas in Hunedoara County

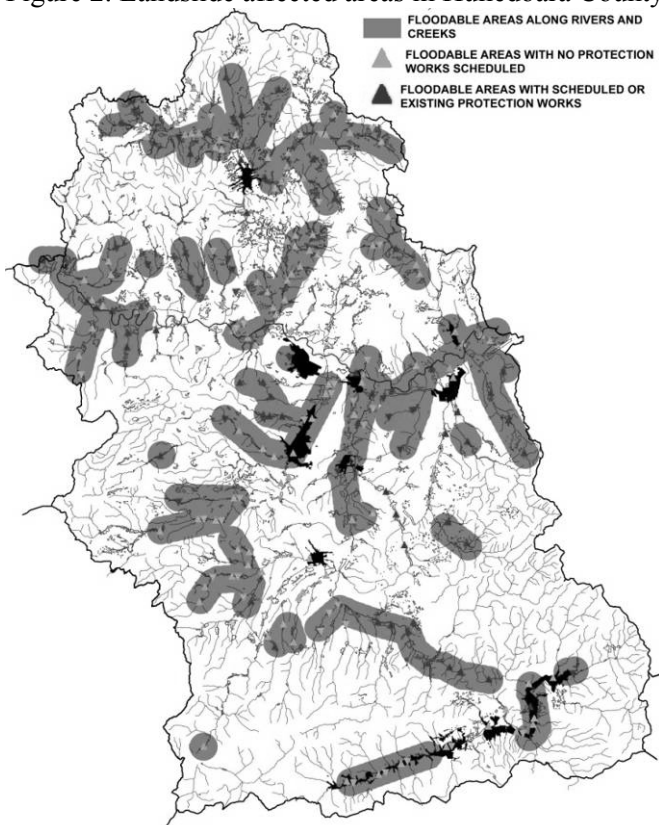


Figure 3. Flood prone areas in Hunedoara County

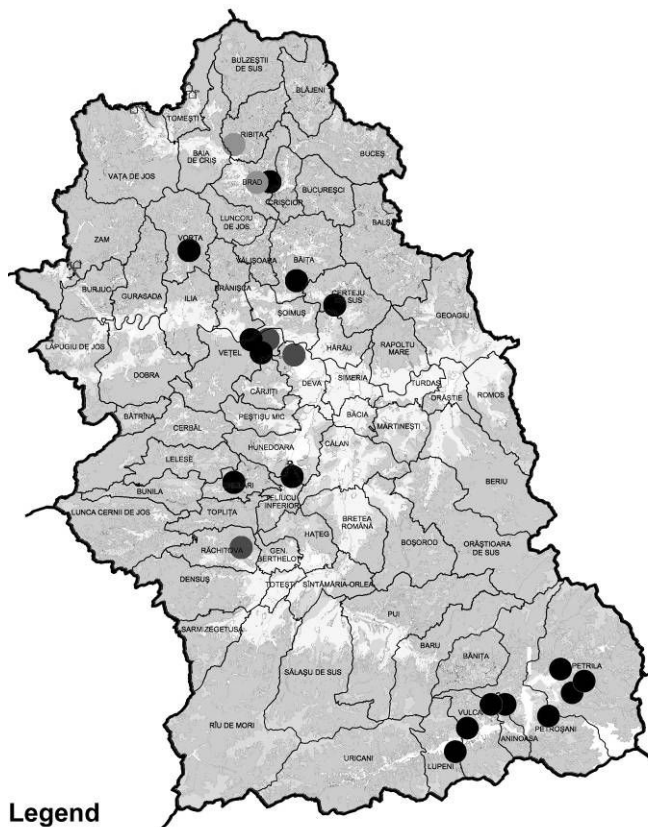
2.1.1.2 Floods

The sudden melting of the snow cover (laid down in considerable quantities in January and February) and water discharge from slopes leads to a sudden increase

in river levels, exceeding defence limits, which creates the phenomenon spring tide, short-term high-water floods, generally from April to May, at the mouths of streams, gills and small rivers, locations usually occupied by villages. Almost every spring, settlements in the drainage areas Mures, Cris and Jiu are in this situation. As the majority of Hunedoara County's settlements are in such valleys their administrative area and developments comprise flooded areas.

2.1.2 Man-caused hazards

The most important human interventions on the natural environment in Hunedoara County are surface and under-ground mining activities in Valea Jului, Deva-Certeje, and Brad and industry based ones. Mining leases are critical areas even though their activity has chased and their ecological rehabilitation has already begun.



Legend

- MINES PROPOSED FOR CONSERVATION ●
- MINES PROPOSED FOR MONITORING ●
- MINES PROPOSED FOR ECOLOGY ●

Figure 4. Areas affected by mines in Hunedoara County

2.1.2.1 Industry

The industry's impact on the natural environment includes soil degradation, fall in underground water quality, negative effect on aquatic flora and fauna, phenomena studied by Naumoski A. Mitreski K. [6], air

and fresh water pollution according to He L. Nie C. [7]. The impact on the quality of life is not only the inability to use river banks for recreation (waste water effuse) and near bay land for agriculture due to contamination, but also the aesthetic impact on the landscape. Steam power plants have a major negative effect on all environmental aspects, air, soil and water, taking into account the complexity of the buildings and equipment, the raw materials and resulted waste and the occupied surfaces.

