Solid Waste Management in Garla Mare

Managing the beauty of the Danube Delta

Part 1:

- ***Description of Garla Mare.***
- ***Geo-hydrological circumstances.***
- ***Contemporary local waste management.***
- ***Governmental organisation and legislation.***

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Introductory

Solid waste management is a hot issue in former Eastern Europe. There are few landfills, there is hardly any waste collection in rural areas, new incinerations must be built while people wait for the collection of their waste.

New legislation is developed and geared up with European standards. The policy writers sit in an 'ivory tower', now and then they throw a leaflet out of their window in the hope that the working staff will be able to understand and implement the new formulated legislation. With the new legislation comes no money, no knowledge, no more staff, no more equipment. Local authorities have to deal with the new regulations themselves. These authorities wonder when the policy writers saw their country and travelled around and talked to the population that has to obey their newly formulated rules?

But one of the leaflets from the' ivory tower' turned gold into our hands. Law no.426 gives citizens the right to get to all environmental data. This empowers conscious citizens the make the right choice, make up their mind and fight for their environment with cool facts at hand. The right to get to environmental data makes superior environmental activism possible.

The need for a proper solid waste management is felt in villages like Garla Mare. The citizens are not per definition motivated by legislation or health care. Daily life in Garla Mare is harsh on people. The economical situation forces them to look at the matter from a more financial point of view: they want to their village to look nice and attract tourism, because that brings in money. The village has a high potential, hardly any village in Romania lies at the border of the Danube so beautifully as Garla Mare, where the view from the small hill over the Danube valley is breathtaking. Only, if just the landfills would not be there.

Motivated to design a new solid waste management program, the local environmental NGO and the mayor consulted a Dutch environmental NGO. How can these partners work together to motivate all citizens to dispose of their waste properly?

The new found Romanian NGO has no knowledge of biogas plants, composting sites or plastic recycling. Knowledge is the first step towards independent thinking, towards choosing the best solution for your local environment. The purpose of this cooperation for the Dutch NGO is to become superfluous and that is what this report is for: to share knowledge about solid waste management. Making conscious choices possible. That is why this report doesn't provide the one solution that most foreign consultants supply most of the time, it provides information for democratic debate.

There is no way to think that this support is a one way stream from the donating western NGO towards the eastern NGO. Cooperation is about learning about each others world, fighting difficulties of understanding, taking the best from both cultures, slaughtering borders that are drawn on a piece of paper by a hand shake or a good-bye kiss.

Pollution crosses country borders, pollution passes the lungs, pollution passes the spinal cord into our newborn generation. The voiceless suffer most. It is the duty of scientist like me to supply information so that the only right decision can be made: protection of the voiceless, be it the corn we eat, the water we drink or the air we breath.

Summary

Romania is a country in transition: in 1998 the communist central planned economy was transformed into a democratic capitalist society. After this transition there no private investments to replace the outdated agro-industrial equipment. This caused the corn and pig industry that was organised by the communistic principle of communal farming (kolkhozes) to collapse. This also happened in Garla Mare, a small rural village in Mehedinti. The economy in this area has not recovered from the loss of the two kolkhozes.

The National Government stated in 1990 that environmental care is a national priority. Romania adopted much of the European legislation in preparation for accession of Romania to the European Union in 2007. At national level the new legislation on waste management is a framework conform European standards. The operation and implementation of this legislation still has to take shape, estimations made by the Romanian government show that this will take until 2020. The lack of implementation of legislation at municipal level will make it hard to develop projects that have to comply with the new waste management legislation. The required standards are under construction, actual norms and measurements still have to be developed. However, it is clear that for most activities concerning municipal waste management (transport, storage and treatment) a permit is needed.

With the overthrow of the old regime, a new organisation of environmental care was established. The Ministry of Water, Forest and Environmental Protection is responsible for waste management at national level. The Environmental Protection Agencies translate national legislation into local measures and are the controlling staff. The County and municipalities have to put these local measures into operation and plan the new policies. The newly developed organisation of environmental care is complicated, responsibilities are not clear, combinations of responsibilities (e.g. permit handling and control by the same agency) can bias the organisation. Because of this new and complex structure it is not clear where permits for waste management activities can be obtained.

The legislation is properly organised at national level, but the implementation at operational level lies far behind. The EPA has hardly any means to control permits, the local and regional governments have no means or relevant knowledge to be able to implement the new legislation. The lack of implementation of municipal environmental management can be witnessed in Garla Mare. There is no communal waste management system present. Villagers throw their waste at the border of the village or burn their organic waste there. People that live at the border of the village try to stop the loss of living ground by natural erosion processes. They fill the existing gaps with solid waste (see fig. 1).

Fig.1 Erosion at the village border in Garla Mare.

The waste stream of Garla Mare consists mostly of organic waste from animals, fields, gardens and vineyards. Other wastes, such as paper and glass are already being reused at the households. Plastic is not being reused and is spread everywhere, which ruins the landscape around Garla Mare.

The people of Garla Mare dislike their waste management and landfills. They want to develop eco-tourism in their region and see the lack of waste management as a major disadvantage. Other risks of

the lack of waste management are the air pollution caused by the burning of organic waste, contamination of water bodies and pests at the landfills.

Several technical tools could be used to solve Garla Mares solid waste problem: Waste spreading, composting, biogas production and plastic recycling. Waste spreading might turn out the most economical waste management tool, but could interfere with plans for eco-tourism. Composting is less economical but can provide a beautiful surrounding and a good soil conditioner to treat the eroded spots around the village. Biogas is the most expensive management tool, but provides a good fertilizer. Since there is no budget for a biogas installation during this project, composting is be the best option for organic waste management in Garla Mare considering legislation and plans for eco-tourism. The experience with diverting waste at household level can be used if further economical development allows the building of a biogas installation.

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This report would not have the detailed insight in the local living conditions in Garla Mare without the cooperation of the director of Geo-san, Claudia Tulei. The mayor and his wife supported the field research with information from the town hall and translated during interviews and discussions. The members of Geo-san shared their concerns and insights on waste management issues providing the researcher with in-depth information that could not be obtained otherwise.

The field research was possible thanks to the financial support by Fondation Ensemble, France. We were welcomed with great hospitality by the people of Garla Mare. This, together with the comfortable stay at Mrs. Tulei's household, made the field research a very pleasant experience.

Foreword

The County Mehedinth, the county in which Garla Mare is situated, shows signs of a lack of waste management everywhere. The fields are covered with litter, mainly plastics. Most villages have no central garbage collection, the citizens throw the litter near their villages or where they happen to be. The waste shows on fields, grassland and on river banks, this waste also consists mostly of plastic bags and plastic bottles. The beautiful riversides look like a rubbish dump, they do not attract tourism in this way. This is one of the main arguments for the villagers from Garla Mare to develop a waste management system: They think they miss a business opportunity in agro- or ecotourism because of the lack of solid waste management. WECF added concerns about public health.

This led to the following research question:

Which solid waste management program is recommended for Garla Mare, considering environmental effects, energy production and gender issues?

Answering the question led to a report in three parts:

- *The first part* describes the contemporary solid waste management in Romania and in Garla Mare. The local situation, governmental organisation and legislation is described here. This part can be reused for other projects concerning Garla Mare.

