

IMPLICATIONS OF THE INTERDEPENDENCE OF HUMAN AND NATURAL ENVIRONMENT. CASE-STUDY OF THE RIVERINE POPULATIONS OF THE MUREȘ RIVER

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Abstract

The implications of the human environment on the pollution of the ecosystem of the Mureș river are significant and the paper deals with the reactions of the human environment towards this theme and the possible solutions in order to prevent further pollution which could come from the inside of the local human communities alongside the river. The research reveals the directions we must emphasize in order to activate the local actors in the ecological activities.

Keywords: resource-dependency, local initiative, ecological education, punitive measures.

Alongside the history of mankind, the development of human communities was always dependent on the natural resources surrounding their settlement. People always settled down in the vicinity of a natural (mainly water) resource, this way they could ensure the premises in the construction of their households and the development of their local economy. Even if sometimes the river or the stream was not quite friendly to them, people always had returned after the floods and continued their lives in these places.

A new way of approaching the problems of the ecosystem of the river has determined us to expand our attention in this project to the possible consequences of the interdependence of the different elements of the ecosystem: the social environment of the river Mureș. The evolution of the resource-dependent human community was and is a traditional interest of the sociology of communities. The theme of resource-dependency resonates in both the early community studies and in the contemporary boomtown research studies from the nineties. In the research upon the Mureș riverine populations the emphasis was on the study of the other side of the relation between natural and social environment, that of the influence of the social community upon the surrounding natural environment.

Considering the importance of the interdependence of these two elements of the ecosystem, one cannot handle the problems of the sustainable development of the riverine communities alongside the Mureş without studying these aspects.

In order to make a broader analysis of these implications, we have made a research based on a complex methodology over the human communities alongside the stream of the Mureş to analyze the way the inhabitants relate to the vicinity of the river and the way this could influence the life and development of their settlements.

For a better grasp of the attitudes of the riverside population both quantitative and qualitative methods were used. So the first stage of the social analysis has started in the autumn of 1999 and included the qualitative research. The interviews made with the most important local actors (local authorities, schoolmasters, priests, top-managers in enterprises in the neighborhood of the Mureş, ferrymen, fishermen, private farmers) of the rural and urban establishments included in the sample gave us a broader view of the attitude of the community towards the actual situation and the possible variants of the development strongly influenced by the vicinity of the river. The close emotional link of these people to the river and their strong will to preserve the quality of the Mureş at least as it is now, and if possible even to improve it was the main finding of the interviews. The year 2000 has been the starting-point in the quantitative research, applied to a representative sample of 580 individuals (the number of questionnaires applied in a locality was determined by its demographic and economical potential).

I would like to make a brief presentation of the localities from the sample. In choosing the sample geographical location was taken into consideration, so we included in our pattern settlements from the upper-, middle- and lower reaches of the Mureş. Another condition in choosing the settlements from the sample was their economic potential and the way the economical life of the community influenced the actual quality of the river. This was certainly a relation of interdependence, as the vicinity to the river influenced the development of the rural as well as the urban settlements in the course of their history. And last but not least the demographic potential was as well important in the choice of the settlements' sample, so there were two small-size communities with a population below 4499 inhabitants (Sântimbru «including the villages of Sântimbru and Coşlariu», county of Alba and Ungheni, county of Mureş), two middle-size communities (Ciumani, county of Harghita and Vinţu de Jos «including Sântimbru and Vurpăr», county of Alba) with a population between 4500-9999 inhabitants and two large-size settlements (Aiud «including Aiud and the suburban Ciumbrud», county of Alba and Pecica, county of Arad), with a population of over 10.000 inhabitants. So there were in all nine settlements where the questionnaire was applied. This choice was made in relation to the territorial expansion of the flow of the Mureş River.

Brief presentation of the human settlements included in the sample

In the following I will try to shape the pattern of the settlements used in the social research, making a virtual excursion along the river of Mureş, making an incursion in the past of these settlements and showing the actual tendencies of the present development.

The first locality from our sample is **Ciumani**, in Hungarian Gyergyócsomafalva, from the county of Harghita, the closest settlement to the spring of the Mureş. It is

situated in the upper reach of the Mureş, in the microregion of Gheorgheni, at an altitude of 745-770 m at the confluence of the streamlet of Nagy-Solymos and the Mureş. As an independent settlement it is mentioned from 1730 (before it had belonged to the village of Joseni- in Hung. Gyergyóalfalu- from the same county). Now it lies between Joseni (distance of 2 kilometers) and Suseni (3 kilometers). It is situated in the attraction-orbit of the greatest settlement of the region, the town of Gheorgheni (in Hungarian Gyergyószentmiklós) from the same county, at a distance of nine kilometers. The industrialisation from the communist era didn't bring a massive depopulation of the village of Ciumani in such a great measure, as the local active population had the possibility of commuting to Gheorgheni, where the need of labor-force snatched up the actives from the nearby villages, so from Ciumani, too (in 1991 41.0% of the actives were commuters). So the population from Ciumani did not suffer a massive depopulation in the communist era (at the census from 1992 its total population was of 4808 inhabitants. From the first census made on the basis of a real scientific methodology from 1880 until 1992 we can see that the population of the village had an upward development. From the data we have from 1996, the population shows a slow decrease in the nineties, mainly explainable with the international migration of the younger fertile population, but in the same time this is a feature of the third phase of the demographic transition which has reached in the last decades of the last century the countries from the Central and Eastern Europe as well.