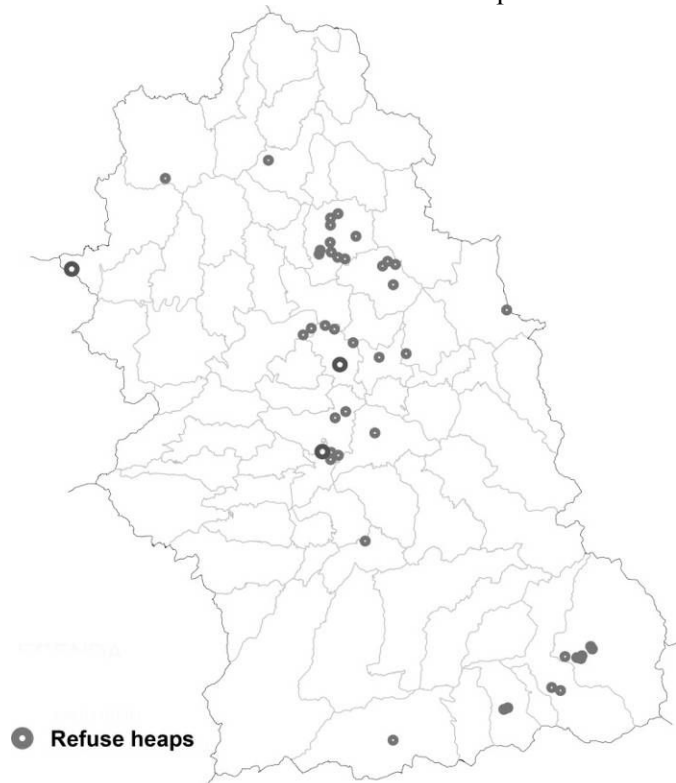


Figure 5. Refuse heaps in Hunedoara County

2.1.2.2 Refuse-heaps and skimming ponds

Over 9000 ha of Hunedoara County’s territory is occupied with refuse-heaps, skimming ponds and industry affected areas (steal works and energy production). This represents a potential danger for ecological hazards considering the possibility of refuse heap slope destabilisation, incontrollable pollutants emissions in the surrounding environment, geotechnical failure at skimming ponds, which could lead to contaminated water inrush and devastating ecological effects.

2.1.2.3 Scrap heap

At present in Hunedoara County are 13 inadequate class B, waste deposits in the urban areas and 9 in the communal ones. Every village has an unauthorised scrap heap, their surface totalling 46 ha. All will soon cease activity or have already done so.

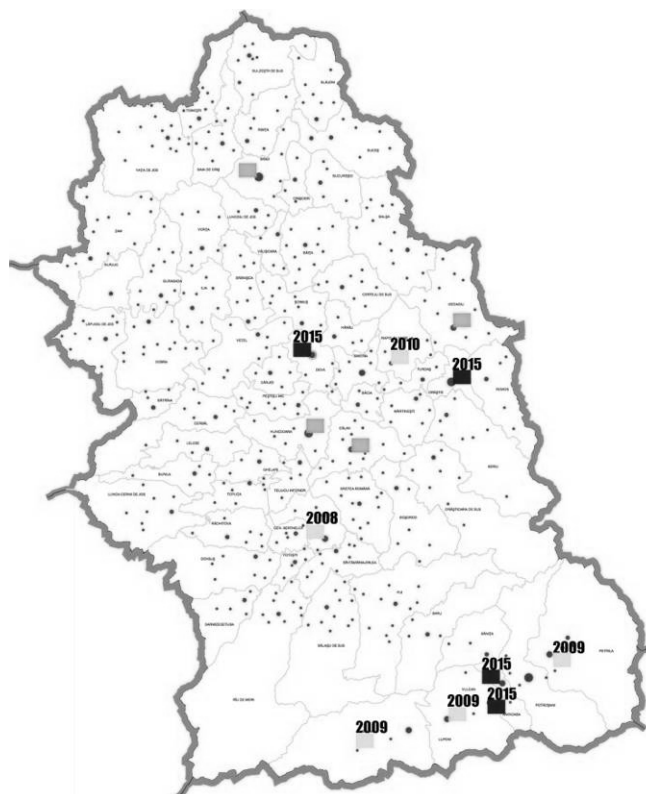


Figure 6. Scrap heaps in Hunedoara County by year of closing

If we analyze the scrap collecting capacity vs. their generating capacity, we can clearly see a constant difference which determine a certain amount of scrap to be disposed of clandestine. Should we analyze their composition, between 2000-2007, over 50% were biodegradable which is much more than the European average.

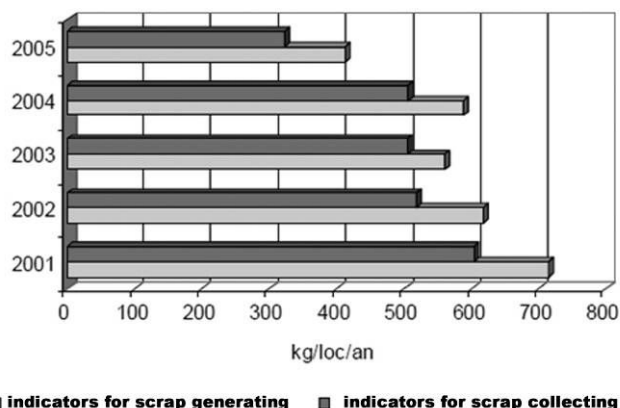


Figure 7. Indicators of collecting vs. generating scrap

If we analyze the coverage degree of scrap collecting services for the period 2001-2006 we can notice that in the rural areas it was below 20% on a rising trend reaching over 30% in 2009, while in the urban areas it was at a constant level of 80%. The difference to 100%

is significant in the rural areas indicating a very low standard of living.