- *The second* part deals with solid waste management techniques, such as biogas installations, composting, recycling of plastic and open burning of household waste. This part can be reused for other projects concerning waste management.

- *The third part* discusses the possible solutions from which the villagers can choose to deal with their solid waste management in an environmental friendly way. There is a recommendation from the author, but local circumstances might still have some unexpected surprises, so that another solution might fit better. With the knowledge of this report, the villagers will be able to judge the situation and the proposed solutions from all stakeholders better.

Methods

This research is a qualitative descriptive research. The research consisted of a topical method of research and a field research. The topical method of research acquired information on legislation, technical tools for waste management and the information needed to prepare the field research. The field research was primarily designed to describe the actual local situation at a single point of time: a qualitative descriptive cross-sectional study. WECF advised to make a qualitative field research at Garla Mare during a first visit. WECF will decide on collection of quantitative data during a longer period in a follow up after publication of this report.

The *research instruments* that were used:
1. Topical research: a *desktop research* acquired, synthesised, organised and presented information on legislation, technical tools for waste management and the local situation in general. Primary documents used were mails, project plans and reports from stakeholders in Garla Mare. Secondary literature used was the reports from WECF on Garla Mare. These documents gave an idea of the cultural, economical, environmental and social issues as perceived by the citizens of Garla Mare and WECF.
Other documents were reports from accredited institutions: Universities, international health organisations and governmental organisations. These documents described legislation and technical tools. Internet was searched for the above mentioned documents, electronic newspapers and reports that gave insight in the situation on waste management in Romania. During this research it turned out that actually many NGO's reported on waste management in Romania, these sources were added.

During the desktop research information on the national legislation was found, but details on regional plans and cooperation were written mainly in Romania, if available. It is probable that there are more detailed printed sources in Romanian at the appropriate offices. These documents could not be obtained because they cost money or the right connection failed.

The topical research was used to prepare the guide and open questions for the semi-structured interviews that were done during the field research.

2. Field research: the researcher observed the local waste management system using interviews, descriptive direct observation and participating observation.
During the field research, the researcher was be accompanied by S. Deegener TUHH, expert on eco sanitation and S. Schinke, expert on landfills. Translation during visits and dinners was done by the director of Geo-san or the wife of the mayor, Mrs. A. Balasoiu. They translated Romanian into English. WECF advised not to travel with valuable objects; all field research was recorded by written notes and photographs.

2.1. Interviews
The members of Geo-san organised a full (dinner) program that made it difficult to plan any research. The planned interviews turned out flexible in place and time and were held mostly during dinner. The interviews gave the opportunity to fully understand the citizens' experiences and gave in-depth information about the waste management system present. Unfortunately it was difficult to speak to somebody in private. The interviews were semi-structured starting with open questions to make the interviewee feel comfortable and moved later to a semi-structured interview. During the interview a relationship developed between the partners, some interviewee's gave their phone number or e-mail address for further contact.

Items that were important to the interviewee were brought up during a semi-structured interview using a checklist. The checklist ensured that during each interview, information on the same general areas of information were collected. This checklist provided the option to pursue unexpected insights (*Trochin, 2006)*.

Sampling
The people interviewed were:

Before the field research: M. Samwel, WECF; S. Deegener TUHH; S. Schinke.
During the field research: the mayor, the environmental police and 6 members of Geo-san. The translators had no time to translate any more interviews.

There was no other NGO working on practical waste management in Romania, that was willing to do an interview. American and European organisations are competitors for EU funding and do not share information about waste management.

2.2. Descriptive direct observation
It turned out that waste management was not a sensitive social issue. Observational research showed that answers from interviews were not biased and much information on landfills was gathered in a short time by direct observation. Direct observation was also used to gather information about how the waste management system actually operates outside the household. To avoid influencing behaviour the direct observation was done the first two days. Geo-san organised a tour around the village, they showed us how landfills are used. This tour showed all known illegal landfills in and around the village within a walking distance of 2 kilometres. There were no means of transport for observing other locations, all horses and cars are needed for work on the fields.

2.3. Overt observation of public meeting and social events
Geo-san organised a meeting with members of Geo-san and citizens of Garla Mare. The researcher and experts were present. This group discussion gave reliable common impressions of the projects on sanitation and waste management. There were many discussions about other topics; villagers discussed the use of pesticides and the struggle against pests in the gardens. It was difficult for the translators to translate the argument, therefore it was not possible to get detailed information of this meeting.
The director of the national water agency Apele Romane, organised dinner with the environmental police, the mayor, the experts and members of Geo-san. During this dinner there was a discussion on plastic in waterways.

2.4. Participating observation
WECF advised to stay at a local household to understand the living conditions. Participating observation was used to observe of waste management of a typical local household; that of the hostess. Observations of her day-to-day activities were made during a 5 day stay at her home. Issues that did not come up during interviews could be observed then. The kitchen and cooking practices showed the reuse of glass for food preparation, the production of ashes from the stove etc.

Accuracy
The researcher used triangulation to check the accuracy of the collected results. The results from the different methods showed the same pattern, this made the pattern more credible. A simple decision rule was used: If there were two conformations and no contradiction the concept was regarded important. On the one hand some issues that were not addressed in the interviews could be observed by participating. On the other hand issues that came up during the interviews could not be discovered by observation only

Due to a lack of knowledge not all important issues were mentioned during the interviews but they became clear through direct/participating observation. Habits were not brought up during the interview, people were not aware that habits like land filling of dead animals, the location of the landfills above drinking water supply, are environmental issues. That is why they were not mentioned during interviews, and became apparent by direct observation.

It appeared that interviewees twisted facts because of the presence of the researcher. The researcher told she works for the Open University and not for the main sponsor of the environmental care in the village, WECF. With the tool of direct observation one can avoid people giving socially or politically correct answers, this tool was effective during this research.

The members of Geo-san showed all the land filling locations known in the village during the tour. They even showed us the Roma area. The interviews were biased by the translators, they translated questions to authorities politically correct and did not translate all the remarks of the major about Germany and the second World War.

The results of the field research were send to the director if Geo-san for reflexion to prevent misunderstandings by translation or misinterpretation of data. She found the field research a good description of the present local situation.

1. The social, economical and political situation in Romania

1.1 Romania in transition

Romania used to have a communist regime with a planned economy. To be independent of foreign import, Romania was self dependent. The advantage was that Romania started without depths in the nineties, the disadvantage was that because of forbidden import of agricultural machines, the agricultural industry became outdated.

After the revolution in 1989 the post communist regime remained in power. Because there was no actual governmental change, the agricultural industry was only restructured and not definitely altered into a capitalised and privatised market. This in combination with corruption explains the lack of foreign investments during the nineties, which caused an economical stagnation. Since 2000 there is economical development, thanks to a definite change towards a market economy and private investments. In 2001, one third of the Romanian economy was privatised.

The Romanian economy grows with 5% per year, the average income per head of the population is 25% of that of the European average. In 2000 44,5% of the population had an income below the poverty line. Over half of the Romanian population (57%) between 15 and 64 years old has a job.