Having a location which is hardly proper for agriculture (the average temperature is of 5°C, being one of the lowest from all over the country), the local population is forced to migrate in order to make their living. Its population was always known as being very skilled in carpentry, and even in the medieval monographies of the region, it is mentioned as being a feature in the local economy of the village. Another characteristic is the existence of more than 10 mineral wells, the historian Orbán Balázs in the 19th century mentioning that the local population uses only the water of these mineral wells and not that of the nearby brooks.

The vicinity of the Mureş river and the nearby streamlets had an influence upon the local economy, people trying to use the energy of water in their activities as an important source of income linked to the processing of the wood. So even from the 18th century there were water-sawing machines and even water-mills.

After 1989, the local economic situation could not escape the overall standing of the country. The downward tendency of the industrial development of the zone led to the disponibilisation of the commuting workers of the villages nearby. This is valid for Ciumani as well, where people could not perform a sustainable agriculture because of the natural conditions, and they tried to get involved in other sectors. So many of them (mainly the male population) commutes monthly - a very common way of migrating after 1989 - to other regions, mainly to Hungary, working as carpenters, mainly in the field of constructions.

One of the alternatives in the sustainable development of the village of Ciumani is considered to be local tourism (mainly rural and agro-tourism). The natural environment (the clear water and the closeness of the mountains and forests) and the cultural (historical, architectural and ethnographical) potential as well as the relatively

good infrastructure and the lodging possibilities can make the village develop in this sector.

The local actors we have interviewed (the mayor, the history professor and the Roman-Catholic priest) were strongly convinced that the vicinity of the Mureş River has contributed to the development of this village, partly because the infrastructure has been developed from the 19th century as a consequence of the strategic location by the Mureş. The good quality of the river can contribute in the near future to the boom of the local tourism, so they consider that they have to preserve (at least) the actual ecological situation of the Mureş, not only because it can be one of the attraction-points, but also taking responsibility towards the forthcoming generations who will hopefully use the river in their leisure activities.

The next village from the sample is **Ungheni**, from the county of Mureş, located in the site of the river, which is called the Lunca Mureşului. Considered by the social geographer Vofkori László one of the most interesting zones of the river is one of the most important (both economically and demographically) micro-regions alongside the river. (Vofkori László, 1999). This site includes one of the most important urban settlements alongside the Mureş River (Târgu Mureş-Hung. Marosvásárhely, German-Neumarkt am Miresch) and other seven communes located all on the course of the river (Maroskeresztúr, Marosszentanna, Nagyernye, Jedd, Marosszentkirály, Marosszentgyörgy, Ungheni-Nyárádtoe). This site is located on an area of 264 square kilometers, with a population of 199.619 inhabitants (data from the last national census from 1992).

Ungheni (Hung. Nyárádtő) is situated on the upper reach of the river, being one of the most important settlements in the county of Mureş, located at the confluence of the rivers of Mureş and Niraj. It has a favorable positioning, being located at a distance of only 10 kilometers from the county seat of Târgu Mureş (Hung. Marosvásárhely, Germ. Neumarkt), at an altitude of 296 m, one of the lowest places in the region. Ungheni is the administrative centre of the commune with the same name, commune which includes besides Ungheni, the following villages: Cerghid (H.Nagycserged), Cerghizel (Kiscserged), Săuşa (Sóspatak), Vidrăsău (Vidrátzseg) and Recea (Nagyrecse). In 1992 the commune had a population of 6609 inhabitants, Ungheni having a population of 3731 inhabitants. This settlement exists from the times of the Dacians, was an important locality in the Roman times, even now locals speak of the existence of a Roman road. Its strategic settling led along the history of the village to many good and bad things. Positive elements were thanked to the possibilities of a sustainable development of the local economy because of the vicinity of the water and the better development of the infrastructure (network of roads). The negative part in its history was due to the same elements: the vicinity of the river and the strategic importance of the village. This led to many destructions caused by the frequent floods of the river, and in the course of history was many times occupied along the military campaigns. It is a village with a multifunctional economy, fact being sustained by the existence alongside the agricultural activity of local industry: two water-mills on the river of Mureş and Niraj and a local distillation plant. The vicinity of the river and that of the city of Târgu Mureş has been of great help for the development of the village.

Aiud (Hung. Nagyenyed, German Strassbourg) is the only urban settlement of the sample, situated on the right side of the Mureş River, in the county of Alba at the contact of the Mountains of Trascău with the Plateau of the rivers of Târnava at an altitude of 270 meters. This settling assures the locality a very favorable resource in the development of an efficient agriculture, especially the wine-growing (its noble wines are famous all over the country).

We have chosen two settlements from Aiud, one was that of Aiud and the other one was the suburban Ciumbud, administratively subordinated to Aiud. The city of Aiud is positioned on a total surface of 624.157 hectares, site which includes the ten suburban localities which now administratively belong to Aiud. These ten localities are: Aiudul de Sus (Hung.: Felenyed), Gâmbaş (Hung.: Marosgombás), Măgina (Hung.: Muzsnaháza, Germ.: Mussendorf), Păgida (Hung.: Kisapahida), Ciumbud (Hung.: Maroscsombord), surface: 80,81 hectares, 1497 inhabitants, Sâncrai (Hung.-Enyedszentkirály), Gârbova de Jos (Hung.: Alsóorbó), Tifra, Gârbova de Sus (Hung.: Felsőorbó) and Gârbovița (Hung.: Középorbó). At the census from 1992 the town of Aiud (including all the suburban localities) had a population of 24.731 inhabitants.