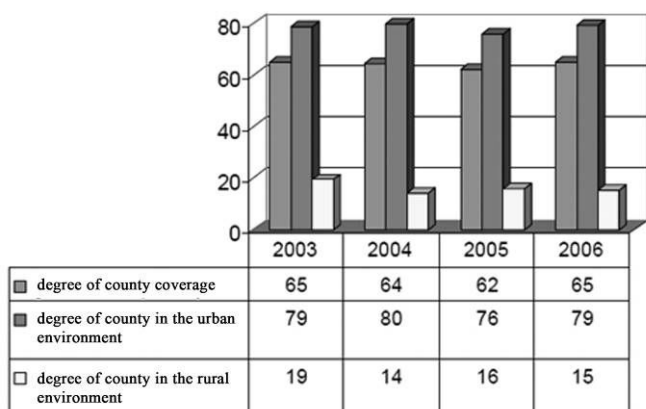


Figure 8. Development of the degree of coverage with scrap collecting services in Hunedoara County (rural, urban, total) in 2001-2006

2.1.2.4 Hydro-energetic power plants

Despite producing clean energy, and they themselves not polluting, hydro-energetic plants have a complex effect on the surrounding environment. Besides occupying considerable agricultural and woodland areas, entire villages' displacements were sometimes necessary. The total area covered by artificial lakes is 889 ha 0.12% of the county. Due to yet unexploited capacities new hydro energetic power plants may lead to changes in local biodiversity, bio-climate and water cycle in nature.

Name	Owner			
	Dam height	Dam length	Total volume	Surface
Gura Apelor	SC HIDROELECTRICA - Hidrocentrale Hațeg			
	168 m	480 m	164,87 mil.mc	420 ha
Ostrovu Mic	SC HIDROELECTRICA - Hidrocentrale Hațeg			
	28 m	29,5 m	11,92 mil.mc	89 ha
Păcliaș	SC HIDROELECTRICA - Hidrocentrale Hațeg			
	23 m	29,5 m	11,38 mil.mc	98 ha
Hațeg	SC HIDROELECTRICA - Hidrocentrale Hațeg			
	28 m	29,5 m	16,46 mil.mc	107 ha
Subcetate	SC HIDROELECTRICA - Hidrocentrale Hațeg			
	23 m	42 m	6,87 mil.mc	86 ha
Cinciș	AN Apele Române – Direcția Apelor Mureș Tg.Mureș			
	48 m	221 m	43,3 mil.mc	162 ha
Mintia	SC Electrocentrale Deva Mintia			
	17,4 m	130 m		
Valea de Pești	AN Apele Române – Direcția Apelor Jiu Craiova			
	56 m	237,5 m	4,50 mil.mc	24 ha

Table 2. Artificial lakes

2.2 Social

2.2.1 Vital statistics (depopulation, emigration)

In 1977 Hunedoara County had a population of 514.413, on the basis of an important industrial development and consequently an internal migration increase in 1992 it reached 547900. After the collapse of the social economic system mass layoffs and emigrations caused a population decrease to 485.712 in 2002 and 470103 in 2008. Out of the 68 of Hunedoara County's districts 7 are affected by a depopulation of over 50% and 19 of over 30%.

The same as for the balance between the number of births and deaths in the case of population comings and goings they present a series of particularities specific to the studied area as follows:

- A clear rise in territorial mobility can be noted both urban-rural and vice versa. Besides the massive migration to urban areas and to EU states, the suburbanization phenomenon appeared namely the retreat of the older population from industrial cities in the adjacent rural environment, similar to the one described for larger cities by Pechorwski D. [8]
- In the entire county, between 2000-2007, can be noted a clear migration balance with negative values (over 2‰), on a rising trend (diminution) in the last two analysed years and a maximum value of -5‰ in the year 2004
- Only 42 of the 69 administrative territories were in 2007 on a positive trend with high values for the

migration balance (Vetel, Bacia, Rapoltul Mare, Carjiti, etc.)

- Urban areas and especially mining ones have negative values due to the migration of a large part of the mining work force: Vulcan -15.4%, Uricani -13.3%, Petrosani -10.4%, Lupeni -9.7%, Aninoasa -9.2%, Orastie, Hunedoara, Petrila, Hateg, Deva -6.4%, etc.