Romania will join the EU in 2007. The European Commission reports that Romania is on its way towards accession but still has to work on: structural changes towards a market economy, stabilisation of the macro-economical situation, enforcement of law and minimising corruption. Romanian citizens indicate that they experience corruption at customs, justice departments, politicians, police and healthcare.

Lengkeek A.R., 2005

1.2 Romanian rural areas

The majority of the Romanian people live in rural areas. During communism there used to be work on kolkhozes, but most of them have been sold to speculators and are out of business. Garla Mare lies in such a rural area and has a rich history of corn production and pig industry. Unfortunately these activities ceased almost to exist. Lack of jobs and income is worry number one. People don't have enough income for their basic needs. The average monthly pension is 1 million Lei (2002: 30 €), while average monthly salaries are also rather low, for example the salary of a teacher is approximately 65 € per month. The prices of seeds and fertilizer and the lack of health are the next most important topics.

In rural areas in general there is a lack of drinking water of a good quality. People use latrines for sanitation. The roads are in a rather bad condition, as are other communal services like school buildings, social security, environmental care and health care. Generally speaking this is caused by a lack of money and a lack of knowledge with the staff carrying out the work.

WECF, 2003

2. The research area: general description of Garla Mare

2.1 Infrastructure

Garla Mare is a village with 3500 citizens, approximately 1200 households, in the Mehedinti district in the south-western part of Romania. The village has one main road that runs from Pristol through the village to Vrata. (*See ANNEX 1 for a detailed map of Garla Mare*.) This road is paved and in good condition. The other roads are mainly without pavement. Because most people have a horse and wagon, this is a problem when it has rained. The roads are seldom narrow. *(See fig. 1)*

The infrastructure in Garla Mare needs investment. Not only the roads are in bad shape. There is no drinkingwatersystem, villagers use water from the public and private wells. Thus an important aspect of this research is the use of groundwater for drinking water. This means that groundwater pollution must be avoided at all times.

There are two water sources:

1.The private and public wells in the village. There are 78 public wells and 480 private wells which provide the households with drinking water. This water comes from a 15 – 25 meter deep aquifer. 83 % of the households use their own well, while 10 % use a public well for drinking and cooking purposes. Most of the wells are badly maintained. Most of the wells have polluted water that does not meet WHO standards for the quality of drinking water. For example, none of the 78 public wells tested as part of a WECF project had clean water. The contamination of the water with nitrates and faecal microbes is due to the use of pit latrines near the water wells.

2. The springs like Sipot. Their source lies in the deep groundwater layer in the sandy surroundings of more then 10 meter deep. These sources show high concentrations of herbicides.
WECF, 2003

There is no gas infrastructure, but there is electricity in the village. Most people do have cable television. Around 150 villagers have a newspaper subscription.
Wolters A, 2005

2.2. Commercial activities

530 citizens depend on social support, most citizens are self-supportive in their food supply. There are some economical activities in Garla Mare: There are 3 mills, two for corn and one for wheat. The largest for corn is very famous in the region and produces 50 ton/day. The owner of the mill also has a pig farm with 600-700 pigs, because he can feed the leftovers from the milling process to the pigs. There are some shops in the village for food and building materials. The village also contains various bars, they serve 120 tables per day. In the main street is a garage, but there are not a lot of cars in the village, cars are a luxury, some farmers do have a tractor though. *(see fig.2.)*

Fig 1. *Normal transport with a horse and wagon.*

Fig. 2. *Agriculture in Mehedinth.*

The village is surrounded by grasslands, gardens and wine yards. Further away start the fields where most people grow crops for their own use. In the fields inhabitants mostly grow corn, wheat, grapes and sunflowers. Vegetables are usually grown in the gardens surrounding the house. The grounds surrounding Garla Mare are famous, there are hardly any stones in it and the soil is very fertile.

Most villagers have a court with animals. *(see table 1)* Shepherds take care of the goats and sheep of the villagers during the day. They herd them mostly at the Danube banks. The landscape north of Garla Mare shows some sand dunes, this might be caused by keeping too many goats and sheep.

Number of cows	380
Number of horses	390
Number of pigs	1.700
Number of sheep	2.800
Number of Chickens, turkeys, geese.	41.000
Number of bee families	200

Table 1. *Number of animals in Garla Mare.*

The two old communist pig farms (kolkhozes) do not produce anything at the moment, they are empty. Speculators bought them, expecting prices of land and location to get higher. Right from these former farms, seen from the Danube that is, are fishponds. They used to produce a lot of fish, nowadays people go fishing there, but they do not grow fish anymore. Right from these ponds are protected reed beds with birds. During the spring the reed is burned by villagers so that they will have fresh reed to tie up the grapes and to make baskets.

Most of the woods are already used for heating and cooking, the surrounding landscape mostly consists of fields. Many of the fields are out of production because farmers lack money for seeds and fertilizer.

2.3 Social circumstances

There are two ethnic groups in the village: the Romanian and the Roma. The Roma live at the left and right end of the village and form 30% of the population. The communication between these groups is not good, there is a different cultural heritage and language. The Mayor tries to get in contact with the Roman citizens.

There are many fights in the villages and many people are related. This makes working together somewhat complicated. Many people do not see the future very promising and start drinking. There are many men drinking on the streets during summertime, the women stay at home mostly. This is

why women like the new environmental organisation Geo-san: it is a reason to meet each other regularly and talk together.

Who you know is more important than what you know in Romania. So it is wise to use the connections from villagers to get things done. It is important to have a reliable partner in Romania, they get things done better and cheaper.

The authorities and companies have close connections towards each other. During communist time this helped improving the production and the economical situation. Now these structures are still there but for a capitalist system this doesn't result in the promised lower prices. People are working on improving the organisation of institutes and legislation to make the relation between governments themselves and governments and companies a more business orientated one.
Wolters A, 2005

3. Description of the geo-hydrological situation

In the centre of Romania lie the Carpates, most inland rivers have their spring there. On the southern part, the rivers end into the Danube, which ends into the Black See. The Danube is a large river, connecting most of Europe. *(see fig. 3)*.

Garla Mare is situated in Mehedinth, in the south-western part of Romania. Garla Mare is situated near the point where the three countries Romania, Bulgaria and former Yugoslavia come together.*(See the green rectangle in fig. 3)* In Mehedinth, the water comes from the mountains and from the Danube into the County.