These settlements have existed from the Roman times, fact supported by the material proof of the nearby archeological site. In the 13th century Saxon settlers had built a fortress, the town maintaining its medieval characteristics even now.

The economy of the town influences the downstream quality of the water of the Mureş. So industry, developed mostly after the seventies in the process of the forced industrialization, has led to the pollution of the river. The hard industry, and especially the metallurgic plant and the concrete elements plant are the main sources of pollution for the Mureş. Even though after 1989 the economic situation has led to the decrease of the importance of the industrial sector in Aiud, the industrial sector still occupies 25% of the territory of the town.

As it is shown from the interviews made at the local council and at the Environment Protection Agency (EPA), the main purpose would be to rehabilitate the natural environment compromised by the unauthorised deposition of industrial garbage (mainly from the metallurgical plant), to punish the polluting sources and to bannish this kind of deposition. The local authorities (at least at the declarative level) are very keen on the finalization of the project of protection of the natural environment, but they complain because of the shortage of financial resources.

The questionnaires applied in this town prove that the majority of the population is aware of the importance of the preservation of a proper environment, most of them complaining that there it is too little done by both the civil society and the local authorities.

There is still uncertainty among the respondents about the proper measures that must be taken in order to preserve an unpolluted environment, most of them expecting others (namely authorities, specialists) to do this.

Sântimbru (hung. Marosszentimre), our next commune downstream the river Mureş is situated in the county of Alba, in the vicinity of the county seat Alba Iulia, at a distance of 8 kilometers. We have included two villages from this commune: the community center-Sântimbru and Coslariu, situated at 2 kilometers from the center. Having very favorable conditions, a soil of good quality and a good transportation

infrastructure (roads as well as railway-station), Sântimbru is a village where the natural resources made the local development possible even during the communist period. Small industry and services (transportation) has been an alternative in surviving even after 1989. The commune is one of the most prosperous one in the zone and the vicinity of the river of Mureş was and still is of great help in the maintenance of a socio-economic and demographic situation (in 1992 the population of the village has been of 1154 inhabitants, this meaning 43% of the whole commune's population).

Still with all this resource-dependence, by the interviews made by us with some local actors of the village of Sântimbru, we have realized that people seem not to be aware of the importance in the maintenance of a proper quality for the river has helped them throughout the history, waiting for "advice" from the authorities of the county of Alba and the central ones.

The next settlement of the sample is the village of **Vințu de Jos (hung. Alvinc, germ. Unter-Winz, Winzendorf)**. This commune is situated in the county of Alba at a distance of 12 kilometers from Alba Iulia, with a population of more than 8000 inhabitants. Besides the administrative center, the commune includes Sibîşeni (hung. Sibisán), Inuri (hung. Borsómező), Vurpăr (hung. Borberek).

In our sample we have included two villages from this commune: Vințu de Jos and Vurpăr.

Vințu de Jos is a settlement with an impressive history. The actual settlement was built up by the Saxon settlers in the 12th century and now it is an important railway junction. Its historical and cultural potential (Vințu de Jos has one of the nicest castles built on the place of an earlier Dominican monastery in the 17th century) can be a possible solution for the multifunctionalization of the local economy by the developing of tourism. Its good site and its developed infrastructure has led to the socio-demo-economic development of Vințu de Jos, and besides the agricultural sector which is well developed here (the surroundings are known as having famous vineyards which produce wines of good quality as in the case of Aiud), small industry and services had developed along the settlement's history and even after 1989.

On the lower reach of the river is the village of **Pecica (hung. Marospécska)**, situated in the county of Arad at a distance of 20 kilometers from the county-seat, Arad. The commune of Pecica includes the following villages: Bodrogu Vechi (hung. Ó-Bodrog), Rovine (Hung. Magyarpécska), Pecica (Hung. Ó-pécska) and Turnu (Hung. Torony). It is the only village in our sample which is situated in a plain, and probably is the most prosperous village from our sample. The first proofs of the existence of a human community were found in the late neolithic age. In the Bronze Age, Pecica was the centre of a group of settlements, and because of the multitude of archeological sites which are different from all the rest, this was known as the Pecica-Periam culture (the most important vases are now in the Museum of the county seat). Because of its wonderful positioning, it has always been a flourishing settlement. Besides agriculture, the people from this village even from early medieval age (10th century) have used the water of the Mureş River for transportation. It is well known that the commerce with salt was a very profitable business and people even in the early 20th century used the Mureş as possibility for transportation of salt and for

persons (people use even now the ferry for transportation). There were also water-mills which have functioned until the dawn of the communist regime.

In our interviews with the local actors (local catholic priest, teachers, local authorities, farmers and even two retired ferrymen) we could see the importance the local population attaches to the cohabitation with the river. Even though the latest floods (seventies, eighties) caused serious problems, the attachment of the community seems to be significant. The pollution of the river did not stop the locals, especially the young ones. It is an interesting initiative of a group of youngsters who would like to make a boat-trip upstream the river in order to see the geographical "history" of the Mureş.

After 1989 the situation of the community has not changed, one of the main functions of the local economy is still agriculture, which because of the fertile soil on the banks of the Mureş is an efficient activity. Still, it is not an intensive form of modern agriculture, but more an extensive one.