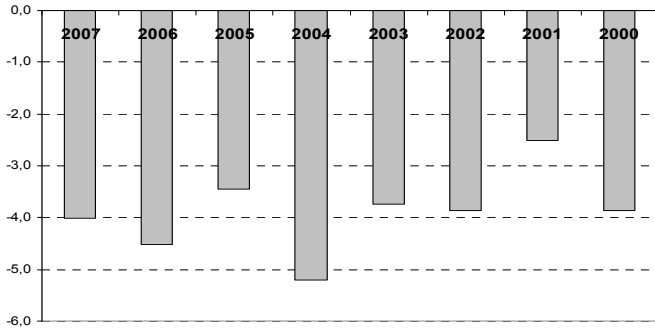


Figure 9. Migration balance in Hunedoara County 2000-2007

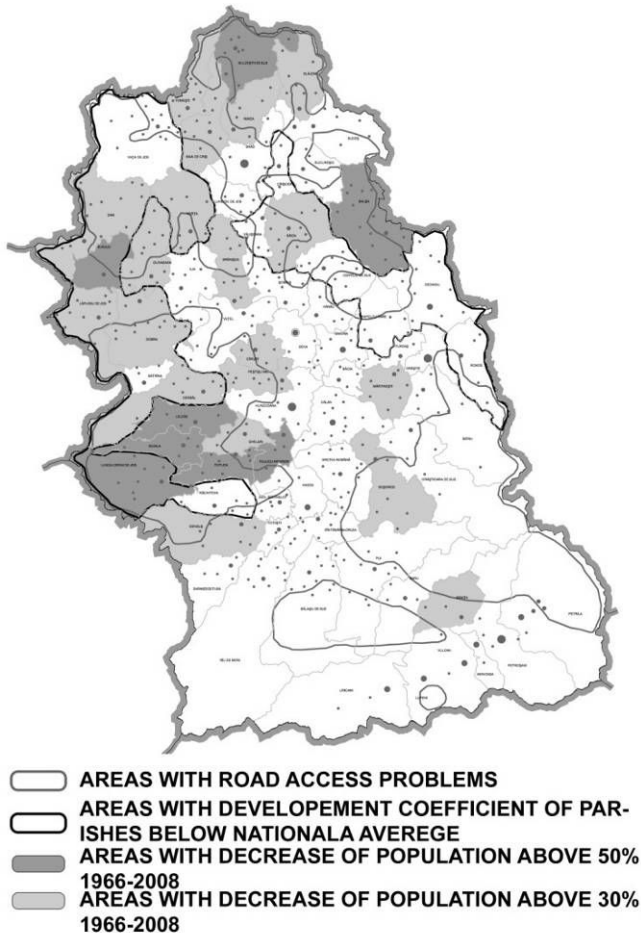


Figure 10. Vital statistics map of Hunedoara County

County, Regoin, County	2005	2010	2015	2020	2025
Hunedoara County	480 459	460 500	435 600	407 400	376 500
West Region	1 930 458	1 904 200	1 861 900	1 809 100	1 746 000
Total Romania	21 623 849	21 226 300	20 696 600	20 026 400	19 243 400

Table 3. Demographic evolution by county, region and country, 2005-2025

To achieve a more detailed analysis which would be the base further developments, we proposed a three variant prognosis (pessimistic, optimistic, average).

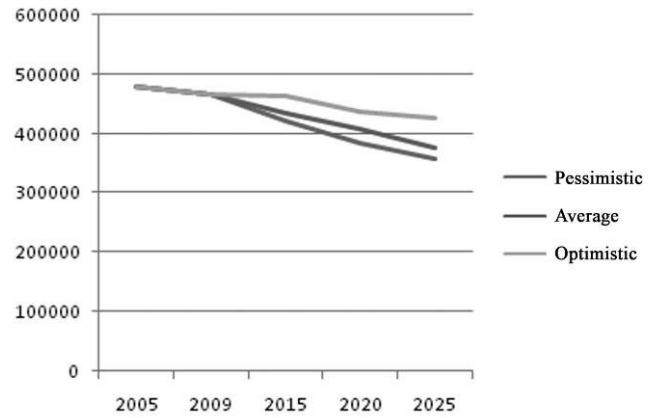


Figure 11. Prognosis for demographic evolution in Hunedoara County

Further we will detail the average variant prognosis considered to be the most probable. From a demographic point of view the main factors that influence the size and structure of a population are birth rate, death rate and migration.

The drop in birth rate phenomenon in Romania is within the European general trend for the period demographical transition but also has some particularities. The main factors which determined the drop in birth rate are economical, social and cultural. It refers to a significant transformation in the employment structure of the population, which lead to, especially for the young generation, a particular territorial and professional mobility and at the same time an increase in training time.

On a whole, the population of the Vest Region, of which Hunedoara County belongs to, is expected to drop by over 200 000 by 2025. This drop will be due to the constant deficit in birth rate in relation to the death rate (negative natural balance), to which a negative migration balance, both internal and external, will add. By 2020 a considerable decrease in population is expected for Hunedoara County (approx. 73 000).

Data for 2005 are from “Anuarul Statistic al Romaniei 2006”, ISN, 2006

According to the demographical evolution prognosis realised by ISN and the analysis of the rural and urban population data, the general trend is followed, resulting in an average of 77% urban population and 23% rural, with a massive drop in urban population and a slight one in the rural environment.

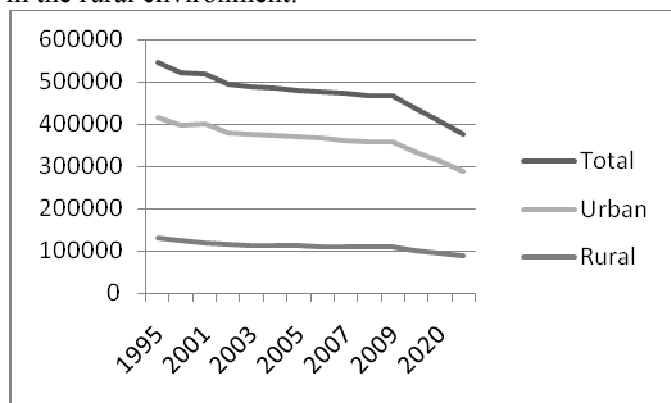


Figure 12. Demographical evolution by environment

2.2.2 Degree of education

In Hunedoara County only 5.9% of the population have a bachelor degree, 6% lower than the national average, 34.1% a high school degree, 19% a vocational one while 25.1% of the population have only attended secondary school and 16.6% primary school. Besides a low average degree of education, with over 40% of the population having attended only 8 years of school, the number of pupils drops every year, to be exact 20000 fewer than 10 years ago.