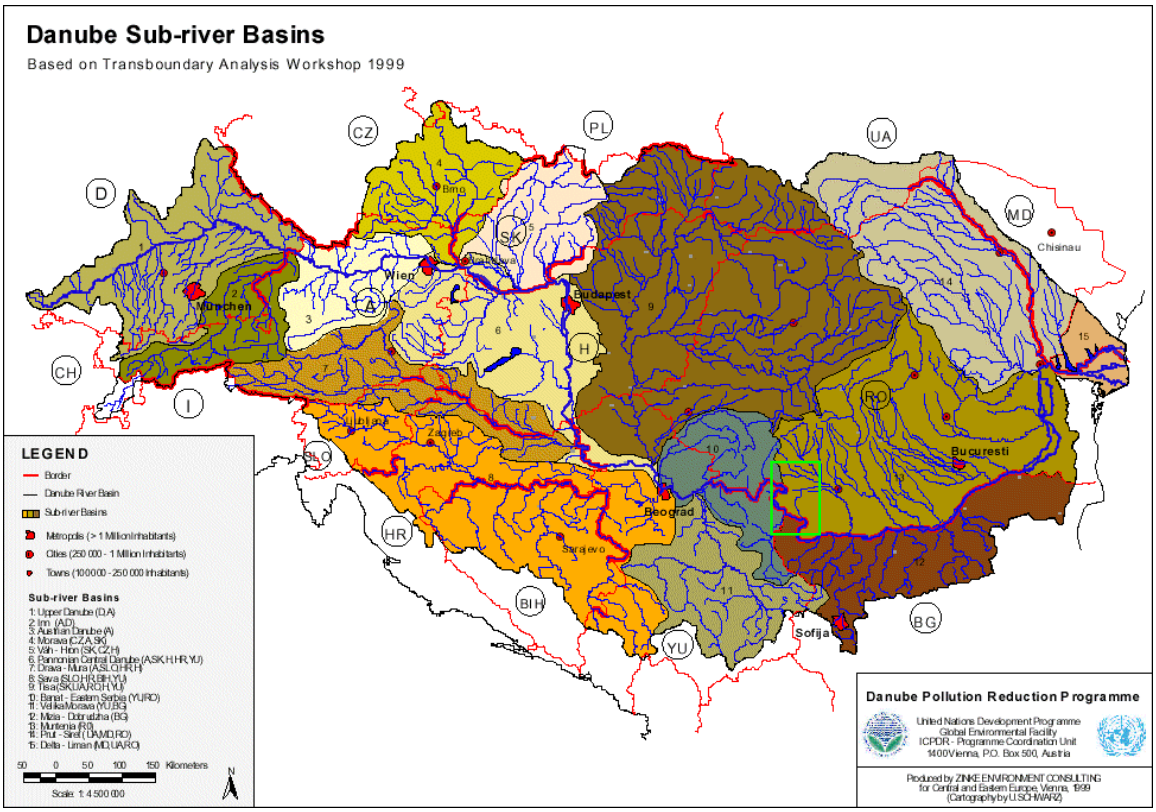

Fig.3 *Danube river Basins.*

Garla Mare is situated near the Danube, the village has been built along the river bank on a small hill. *(See fig. 4 and 5)* The way to the Danube is very steep until you reach the grasslands downhill and a little further the Danube. In the North-West of the village is a small lake, Lake Zaton. The water level has raised during the last 6-7 years, the springs there provide less water then they used to do.
Wolters A, 2005