People with the help of the local authorities are trying to establish an activity of rural tourism, which would include the possibility of leisure activities related to the river of Mureş. The help of the central authorities (in the solving of the problems of the pollution of the river) keeps still waiting.

We must underline the interest shown by the locals in answering to questions regarding the actual natural ecological problems of the Mureş, caused mainly by the insufficiency of legislative frame in the ecological domain, so there are no efficient measures officialties can take in the punishment of those who pollute the water of the Mureş. In the findings of the social research we could see that there is- at the rhetoric-declarative level- a very strong attitude against those who are really responsible for the pollution of the river.

The presentation of the social research includes two subdivisions, the first relates to the existing links between the human population and the Mureş river and the second to the ways of the protection of the natural environment, particularly the Mureş river.

A. Presentation of the sample

Our sample of the questionnaire, as mentioned above included 583 individuals, distributed as it follows in the nine settlements from the six communes of the sample:

Table nr. 1: The numeric distribution of the sample for villages

Name of the settlement	Nr. of applied questionnaires	Percentual
Ciumani	60	10.3
Ungheni	122	20.9
Ciumbrud (Aiud)	102	17.5
Aiud	14	2.4
Sântimbru	36	6.17
Coşlariu (Sântimbru)	44	7.5
Vinţu de Jos	54	9.26
Vurpăr(Vinţu de Jos)	33	5.6
Pecica	118	20.2
Total	583	100

The sample included settlements from the three reaches of the Mureş river, that is: the upper reach of the river is represented by the village of Ciumani (60 questionnaires) and settlements from the middle reach gave the 69,4% of the total, and the lower reach included only the village of Pecica (118). Our sample is representative for the whole population of the riverside as it includes all the economical, social and demographical categories which exist in the whole population, with a percentage close to the national census' data from 1992.

The relation of the people to the river of Mureş

Personal identification items were followed by the questions which were ment to reveal the personal relation of the local people, especially with what finality do they use (if they use) the water of the Mureş. We will treat the relationship between the riverside human population and the Mureş as an input-output relation, input will include the way the population relates in its everyday especially economic – activity, the way they are protecting (if they do protect) the natural resources from their environment, particularly the Mureş river. So we wanted to find out how does the population handle the problem of removal of the organic and domestic trash.

The output side of the relation is represented by the activities related to the natural environment, household and leisure activities, so what the population “gains” from the fact of being in the close vicinity of a water resource. In parallel with the questionnaire we have interviewed older people who have made an oral history of the late few decades of the place the river used to have in the community's life. Our findings have revealed an existing close comunion of the riverside population with the Mureş and its resources.

In thw output we took into consideration more activities (agricultural, household and leisure) in which local people could have used the water or the ambience of the Mureş. We have also asked them if they drink (occasionally) from the water of the Mureş.

Results have shown that the great majority of the people never use the water of the Mureş for drinking (97,2%), the great majority has wells or running water (haven't got canalisation though). Only a small number of people specify that they do not drink because the water of the river is polluted. This is the case of those who live at a very small distance (50-150 meters from the banks of the river) and who used to drink the water of the river a few decades ago. The highest percentage of those who find the water of the Mureş handy and always drink from it are in Ungheni, county of Mureş, where they have an important colony of gypsies living close to the banks of the Mureş river, having no economical possibilities to dig to find a well or fountain. In many cases those who affirm that they do not use the water of the Mureş declare that even if they would not have this well (which in many cases hasn't got either the proper quality to be used as drinking water-see the case of Ciumani, Vinţu de Jos, Sântimbru where even the wells are infected because of the pollution from the industrial sites from the vicinity of these settlements) would not use the water of the Mureş because it is polluted and would bring (and in Vinţu de Jos they actually do) water for drinking

from other sources-as in the case of Vințu de Jos- the spring of the Sibișel, the local population bringing in the drinking water with cars from almost ten kilometers. A similar case can be found in Sântimbru where the local doctor has affirmed that they have recently made bacteriological, chemical analysis of the water of the wells and they did not find one well which would correspond to the normal standards. The lady-doctor, although aware of the serious consequences has affirmed that: " what can one do? If hasn't got a horse, must go on foot!"

The more frequent use of the water of the Mureș in other activities can be seen in villages situated on the middle and lower reach of the river. People use the water especially in agricultural activities (watering and irrigating), although they have admitted that lately they rather use water from the well because the pollution from the water they have been using has caused serious damage to the crops (in the case of these people the most often asserted measure that must be taken in the near future would be the building of stronger dams and the ecologisation of the banks of the river). Of course, the highest percentage of those who answer affirmatively to the question whether they use the water of the river in their activities is made up by the effective riverside population, with a distance of under 500 meters from the banks of the river. The existing positive correlation proves that our primary hypothesis regarding the role of the distance to the river in the development of a closer connection of the population with the Mureș proved to be right. At the whole sample this coefficient was $r=0,13$, the highest values of these coefficients we could see in Ciumani ($r=0,24$) and in Pecica ($r=0,29$) where the distance plays an important part in the frequency of the use of the water of the river, especially in agricultural activities.