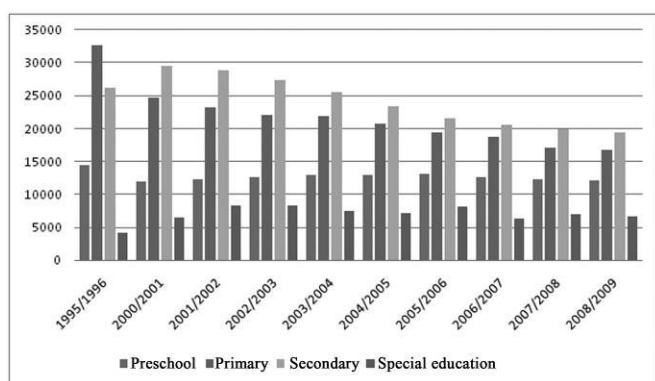


Figure 13. Evolution of the number of students in preschool, primary, secondary and special schools

Compared to the 2008-2009 school year the number of students has dropped by 12 772. From the above chart it

Sick/year	Cardiovascular diseases	Respiratory diseases	Neoplasm	Digestive diseases
2001	3810	210	945	284
2002	3931	235	894	298

can be clearly noted a significant decrease in the number attending primary and secondary schools, which, unless drastic measures are undertaken, means that it will be increasingly harder to follow the EU trend.

2.2.3 Degree of wealth

18 of the county’s districts are under the national wealth average (Valisoara, Lapugiu de Jos, Burjuc, Vorta, Lunca Cernii de Jos, Vata de Jos, Burjuc, Zam, Dobra, Batrana, Cerbal, Rachitova, Romos, Rapoltul Mare, Certejul de Sus, Baita, Criscior, Geoagiu). Their placement on the Eastern and Western County border breaks the traditional county division in three parts, North, Centre and South, and it can be clearly noticed that they are the same districts affected by depopulation, lack of accessibility and utilities.

2.2.4 Unemployment

Unemployment rates dropped in the past years, from 21265 in 2002 to 10087 in 2007. In 2002, in Hunedoara County, just 33.7% of the population was employed, the rest of 10.3% unemployed, 7.5% under the care of others, 2% under state or ONG care and 17% under 16 years old. In the past 10 years the number of employees dropped by over 25000 even though, on the one hand, the majority of layoffs in Hunedoara had already been done, the number dropped there by only 5000, and on the other hand, Deva experiencing an increase of over 10000. These phenomena led to a decrease of social diversity, sociability, community involvement in the decision making process and local security.

Resolving the social problems depends on the local’s capacity to use technology to reasonably optimize the available assets. Adjusting the economical structure and improving the technical and economical level can be used to increase the capacity to take care of the resources [3] and reduce natural and man caused hazards.

2.2.5 Degree of health

The degree of health in the county is similar to the national average. If we analyze the factors that determine the death rate an increase in respiratory diseases becomes apparent between 2001-2010 with a rise in the 15-64 age group and in the urban environment.

2003	3717	243	951	293
2004	3687	240	1012	305
2005	3873	205	958	247
2006	3589	309	983	271
2007	3181	423	950	250
2008	3308	359	1079	260
2009	3388	278	1000	304
2010	864	101	272	78

Table 4. Main causes of death in Hunedoara County

Morbidity specific in the year 2007 in Hunedoara County					
Nume	Date absolute			Distributie	
	0-14 ani	15-64 ani	peste 65 ani	Rural	Urban
Boli respiratorii	130329	109905	22109	42338	220005
Boli sistem digestiv	8680	26144	6878	7784	33918
Boli circulatorii	591	15375	9971	5299	20638
Boli endocrine si metabolice	2938	9476	2483	2582	12315
Tumori maligne	18	585	293	151	745

Table 5. Deaths in 2007 by disease

2.3 Economy

2.3.1 Agriculture

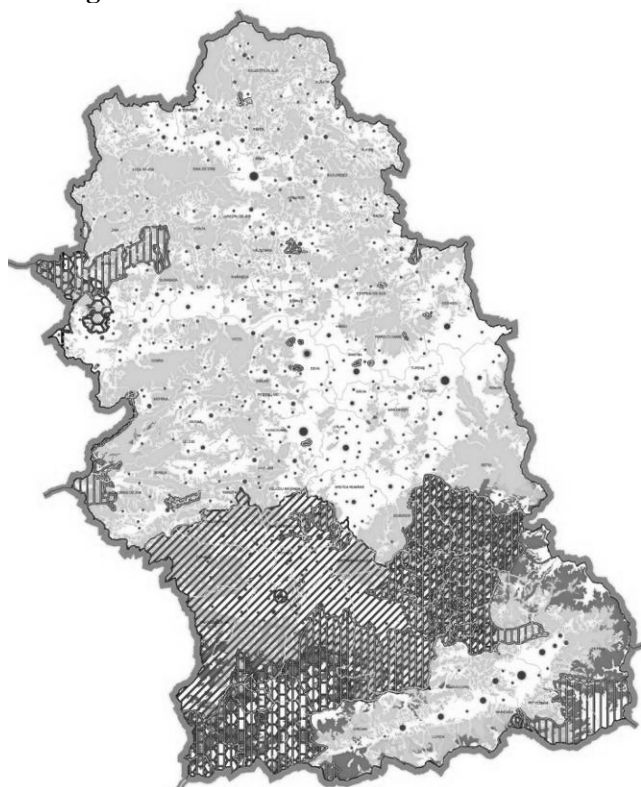


Figure 14. Woodland areas and natural preserves in Hunedoara County

Although at first sight agriculture and forestry may seem important sectors of the Hunedoara County's economy, taking into consideration only hard factual data it represents just 4% of the total income for services and

productive sectors. From 2005 to 2007 forestry and lumbering produced over 50% of the total agricultural economical sector.

The only economical subsector that experienced a significant increase in activity in this period of crisis is fishing. As it can be seen from the following picture the fishing industry increased lately. Even though a 250% increase in activity may have a certain ring to it one must consider that in that year a new company was established in addition to the two existing ones.