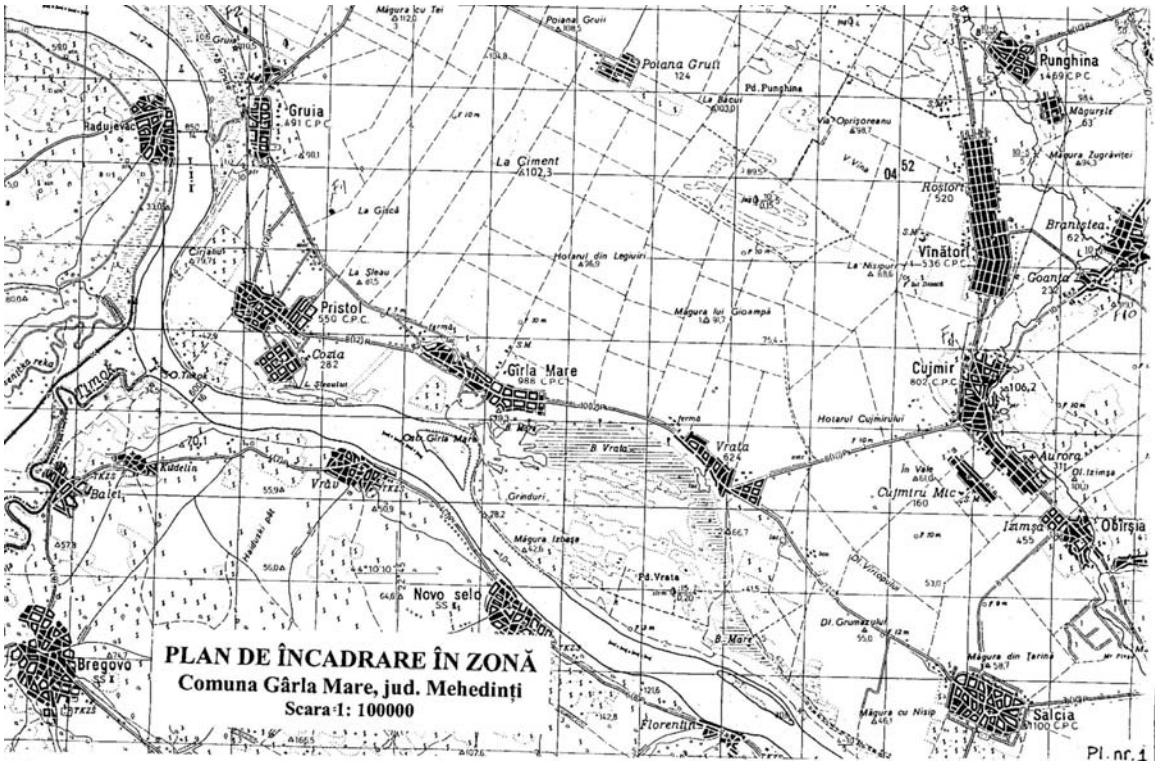

Fig.4 *Map of the surrounding land of Garla Mare.*

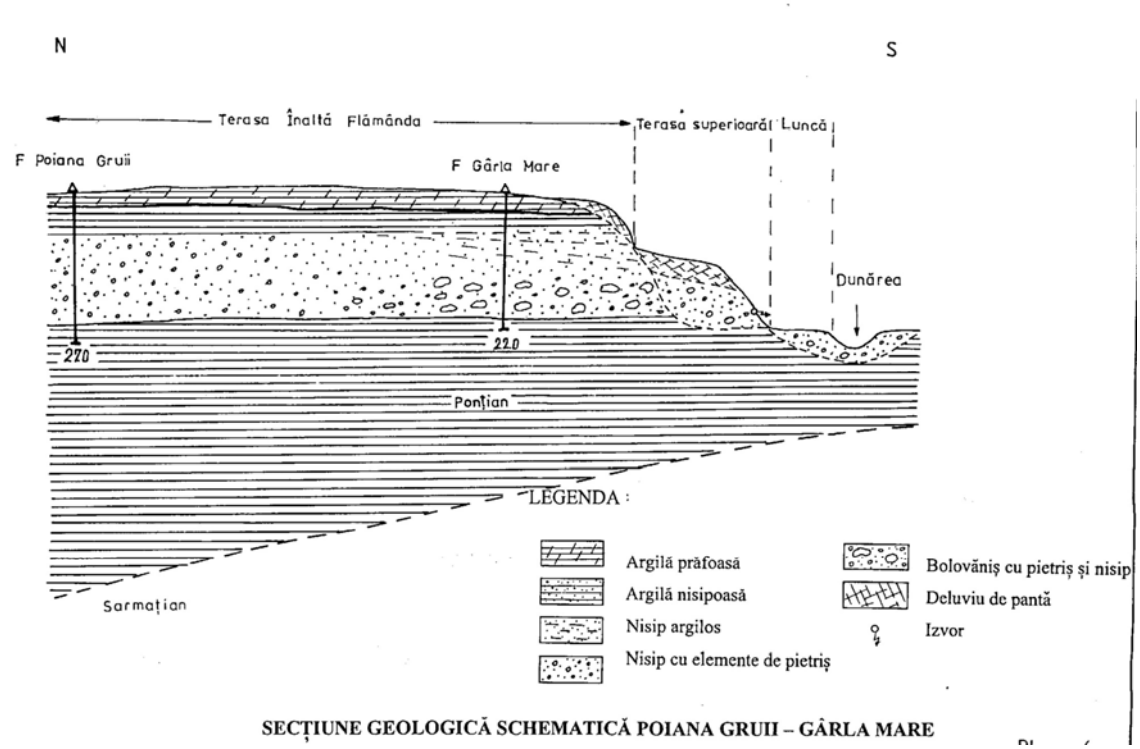

Fig 5 *Longitudinal of the ground around Garla Mare.*

Translation of the legend:
Argile = clay
Marna = diorite sand
Pietrisuri = gravel
Nisipuri = sand
Loesside = loss
Conglomerate = mixture
Gresii = Gritstone
Calcar = Limestone
Recifale = Reef
Siste Argiloase = Clay slates
Carbune = Coal
Prafoasa = dust
Slab = thin
Bolovanig = bigger stones

Garla Mare is situated on a clay layer that contains clay and loess *(See figures 5 and 10)* . Under that layer is a layer that consists of clay. In total these two layers are 4 meter deep in Garla Mare and north of Garla Mare. Under these 4 meter lies a sand and clay layer which contains calcium. The calcium containing layer goes until 16 meter under the ground level, following this layer towards 19 meter deep, we find more sand and less calcium, we then reach the deepest point of the layer. Then we find three meters of sand and stones, this layers lies on thick a layer of clay, the measurements end at 22 meter deep. *(See fig. 6)*

Towards the Danube we find a different landscape. Eroded sports show a more sandy layer there. *(See fig. 7 and 8).* In figure 5 we can see that there, deeper layers come to the surface. The spring (Izvor) in figure 5 comes from this deeper layer containing sand and stone.