Another type of activity they use for the water of the Mureș are the household-activities. For now "only" the cleansing of the carpets and the washing of the (personal) cars, older women recall the period when they used to bring the clothes and washed it here. Even though they appear as different opinions, those who declare that the water is polluted and would not use it and those who never use it because they have other sources belong to the same category: that of the people who have an alternative to the water of the Mureș. A sad manifestation of the attitude of the people towards their personal role in the protection of the environment is that only a minor number of the respondents affirmed that they are not using the water of the Mureș in their activities because this way they themselves would pollute the river. The village where they declared in the highest proportion of the local sample that they would not use the water of the Mureș because they would pollute it is Ciumani, where these respondents form 10% of the local sample population (in the whole sample the percentage of those respondents who answer similarly is only of 1,88%!). These respondents have mentioned as a possible measure that must be taken in order to (re) establish the best possible quality of the Mureș the ecological education of the people, make them be aware of the results of their actions in the environment.

Another group of questions is still related to the output in the Mureș -human population's relationship, and these questions refer to the role this river plays in the leisure activities as well as in the ingestion of fish., meaning the size of the population from our sample who eat fish fished by the anglers (we could not find professional fishermen alongside the river).

Many people from our sample go elsewhere in their spare-time. They have confessed that in their youth (10-20 years ago-this is the cause of the age-groups which include the population between 40-60 years) they went frequently to the Mureș, but now they prefer other places (almost all of them prefer the mountains or neighbouring settlements where there is a water-spring where they can enjoy nature and in the same stay on the banks of a water-source (especially in the settlements downwards Târgu Mureș, in the middle and lower reaches of the river). Processing the information we could establish a positive correlation between the way people spend their free-time and the perceived quality of the Mureș ($r=0,11$). So those people who do not come to the Mureș in their leisure activities consider that the Mureș is polluted and in the same time dangerous, especially in the villages situated on the middle and lower reach of the Mureș people said that they are afraid for the life of their family, as the intensive exploitation of the river ballast caused serious damages in the bed of the river, and besides pollution the whirlpools from the river can be dangerous. Especially in the villages situated between Sântimbru and Pecica (including Pecica), one of the possibilities of making the Mureș more attractive for leisure activities was the establishment of a leisure center on the banks of the river (in an oral history an old man who used to be a ferry-man in Pecica narrated the possibilities that have existed in the thirties, when on the banks of the river there were more leisure centers, with open air bathes and lidos and tennis-courts for both the well-to-do social categories and the poorer ones could have had a very pleasant time). It is interesting what the younger (and poorer) people say, that going out to the banks of the river is the only opportunity to meet with friends without going to some pub in the village or nearby; and even if they admit that the conditions they find near the Mureș are many times terrible, they come here because they have no alternative in spending their free-time in the middle of the nature. In their case the attraction towards the Mureș is not the main argument they come here for.

Another possible way to spend one's free-time is to go out fishing (or more precise angling). From the whole sample only 17,3% of the respondents go or would like to go out angling. The overwhelming majority says that they never go out (90% Ciumani, 80% Pecica, 82.7% Ungheni), even if they did before, the main cause being the unexistence of fish. But people do not state affirmatively that they do not go out fishing because of the pollution.

People who are not anglers in their majority do not eat fish. The correlation of these two items gave a significant coefficient of $r=0,21$ for the whole sample, higher values being obtained in Vurpăr $r=0,43$, and Aiud $r=0,38$. There is no positive correlation between the quality of the water and the motivation of those who do not eat fish (so the quality of the water does not influence the people who do not eat fish) for the whole sample the value is $r=-0,07$, the only positive values being registered in Ciumani $r=+0,28$,

The following two questions reveal the input part of the relationship of the human and natural environment of the Mureș river, particularly how local people protect the Mureș from the individuals' pollution, this question can reveal the attitude the local

riverside population shows towards the small-scale ecology which is dependant on their actions.

This category of questions was related to the handling of the removal of the rubbish, especially in those settlements where there is no institutionalised way of removing the trash. There were two questions in order to see how do the local people solve this very "thorny" problem each human community faces. We were aware of the fact that these people keep animals in order to supply the provisioning and work their household-plots (or their larger agricultural plots).

The great majority of the people use the organic trash (78,8% of those who have in their household such trash) as natural fertilizers and only 21,2% are placing it on the river banks or in dung-holes. In almost all of the settlements of the middle and lower reaches of the Mureş the dump-hole was in the close vicinity of the river (this was a place established by the local council sometimes decades ago) and people were very content with themselves as they were saying that they did nothing wrong just follow the "orders" of the authorities. Although in many cases they knew that this was not right they pleased oneselves that it was "legal" to do so. The only settlement where there was no such "authorised" dump was Coşlariu, but there were other ones used in common agreement by the locals.

Those who have responded that they do not have such organic trash have smaller animals (like poultry or pigs), so we can say that every household includes agricultural activities at small-autosubsistancy scale.

There were people who affirmed that one of the main problems is the discrepancy between the rhetorical and the real action-level, so many people who affirme that they throw away the dung from the animals "wherever they could, sometimes in twilight they went with the cart to the banks of the river and threw away the dung they did not use(the more serious problems appear when we talk about the removal and placing of the household garbage). There were just a few people who used the more and more popular storing method of the compost. The difference between them and those who affirmed that they have stored the trash in the garden was that the later were just putting the trash out without having a stable place where they used to put it. The great majority said that the back of the garden was the place they were putting the trash or they were throwing it directly on the land as natural fertilizers without any further storings of the dung.