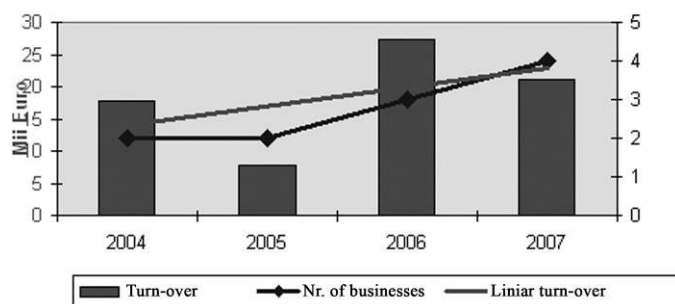


Figure 15. Fishing industry activity between 2004 and 2007

2.3.2 Industry

Most of the county's former income came from industry, to which major contributors were mining and metallurgy. Nowadays a great part is represented by electricity production, forestry and lumbering, construction materials, light industry and the food industry. These types of industries have high running costs, low services, no flexibility to the lack of the financial structures capable of refining production.

Together the three economical sectors of industry, production and distribution of electricity, and constructions had a dynamic evolution starting from 494.96 million Euros in 2004 and reaching 1.05 billion Euros in 2007. During this time many of the industrial subsectors experienced a steady increase, while others suffered a decrease in their pace of evolution in 2007. Practically, during this time, the three economical sectors doubled their economical activities in the county.

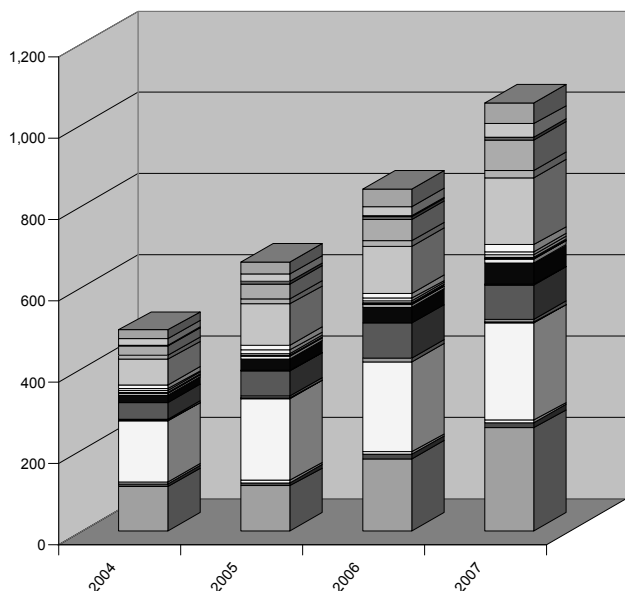


Figure 16. Development of the industry, production and distribution of electricity, and constructions economical sectors in Hunedoara County, 2004-2007

As it can be seen from the above chart different subsectors had different contribution to the general economical development. Main parts of the county's industrial production are the subsectors Metal ware production, 15.65% in 2007, Electricity production 22.85%, Metal hardware production 7.26%, Furniture production 4.98% and Production of other articles from non-metallic minerals – ceramics, concrete, stone 3.09%. These sectors have a good dynamic not only as weighting factor but also as rate of growth during the studied period. Therefore it is reasonable to state that these subsectors were development engines in Hunedoara County in the studied period.

After 2008 their decrement in activity was drastic due to the crash of the external market and after 2009 the local one as well.

2.3.3 Services - tourism

The growth rate in the tourism economical sector, for the studied period, is a result of mainly the restaurant business – currently there are 231 firms that operate under the activity “restaurant” which increased their weight in the touristic sector from 27.96% in 2004 to 34.43% in 2007.

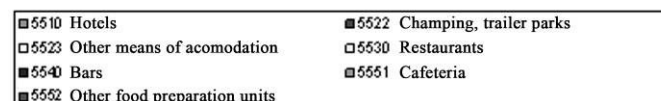
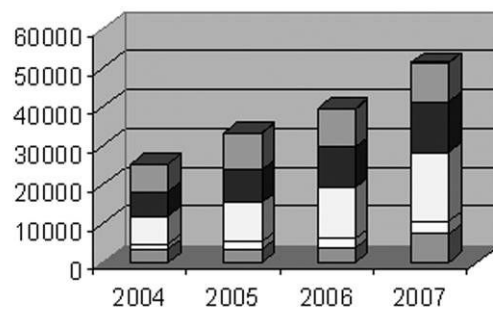


Figure 17. Touristic activities development in Hunedoara County, 2004-2007

According to the “Touristic Development Strategy for Hunedoara County” developed by the Dutch consulting agency Eurodite B.V. :“At present tourism in Hunedoara County is low, but it is within average for Romania.”

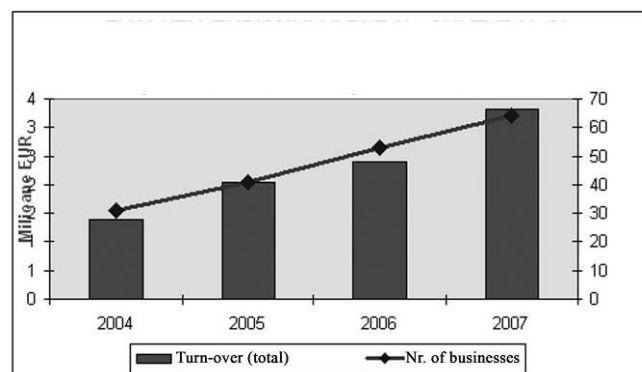


Figure 18. Evolution of rural, cultural and mountain tourism activities in Hunedoara County, 2004-2007

According to the above figure Hunedoara County has a substantial tourism potential, mainly with a mountain-natural character and due to the possibility of the rural environment to become agro-touristic, but also with important folk and cultural aspects, old churches, historical monuments, archaeological sites and the development of ski resorts.