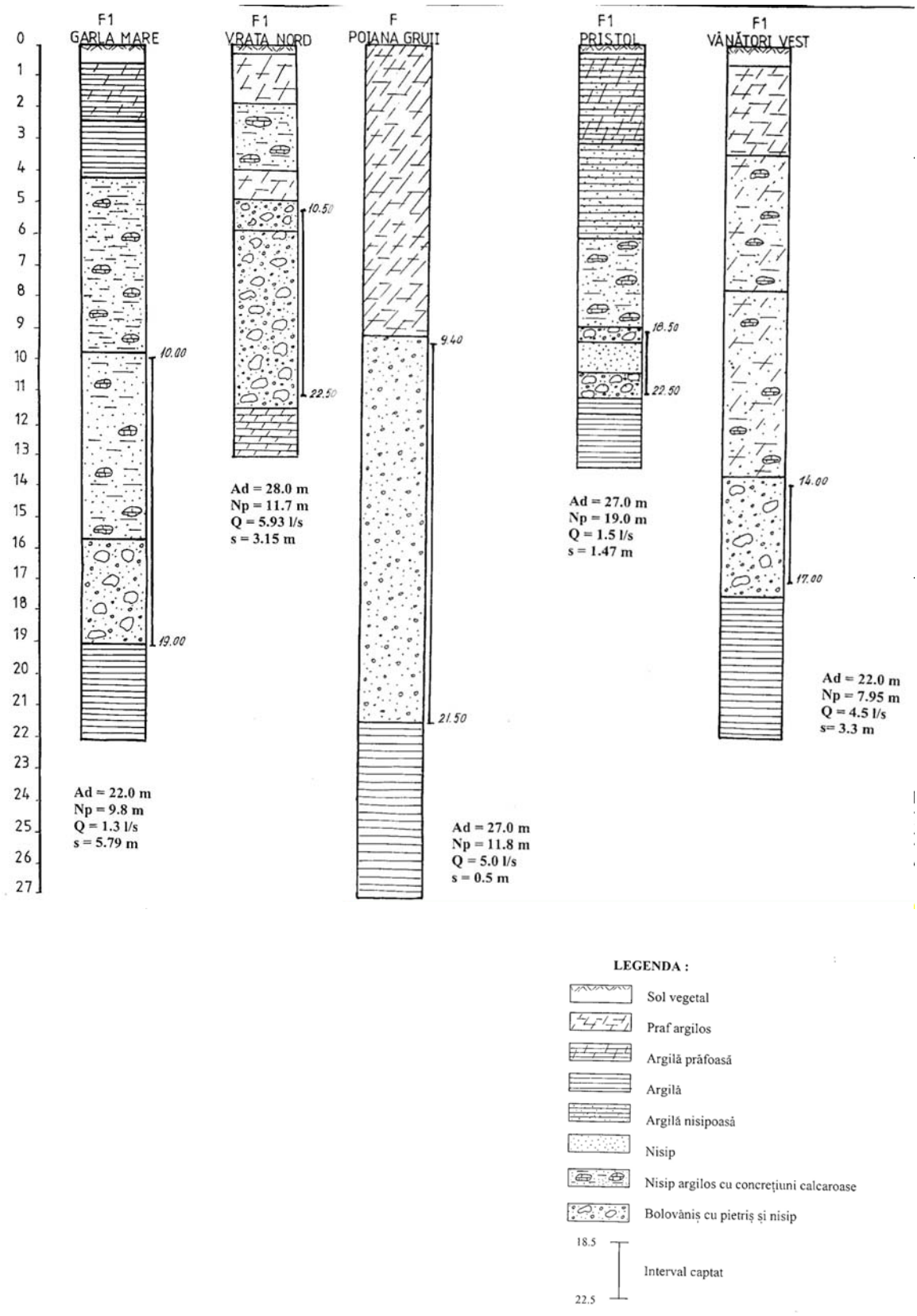

Fig.6 *Characteristics of the soil in zone Garla Mare.*

Fig. 7 *Soil structure around the village.*

Fig. 8 *Soil on which the village is built.*

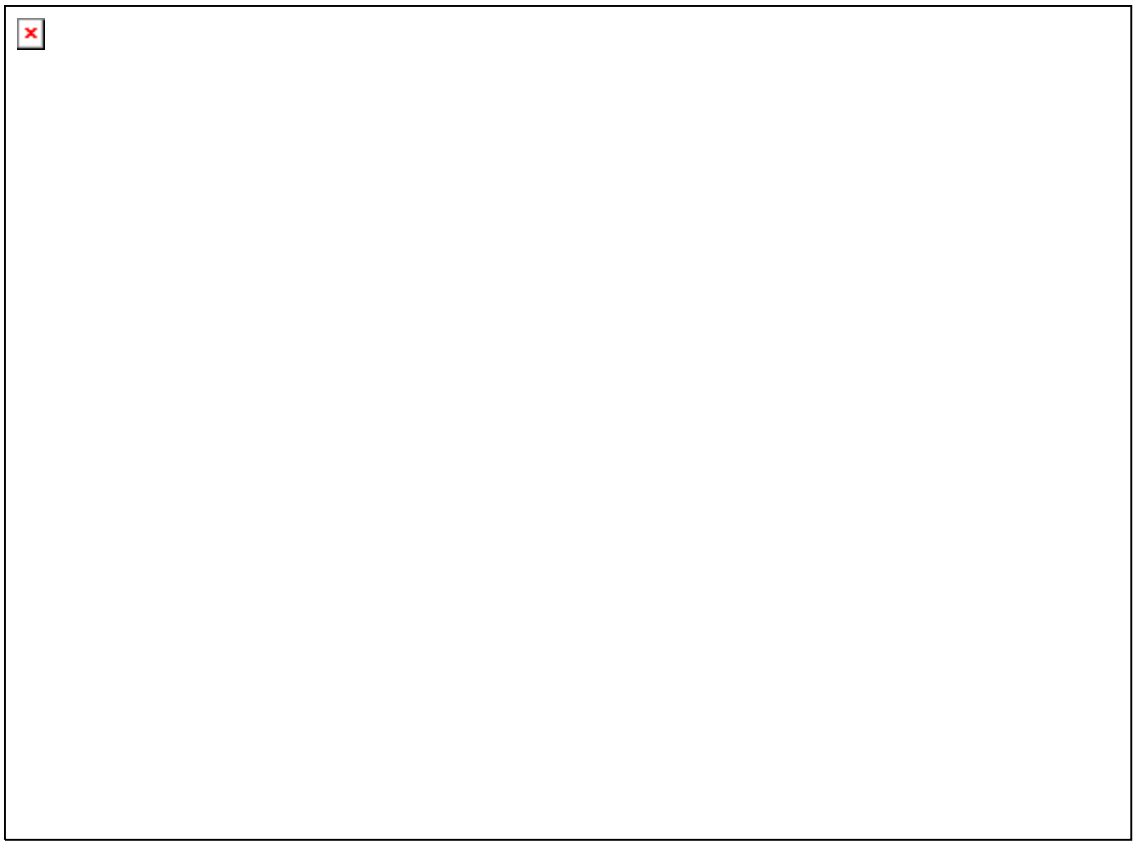

Fig. 9 *Contour lines and groundwater stream around Garla Mare.*

Groundwater flows from North to South. The groundwater passing Garla Mare is shown by the longest arrow in figure 9. The two triangles show two water springs with the largest water production. The groundwater that shows up at the spring comes from the 10 till 19 deep layer containing sand, clay and, in the upper part, calcium. Because of the thick clay layer under this sand layer, the water doesn't come from deeper. The local water authority describes one groundwater reservoir and not various groundwater flows. The Sipot spring is marked on this map, because this is the most probable water source for a drinkingwatersupply.

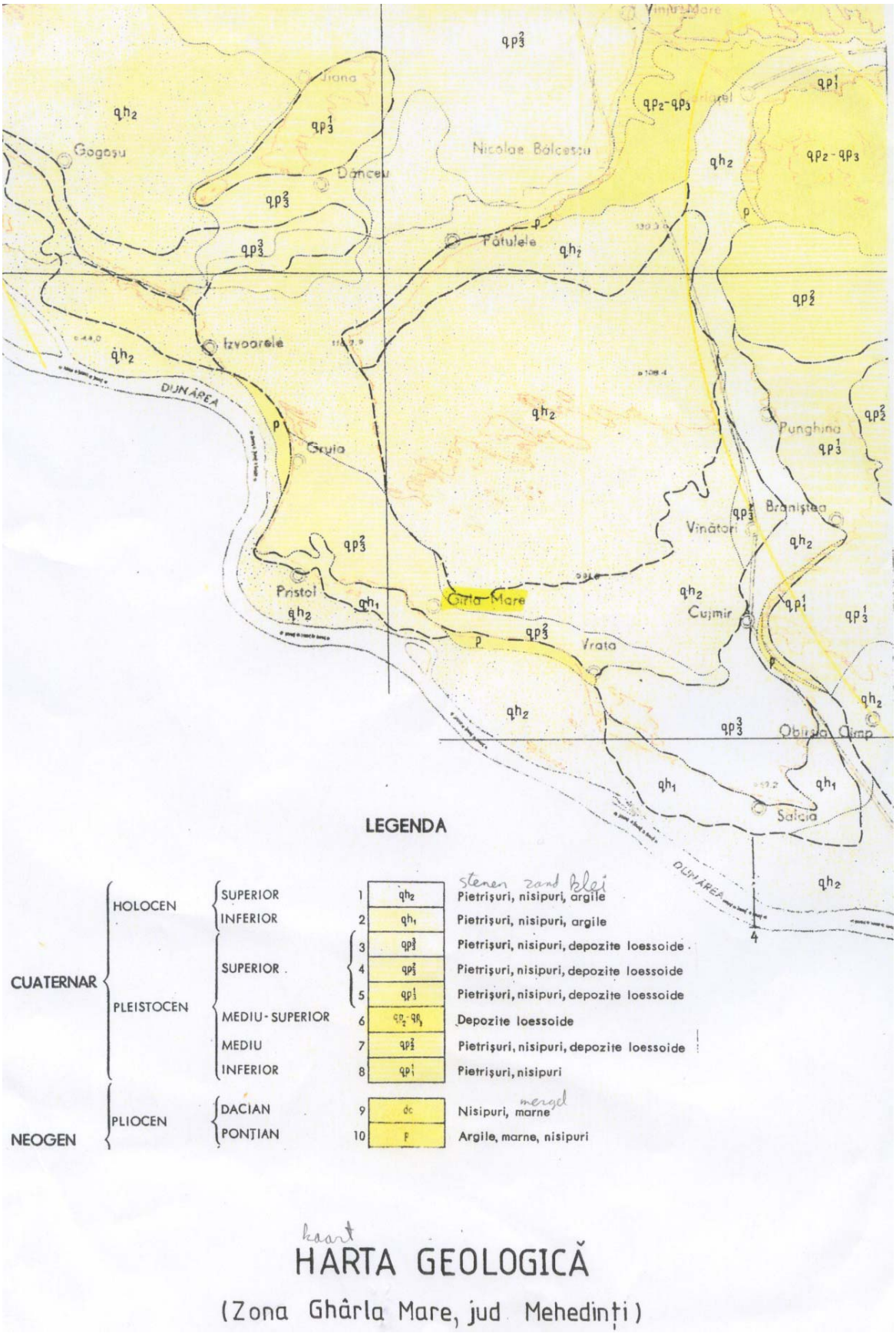

fig. 10 *Geological map of area surrounding Garla Mare.*

4. Romanian policies on environmental care and waste management.

4.1 Governmental organisation of environmental care.

Solid waste management will require a lot of attention in Romania. In 2006 Romania will join the EU and has to live up to European legislation. The Romanian government has established that environmental protection represents a national priority and must be addressed by all governmental and non-governmental institutions, associations, organizations and political parties.