Serious problems occur when we discuss the solutions the locals give to the removal of the household garbage, because almost all of the few settlements from the middle and lower reaches has a serious or more loose contract with a company which removes periodically of the rubbish, but people from Pecica, Vurpăr, Ciumbrud and Coşlariu are unhappy because of the defficiencies in the organisation of the removal, because for example in Pecica the rubbish is removed only once a month (!) and in the meantime people have to handle themselves the transportation of the garbage. So as we can see, only the settlements downward Aiud benefit from an organised system of removal of the rubbish(the only exception is Pecica). Still even in these villages there is a significant percentage from the sample who cannot pay the fees of the removal (as they have confessed themselves), so they bury or incinerate (even the plastic is incinerated) the rubbish or in the case of the population from one of the

isolated districts from Vințu de Jos (Intregalduri) they throw it on the banks of a streamlet which flows into the river of Mureș. A global evaluation of the current standings shows that in the case of 59,1% of the total sample population rubbish is removed from them or they are placing it in authorised (although not ecological) refuse dumps. Only 5.1% of the total population states that they throw the rubbish to the banks of the river. We had to register the responses the questioned persons gave so we could not verify the true/false quality of their affirmation.

The distance of the respondents to the river played a role in the placing of the garbage, even if with not a great significance, the evaluation of the data showed a positive correlation for the two items ($r = 0,04$).

One of the problems most people raised was the breaking of the promises by the local authorities, because on their electoral agenda at the 2000 local elections the placement of a better, more ecological refuse-dump or the punishment of the population who place garbage in forbidden places was included, but there are no encouraging signs in the direction of implementation of these objectives. Authorities have said that the complexity of this problem makes the functioning of such a projects not being visual at this moment, but they have mentioned that the people themselves should do something in order to marginalise those who really pollute the river by placing their household garbage close to the river in unauthorised places, particularly by public disapproval.

3.

This part of the research regards the way local people perceive the quality of the water and the possible solutions seen by the local population and the authorities to protect the Mureș and to avoid the further pollution of the river. This chapter includes the (subjective) perception of the sample population of the present condition of the river, the way authorities handle the environmental measures, the role population should play in the environmental actions and finally what chances do they see in the preservation of the natural environmental frame for the following generations and what specific measures should be taken in order to prevent further pollution of the Mureș.

We emphasize that this is the subjective perception of the local population on the quality of the water of the Mureș, the great majority affirming their judgements without any specific scientific basis, their opinion dictated in many times by their common-sense or by the negative personal Mureș-related experiences their neighbours or relatives just had

The question was referring to the perception of the quality of the water in the last few years related to its previous condition.

There is a very strong majority (63,1%) who is not content with the actual quality, most of them accuse the upper settlement who pollutes the river (see Ungheni accusing Târgu Mureș, Vințu de Jos accusing Sântimbru and Pecica accusing Arad). There was a difference among the people who affirmed that the river is indeed polluted: there were those who were saying that for the whole year it is polluted, and others who connected it to the melting of the snow and the ecological accidents of one

of its affluents: the Arieşul river. Those who said that the river is polluted in the whole year were those who when it came to the measures to be taken were the most fierce in applying punitive measures against the pollution sources from the outside.

We can still find people who are making a distinction between pollution and muddiness, who are blaming that the balast-exploiting companies are to blame. These people have affirmed that the river is not so polluted but it is muddy and not good for drinking or bathing, but they have answered that the pollution has diminished after the industrial restructurations of some important polluters which have reduced after 1989 their production capacities. We might sarcastically say that this was the only benefit of the economic decrease to the population and to the environment. 14,7% of the sample population did not make any assertions related to the quality of the river. This is a very high percentage if we take into consideration the firm opinions of the population in previous questions.

Another important question in the population's reaction towards the activity of the authorities was related to the way local authorities handled the problem of pollution by taking measures in order to reduce it. Measures were considered to be: punitive measures against the polluters, a better placement for the refuse-dumps, the organisation of a guard who could watch out for the river and the duty of informing the hierarchical superiors about the more serious pollutions, etc.

The analysis of the responses reveals a very strong dissatisfaction of the population towards the measures local authorities have taken until 2001. As the figures show, 73,0% of the whole sample considers that the local authorities did not anything or did too little in order to protect the natural resources. The percentage of those who are content with the way the local council and the mayorship handles the ecological problems is very low (12,1%), and it came from people who are still afraid to expose their opinions versus authorities because of the impregnated fear they have because criticism towards these institutions was not allowed and even seriously penalized. In our interviews made with representatives of the local authorities they have pointed out two main obstacles in the enactment of such projects: the impossibility of raising funds—we might add that sometimes we are facing the immobility of the local authorities and their lack of experience in competitions with a serious international financing and the lack of sympathy coming from the population, organised especially by those who have registered a loss lately in their relation to the local authorities.

Regarding the role people should play in the maintenance of a proper quality of the natural environment we have found a very interesting duplicity: even though 83,1% of the whole population admits that it is a moral duty of the locals to organise and participate at environmental projects in order to prevent the pollution of the Mureş, there were few people who could come up with concrete actions that can be initiated (and they would like to participate) and tell us more about the concrete ways this co-operation can come to action. So I believe that the opinions cover more the rhetorical level, many respondents want to correspond to the social expectations, "to say what must be said". Still there was a positive correlation (even if not very significant – $r = 0,1$) between the way people reacted to the possibility of co-operation and the concrete measures proposed by the same respondents. We must outline the role of educational level, which influences the way people feel about the importance of co-operation,

educational attainment being a condition in the way they have responded (correlation coefficient was $r = 0,1$ for the whole sample).