3 Risk mitigation through sustainable territorial urban planning

To attain sustainable development it is necessary to apply measures according to a holistic vision and have a balanced approach on its all three aspects ecological, economical and social. Ecologically speaking the measures can be either active or passive.

3.1 Landslides – building ban and reforestations

Passive prevention measures could be establishing no building zones on affected areas that have not yet been built-up or even excluding them from the administrative territory. Active measures are slope reinforcing and anchorage forestation in areas in which such an investment is economically viable.



Figure 19. Water retaining basins as urban parks near future housing developments

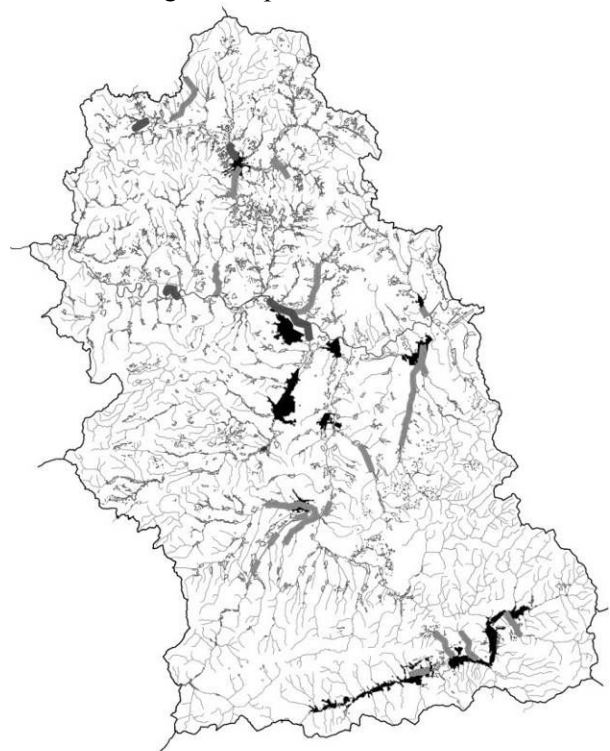


Figure 20. Dams, river training and retaining walls in Hunedoara County

3.2 Floods – banking and polders

On the one hand active measures are necessary in areas where human lives or material goods are at risk, thus dams, river training and retaining walls are proposed to be built on the rivers Mures, Cerna, Sibisel, Geoagiu, Jiul de Vest and on some of their tributary streams. Another active measure would be creating retention ponds, having the double function of large urban parks, outside the administrative territory, for example the ones

proposed for the city of Deva [9], and also preventing floods downstream by retaining excess water.

3.3 Industry

Economical development, even at a local level, responds mainly to strings that are beyond the power of the local or even county administration. Among these strings are macro economical factors, part of which are under the control of the national government, namely monetary and fiscal policies, legal mandates concerning employers contribution to social security and national inland revenue. By definition the strings of the local and county administration are extremely limited including investments in local infrastructure, local regulations to encourage entrepreneurship such as relief from local taxation. It is also possible to open special offices inside the county administration to offer managerial assistance and even possibly assistance in receiving non refundable finances by private firms from the economical sectors identified by the county's strategy for economical development as priority sectors or with cluster potential. The main priorities for economical development in Hunedoara County are based on the development potential of some local clusters, namely the industry subsectors of Metal ware production, Metal hardware production, Furniture production and Production of other articles from non-metallic minerals – ceramics, concrete and stone. All other energy consuming, pollution producing activities must be down scaled and re-orientate the county's industry on natural reserves such as berries, medicinal plants and fishing. The only viable economical development strategy is focusing on tourism, mainly mountain related (biking, hiking, winter sports), natural preserves, eco-tourism but also cultural tourism (religious heritage and historical monuments). Neither type of tourism can evolve unless it relays on an important adjacent services structure be it commercial, food, housing or transportation infrastructure.

3.4 Refuse heaps - capitalization and protection through forestation

The remaining functional industry units would undergo modernization to be brought up to ecological impact standards. However their effects are long term and the refuse heaps also need greening measures.

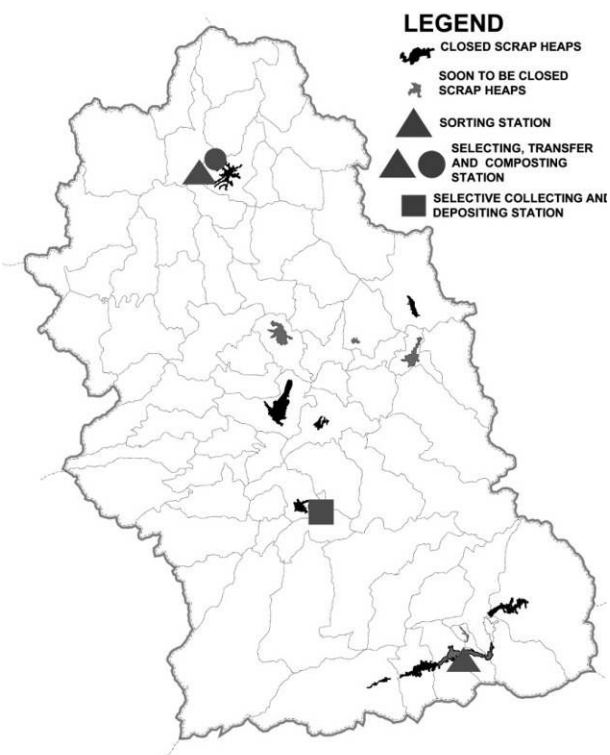


Figure 21. Proposed scrap heaps for a county level waste management plan

3.5 Scrap heap - proposals

Currently all the urban scrap heaps are undergoing a process, financed by the European Union, of closing down, greening, and assumption of duties by new selective collective centres, transfer and depositing stations at the county level, dividing it in scrap catch basins.