At the beginning of 1990, after the overthrow of the totalitarian system, environmental protection restructuring did begin to take place. For the first time a Ministry of Water, Forests and Environmental Protection (MoE) was established. The Ministry of Environment was established in 1990 and later renamed the Ministry of Water, Forest and Environmental Protection. While certain individuals within the MoE are responsible for policy development, there is no separate office or department for environmental policy. At the governmental level, the main actor is the MoE, this body is responsible for environmental issues. Today almost every ministry has a special office dealing with the environment. The government intends to set up an inter-ministerial working group for environmental issues.
The 42 Counties and the environmental inspection (EPAs) have to translate national legislation to local and communal measures.

The MoE supervises 41 Environmental Protection Agencies (EPAs), one for each county in Romania; the EPAs are responsible for monitoring and inspection activities. It must be mentioned that the inspection equipment is quite poor, and needs to be upgraded or replaced. There are research institutes specializing in environmental protection problems: the Institute for Research and Environmental Engineering, the Institute for Research and Forestry Planning, the Romanian Institute for Marine Research, the Institute for Soil Science and Agro-chemical Research, the Institute for Hygiene and Public Health, and others.

The MoE has been given responsibilities which are sufficiently comprehensive to ensure an integrated approach to environmental management. The MoE is responsible for drafting, executing and enforcing: environmental policies and strategies on national and local levels, including setting water management and forestry policy, responsibility for nuclear issues; operational action plans and programs; environmental projects.

On the regional level, the EPAs are responsible for environmental monitoring and inspecting enterprise activities in order to enforce respect for the environmental protection regulations. There are 10 water-related agencies indirectly subordinate to the MoE via the central water authority "APELE ROMANE". The monitoring system is organized by environmental media. Apele Romane monitors surface water and collect data from 276 sampling sites, 7 of which are on the Danube river. There are almost 12,000 sampling points for ground water located near potential pollution sources and sources of drinking water supply. Also there are almost 1000 sampling sites to measure soil contamination. Two thirds are located in agricultural areas and one third in the forest land. These are monitored by the EPAs.
www.rec.org

A Directorate of waste and dangerous chemicals management was set up within the Ministry of Water, Forests and Environmental Protection. There are offices of waste and dangerous substance management in every EPA. A new directorate responsible for public relations was set up within the Ministry of Environment and Waters Management. There are periodically meetings between representatives of administrative sector with representatives of trade unions and the business affaire sector to create awareness. The National Research-Development Institute for Environment Protection (ICIM –Bucharest) deals with the research programme for environmental protection including the management of waste. The National Commission for Recycling Materials under the Ministry of Industry and Resources is the main organization that promotes waste recycling, waste recovery and its use as secondary raw material.
UN, 2004

One of the biggest problems concerning environmental legislation in Romania is the lack of implementation and compliance with the law due to lack of:

- Incentives

- Technology
- Financial means
- Public participation
- Preserving legislation.

Public servants have no means to implement practical measures. Preserving legislation is hard because there is hardly any money, knowledge and means for the preserving staff. Corruption also undermines preservation.
Lengkeek A, 2005

4.2 **Legislation on waste management under construction.**

Harmonizing Romanian waste regulation with EU norms, the Romanian authorities adopted the following legal documents: Law no. 137/1995 on environmental protection which contains general provisions concerning management of waste (permitting system, environmental impact assessment procedure, restriction on import of waste); the Law no.426/2001 that approved the Urgent Ordinance (GEO) no. 78/2000 on waste regime which is a specific legal act; the following wastes are excluded from the scope of the Law no.426/2001: radioactive waste, waste resulting from mining activities, non dangerous waste from agriculture, decommissioned explosives; these waste are covered by other legal documents (see radioactive waste) or will be covered by future legal acts; Governmental Decision no.856/2003 on waste inventory and evidence; Governmental decision no.173/2000 on PCB/PCT (hazardous waste) and M.O. no.279/2002; Governmental Decision no. 662/2001 on used oil (hazardous waste); and Governmental Decision no.1057/2001 on used batteries (hazardous waste).

The most important legal document is Law 426/2001, handling communal solid waste management, the national solid waste management plan. This national plan is under construction. The most important goals are development of a national central organisation of collection and land filling, building 3 incinerators for domestic waste, reconstruction of landfill sites, construction of collection points for recycling and measures for solid waste prevention.
www.idced.com

In an advanced stage of preparation are the following Governmental Decisions drafts on the management of hazardous and solid wastes:

- Landfills: Governmental Decision no.162/2002 and M.O. no.1147/2002
- Waste incineration: Governmental Decision no. 128/2002, M.O. no. 1215/2002
- Import, export and transit of the waste: Governmental Decision no.1357/2002 and Governmental Decision no.228/2004
- Management of packaging and waste packaging: Governmental Decision no. 349/2002 and M.O. no.1190/2002

UN, 2004

The report of UNECE of 2000 on the progress made in the transposition and implementation of EU legislation shows that only about 15% of waste legislation has been transposed. The enforcement of the main directives on municipal and industrial waste management (such as the Waste Framework Directive (75/442/EEC) as amended by 91/156/EEC; the Hazardous Waste Directive (91/689/EEC) as amended by 94/31/EC; the Packaging Waste Directive (94/62/EC); the Directive on New Municipal Waste Incineration Plants (89/369/EEC); the Hazardous Wastes Incineration Directive (94/67/EC) and the Sewage Sludge Directive (86/278/EEC)) is not expected before 2015-2020.
UNECE, 2000

The Environmental Protection Law

The basis for environmental care and the waste management legislation, is law no. 137 of 1995, a copy can be found in ANNEX 2. The important articles from this law for solid waste management are:

Article 8, that states that a permit must be applied for, before putting into operation new objectives that fall under the environmental agreement. For these objects there shall be an environmental impact assessment (art. 11): the quantification of the effects of human activities and of the natural processes on the environment, human health and safety as well as of goods of any kind.

Activities which are subject to the procedure for environmental impact assessment for the issuing of the environmental agreement and permit are:

- Inert materials discharging and/or depositing.
- Controlled, bioactive discharging.
- Controlled discharging for stabilized waste
- Installations for waste sorting, treatment, recycling or incineration
- Temporary storage for fluid, solid or muddy waste

Article 22 states that the central protection authority shall elaborate regulations regarding the collection, processing, treatment, neutralization of wastes as well as the recycling of reusable ones and the transport of wastes. It also states that a permitting procedure for location and construction of storage devices, transport, creation, processing and utilization of wastes of any kind will be regulated within 90 days.

According to article 24, the local administration authorities, the natural and legal persons whose scope of activity includes activities covered by the regulations stated under article 22 have the following obligations:
- Request an environmental agreement or permit.
- Storing domestic, industrial, agricultural and other wastes only on surfaces authorized for such purposes.
- Locating and constructing waste storages according to the prerogatives granted by law.
- Recovering reusable wastes and turning them to account through specialized units.
- Using only certified waste on farming lands. The certification should be done by competent environmental protection, health and agricultural authorities.

According to article 79 , new activities should be reported, permits asked for and there should be cooperation with authorities. Therefore monitoring systems must be organised, so the local authority can control the sites and safety can be guaranteed. Also should natural and legal persons not impair the natural or created environment by uncontrolled disposals of wastes of any kind.