With all this pledge to morality and co-operation, we must add that the lack of strong community bonds is something we did see along our observation sessions, so in the "rurban" communities, where modernity has destroyed the traditional community and did not bring in (yet) the postmodernity's civic society, there it is a sad reality that an incipient individualism associated with negligence characterizes the individuals' mentality. This is a serious obstacle in the probability of joint environmental actions of the population and the authorities.

The answers given to the question related to the future of the river's condition show that people are very pessimistic about the perspectives of the way pollution will evolve, a big exclamation mark must be put on the right side of the 27% of the absolute unbelievers in the improvement. If we want to draw into the community works the people in order to help in stopping the pollution, we must always be aware that there always be negativists, but sometimes ecological activists who are predicting a kind of world-wide catastrophe are more decise and can be more active. So we must not really see these people as totally unusable in ecological actions.

Figures show us that the optimism of the people is still there, a great percentage (45,8%) said that people can be educated. This can be a starting point but as our respondents have told us that the school and the other institutions must handle this problem it is obvious that they perceive this education as being the task of "others" and they just enounce a way it must be done without very much intention of helping in one way or another in doing this. One of our respondents, an older woman from Vințu de Jos has admitted that she cannot do anything: "even if I see those youngsters who are throwing all kinds of trash in the river, I cannot say anything or else they will beat me up".

There is a percentage of the people who believe that there is no need for any measures against those who pollute, because they already behave properly. Those who gave this response have lower expectations (mostly come for the lower strata of the social structure and have a lower educational attainment). Or they really cannot define the notion of "ecologically conscious behaviour", which is indeed very hard to define.

Our last question of the questionnaire was related to the way people see the possibility of taking into their hands the decision, the question sounded like this: "If you would be in position to make decisions for stopping the pollution of the river, what would you say?" this was an open question, meaning that the codes were set after recording all the 583 answers given by our respondents. Response variants were:

1. Has no opinion;
2. There is no need (satisfied).
3. Punitive measures towards all the polluting factors (men and industrial plants);
4. Education of the population;
5. The closing down of the external polluting sources (from outside the settlement);
6. The closing down of the internal polluting sources (from the settlement);
7. The control and the ecologisation of the river-bed;
8. Raising of funds for the cleaning of the water (especially external ones);
9. They have to control only the industrial plants;
10. The placement of waste-pipes/rubbish-shoot;
11. There is nothing to be done anymore.

The big number of the answering variants made possible to register a more nuanced view of the ecological measures to be taken asserted by the sample population. I have made up three groups of the proposed measures: 1. The group of the punitive measures which includes variants nr. 3,5,6 and 9. Differences are only those related to the extension of the punitive measures. 2. The group of the educational measures (variant nr.4). 3. The group of the constructive measures (variant nr.7 and nr. 10).

The great bulk of the people disapproves of the "softness" of the authorities when it comes to the punishment of the real polluting factors (mostly the industrial ones) as well as that of the individuals who are throwing away the trash in unauthorised places. If we take these three groups, we can say that the highest percentage was registered by the group of the "severe": 43,4%, followed by the "real measures" group with 29,1% and the education or "soft" measures had only 9,9%. The percentage of these groups varies for each settlement according to its geographical placement, so the settlements of Ciumani (56% punitive measures but in the same time 54% constructing measures), Ungheni 54,1%, Sântimbru (52% punitive measures), Vințu de Jos (54% punitive measures) are situated in the closeness of pollution sources (big industrial centers like Târgu Mureș, Luduș, Alba Iulia, with the exception of Ciumani, where the respondents did not point to a specific pollution source). Punitive measures are seen by some of the respondents as the first step in order to restore a discipline which in their view cannot be done with only education. Many of them pointed out the lack of civic sense and the lack of self-discipline in actions. Those who believe in the force of education, point to the younger population which could benefit from a proper ecological education (there was a very negative opinioning towards the category of youngsters who have no ecological or other education, coming not only from the very old population). Although they agree that there is a strong moral crisis and school, among others is found responsible for this crisis, there is a belief that it could still fill up this function.

It is interesting to present the opinions of those who really want concrete measures: those who are for the placement of refuse-dump and waste-pipes or waste-filters or they want the local authorities to take greater measures and participate at greater zonal and regional projects of placing and strenghtening of dams and the regularisation of the river-beds. These measures in their great majority are for the increasing and improvement of the output the population can get from the river, in this case as in all it is the eternal economical relation between resource and needs. Needs like use of the water in agricultural activities but without having the constant fear that the river would flood every year and distroy their yearly work, other needs for using the Mureș as a leisure source (we have mentioned that the population has this claim of having - especially at the lower reaches of the Mureș river - leisure centers where people can spend their spare-time in confort). We can say that there is a positive environmental attitude towards the use of the Mureș, but this does not reflect the way each individual will act in everyday life.

Finally we can say that the social research has revealed two important things: that there is a consciousness towards the existence of pollution of the Mureș river, and this affects the riverside population, and on the rhetorical level there is a strong commitment for solving these problems with punitive and construction measures. On

the other hand, there is no real support coming from the civil society in implementing such ecological projects and not even the environmentalist policies are very well seen as they affect the industry and besides the economical problems they create a social one: the unemployment. Romania has to realise that environmental policies include the creation of new jobs, and as it appears in the book *L'ecologie contre le chômage* edited by the organisation Les amis de la Terre in 1984 long-term employment will be possible for the local economy, first of all in order to repair the damages done until now to the natural environment, so we can say that ecology can be infiltrated in the economical process as a part of the production process.