3.6 Hydro-energetic power plants

Landscape developments for hydro-energetic plants not only act as major retaining basins, preventing floods but also provide the means for a clean source of energy and new tourism potential.

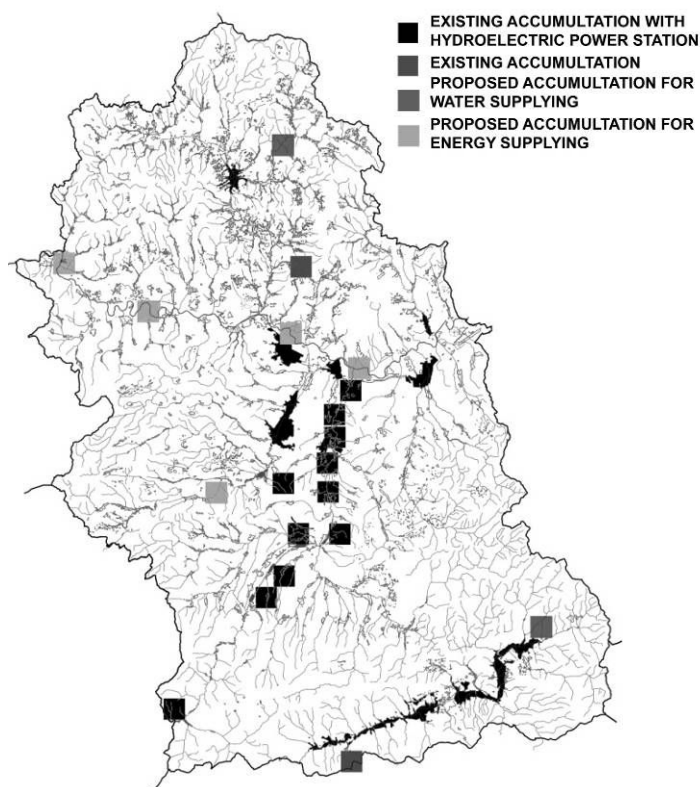


Figure 22. Proposed landscape developments for future hydro-energetic power plants

4 Conclusion

Applying this risk management measures from the risk and opportunity [10] development strategy a step by step mitigation of the social-economical-ecological situation can be achieved. Even in the case of an zero or negative economical growth without harmonizing the three pillars of sustainable development (environment, economy, society) which includes according to Jacobs M. [11]: „The integration of the economy and environment: economic decisions to have regard to their environmental consequences; Intergenerational obligation: current decisions and practices to take account of their effect on future generations; Social justice: all people have the equal right to an environment in which they can flourish (or have their basic human needs met) ; Environmental protection: conservation of resources and protection of non-human world; Quality of life: a wider definition of human well-being beyond narrowly defined economic prosperity; Participation: institutions to be restructured to allow all voices to be heard in decision-making (procedural justice)” regional sustainable development cannot be achieved and therefore neither that of each city, community, neighbourhood and citizen.

References:

- [1] He L., Nie C. (2009), *Theory and development trend in future about water resources carrying capacity in Environmental Science and Sustainability*, Baltimore, USA, Nov 7-9, 2009, pg 43- 47; ISBN: 978-960-474-136-6
- [2] Snow R., Snow M. (2009), *Climate Change Curricula and the Challenge for Educators in Environmental Science and Sustainability*, Baltimore, USA, Nov 7-9, 2009, pg 43- 47; ISBN: 978-960-474-136-6
- [3] Dobson A (1995) *Green political thought* (London: Routledge)
- [4] PATJ HD project realized in the Research Group for Sustainable Development in the “Politehnica” University of Timisoara, Faculty of Architecture, , author project manager arh Radu Radoslav, co-author stud arh Ana Branea, stud arh Marius Găman.
- [5] Murarescu O-M, Pehoiu G, (2009) *Impact on the environmental factors of the landslides in the Sub-Carpathians of Ialomita river, Romania in Environmental Science and Sustainability*, Baltimore, USA, Nov 7-9, 2009, pg 116-120; ISBN: 978-960-474-136-6
- [6] He L., Nie C. (2009) *Water Resources Survey and Urban recycled water reuse of Handan in Environmental Science and Sustainability*, Baltimore, USA, Nov 7-9, 2009, pg 37- 42; ISBN: 978-960-474-136-6
- [7] Pechorwski D.,(2009) *Analysis of the phenomenon of suburbanization as the demographic process in selected European capitals in 2001-2007 in Environmental Science and Sustainability*, Baltimore, USA, Nov 7-9, 2009, pg 85-90; ISBN: 978-960-474-136-6
- [8] Naumoski A., Mitreski K. (2009), *Climate Change Influence On Diatoms Bio-Diversity In Lake Prespa in Environmental Science and Sustainability*, Baltimore, USA, Nov 7-9, 2009, pg 25-31; ISBN: 978-960-474-136-6
- [9] PATZI DHS project realized in the Research Group for Sustainable Development in the “Politehnica” University of Timisoara, Faculty of Architecture, approved in 2008, author project manager arh Radu Radoslav, co-author stud arh Ana Branea, stud arh Marius Găman.
- [10] Charles Landry, *The Art of City Making*, Earthscan, 2006, pg 295
- [11] Jacobs M. (1995), *Sustainable development: Assumptions contradictions, progress* In Loverduski J, Stanley (eds.) *Contemporary political studies: Proceeding of the Annual Conference of the Political Studies Association* (London: PSA)