Appendix

Questionnaire (model)

A. The geographical localization of the studied settlement

1. The name of the settlement

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2. On what reach of the Mureş River is it situated:

1. lower reaches
2. middle reaches
3. upper reaches

B. Identification questions of the subject

1. Gender:

1. Male
2. Female
0. No answer

2. Age:

1. 0-19 years
2. 20-29 years
3. 30-39 years
4. 40-49 years
5. 50-59 years
6. 60-69 years
7. Over 70 years
0. No answer

3. Marital status

1. Unmarried
2. Married
3. Widow
4. Divorced
5. Concubinage
0. No answer

4. Educational level

1. Public elementary school
2. Vocational school
3. Training college
4. Secondary school

5. Post-secondary training

6. Higher educational training
7. No schooling
0. No answer

5. Profession:

1. Homemaker
2. Farmer (private)
3. Blue-collar
4. Official (clerk)
5. Professional
6. Private entrepreneur
7. Student, pupil
8. Unemployed
9. Pensioner
10. No profession
0. No answer

6. Working place:

1. Has no working place
2. Does not work anymore/yet
3. Works in the village
4. Works in a nearby rural settlement
5. Works in an urban settlement
0. No answer.

7. Nationality:

1. Romanian

2. Hungarian
3. Gypsy
4. German
5. Other nationality
0. No answer

8. Place of birth:

1. in the settlement
2. in a nearby village or city alongside the Mureş River
3. settlement from another region

4. No answer

9. The period of your presence in this settlement:

1. I was born here
2. We got settled from my childhood
3. I came here because of my profession
4. I came here after my marriage
5. I have come here recently
0. No answer

C. Questions related to the environment

1. The distance of your house from the river:

1. 0-5 m
2. 6-50 m
3. 51-100 m
4. 101-500 m
5. More than 500 m
0. No answer

2. Do you use the water of the Mureş for drinking?

1. Always because it is close and handy
2. Sometimes yes
3. Never because it is polluted
4. Never, because we have wells/fountains
0. No answer

3. Do you use the water of the Mureş River in your household activities (watering, washing, carpet-cleaning, etc.)?

1. Always, because it is by me
2. Not so frequently, but I use it
3. Never because it is polluted
4. No, because this way I would pollute the environment myself
5. No because we have running water and/or well from another source
0. No answer

4. Where do you put the organic trash (animals, etc.)?

1. We don't have such type of trash
2. We store it in the garden (for agricultural use)
3. We put in the garden and afterwards take it out to the land (fertilizer)
4. Compost
5. Throw it to the banks of the river
6. Garbage heap/dung-hole
0. No response

5. Where do you throw the trash (in case you do not use it for heating-corn-cob f.e.)?

1. Rubbish-shoot
2. Incineration
3. Garbage heap
4. Garbage heap and incineration
5. Throw to the banks of the river
6. Throw to the banks of the river and incinerate
7. Bury in the ground
0. No answer

6. How often do you go in your spare time to the Mureş (to take a bath, entertainment)?

1. as often as we can (every weekend)
2. we prefer other places where we enjoy it more, but sometimes yes
3. never because it is polluted

4. we never go out

0. no answer

7. Do you go fishing in your spare time?

1. never

2. not lately because the water is polluted

3. I would like to, but I do not have time

4. As many times as I can, alone or with my friends

5. Sometimes

0. No answer

8. How often do you eat fish from the Mureş River (even if it was fished out by someone else)?

1. I never eat fish

2. Once in two months

3. Monthly

4. Weekly

5. More than once a week

6. Occasionally, but not very often

9. If you do not eat fish, what is the motive?

1. We were not used to in the family

2. I don't like fish

3. I do not eat it, because I cannot prepare it

4. I don't eat fish because the water of the river is polluted

5. I eat fish

0. No answer

10. What is your opinion on the recent quality of the river Mureş?

1. It has not changed, it is the same as it used to be, but it is polluted

2. It is worse than before

3. It is better than before

4. I cannot appreciate it

0. No answer

11. How do you value the local official measures in the field protection of environment?

1. There are no such measures in our settlement

2. There are some, but there are not efficient

3. I find them satisfactory at local level

4. In the actual economic situation there is too much talk about it

5. Cannot appreciate

0. No answer

12. Do you think that in your locality there must be an active co-operation between the local authorities and the population in order to activate the protection of environment?

1. No because there are far more important things we must solve at local level.

2. Maybe in another economic context, but now it is not efficient because there are no funds for sustaining it.

3. Yes, because we have the moral duty to preserve for the next generations an unpolluted environment.

13. In your opinion what are the chances that the actual grown-up generation would leave an environment without polluting it?

1. In this rhythm in a few decades everything will be deteriorated.

2. If we can make the people realise the consequences of the unprotection of the environment we can stop the deterioration.

3. The great bulk of the population contributes already to the protection of the environment.

4. I cannot estimate.

0. No answer

14. What are the necessary measures coming from the local authorities for the improvement of the quality of the Mureş River?

1. There is no need for such measures (satisfied)

2. Has no opinion

3. Punitive measures towards all the polluting factors (men and industrial plants)

4. Education of the population

5. The closing down of the external polluting sources (from outside the settlement)
6. The closing down of the internal polluting sources (from the settlement)
7. The control and the ecologisation of the river-bed
8. Raising of funds for the cleaning of the water (especially external ones)
9. They have to control only the industrial plants
10. The placement of waste-pipes/rubbish-shoot
11. There is nothing to be done anymore
0. No answer

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