Within the European Community there is no legislation that applies specifically to the area of waste or waste derived products applied to the land in an indirect way, especially not for compost. The waste regulation with the European waste catalogue (EC/94/904), the eco-labelling of soil improvers (98/488/EG) and the pre-standards are developed by the CEN, the European standards organisation. The CEN standards will provide the standard method for analysing waste derived soil improvers but will not provide the limiting levels that define the quality of the product. Due to the variation of interactions between factors such as soils, land use, and perception of what is safe, rational EU wide quality criteria may not be appropriate.
Platteu, W. 2001.

Romania has unilaterally assumed the date of January 1, 2007 as a working hypothesis for finalising the preparations for its accession to the European Union.

In 2001 the following laws in waste management were established to comply with European regulations:
- Law No 426/2001 for the approval of Emergency Ordinance No 78/2000 on waste regime;
- Government Decision No 155/1999 on the introduction of waste registration and the European Waste Catalogue
- Law No 465/2001 on the approval of GEO No 16/2001 on the recyclable industrial waste management.

Conference on accession, 2001

Romania will implement the acquis communautaire in the field of environmental protection until the date of accession, with the exception of the following EU legal acts:

- Council Directive No 94/62/EC on packaging and packaging waste; Romania requests a transition period of 3 years, until 2010.
- Council Directive No 99/31/EC on the landfill of waste; Romania requests a transition period of 10 years, until 2017.

- Council Directive No 2000/76/EC on incineration of waste; Romania requests a transition period of 3 years, until 2010.

Conference on accession, 2001

After accessing the European Union, legislation must be provided according to European standards. This implies that it is important to follow European directives, so that the solid waste management system we built now in Garla Mare will be fit for the future. A summary of the European legislation can be found in ANNEX 3.

5. Contemporary solid waste management

5.1 In Romania

There is no precise information about the risk to health due the contemporary collection and storage of municipal and solid wastes. Some conclusions can be drawn from the study conducted in mid-1990s, when inappropriate municipal waste collection and storage was found to be very frequent in Romanian cities. Deficiencies in household waste storage, collection and removal were reported by 40% of households included in a nationwide study conducted by the Institute of Public Health in Bucharest in late 1990s. In 77% of studied apartments, presence of insects or rodents was reported.
UN, 2004

The largest part of the solid waste is produced in industry (foresting and agriculture). The amounts of waste declined to 34 mil. ton in 2001 because of the economical situation. The population produces an average of 270 kilo per year per person domestic waste. The total production of domestic waste is 7 mill. ton annually. Experts estimate that there will be another mill. ton of non collected waste from rural areas. In villages there is solid waste collection, 49% of the Romanian people have a solid waste collection system. 90% of the solid waste ends in landfills, of which 60% has mixed domestic and industrial waste, 30% only domestic waste and 10% is specialized in sewerage sludge. In Romania solid waste is brought to one of the 1250 (616) landfills. 60% of which do not live up to European Safety and Environmental Legislation. Recycling of glass is pretty good organised, compared to other Balkan countries, 7 kilo per year per person is collected. There is no national recycling program.
www.idced.com

A report from Eurostat describes that there are 512 landfills for non-hazardous waste and 180 for hazardous and non-hazardous waste. These figures only represent the industrial waste facilities. In 2000 there were no incineration plants for municipal and similar waste, in 2010 at least three are planned. At landfills there are no special facilities to protect the environment. Out of the total number of industrial waste deposits, only 30% has been authorised by the environmental protection agencies.
Eurostat, 2002

Polluter pays

In accordance with existing waste legal framework the “polluter pay principle” is applied in the management of waste. The Government could decide to provide financial resources from their budget for waste management facilities. There are financial instruments for waste management in preparation. A part of the research programmes that includes programmes on waste, are financed by the budget of the Ministry of Environment and Waters Management.

Three charging systems are applied:
- for households: a fee per household, based on family size;
- for industry and other waste producers: a fee per ton of waste generated;
- for disposal at public disposal sites and landfills: a charge per ton dumped.

Household waste is charged as a fee per person per month and generally varies between US$ 0.30 and 0.70, depending on the municipality. Disposal charges for industry generally range between US$ 8.5 and US$ 12.5 per ton depending on the site. Information on industrial waste charges and depositing on industries own sites were not available. It is not mandatory for households to participate in the waste collection system. In many smaller towns the waste collection and transport system has completely broken down since 1989.
UN, 2004

Composition of solid waste

In CEE countries, although municipal solid waste (MSW) varies in composition widely from country to country, it has some generally recognisable features:

- On average MSW contains 30-50 per cent organic material by weight. This is unevenly distributed, with most organic materials present between April and November. In the summer, subsistence-related food preservation activity makes for nearly 100 per cent organics in many garbage cans

- MSW is low in paper content - paper tends to be hoarded for re-use. In small and medium sized municipalities (where there is no central heating) wood, coal, and virtually all paper and packaging is burned. The waste stream between November and the end of March consists of up to 30 per cent wood ash and clinker from heating stoves. Much live ash is disposed of in individual and communal waste containers, where it frequently sets fire to the plastics in the waste

- MSW contains a relatively high proportion of plastics (up to 10 per cent) - dominated by low density polyethylene (LDPE) films and unexpanded styrene yoghurt containers

Scheinberg A, 1999.

5.2 In Garla Mare.

The waste in Garla Mare is first stored in the courtyards. After some time the men bring the waste to one of the rubbish dumps. Transport is hard, people carry bags of waste on their back or use a horse and wagon. Because of these hard transport conditions citizens dump their waste at the edge of the village.

The border of the village is full of small rubbish dumps. The dumps form a circle around the village. *(see fig. 11)* Because the dumps are used every day, they 'move' during the time, the paths lying in between change their course if necessary.

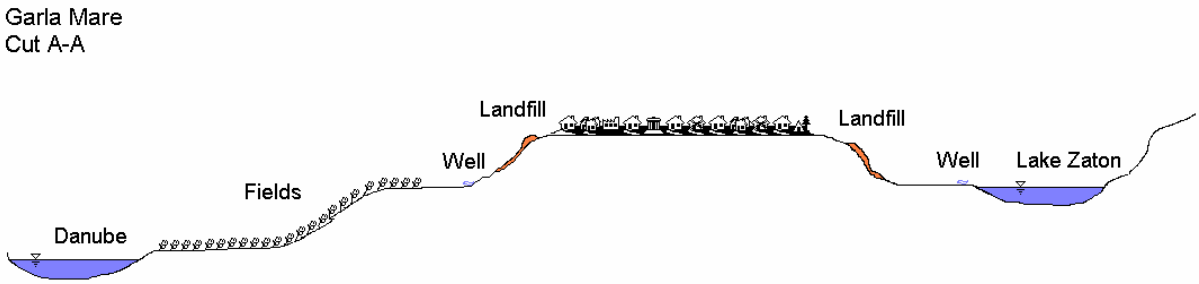

fig. 11 *Picturing the circle of waste around Garla Mare.*

Fig 12 *Waste near a road leaving the village at the west side.*

All the garbage dumps are situated above water springs where people take drinking water or wash their clothes. *(see fig. 13)* Rainwater that trickles through the garbage might contaminate that water.

Fig. 13. *Waste near Lake Zaton.*

Most citizens sit around the smaller garbage heaps if they need to wait or rest. Much inhabitants are not aware of the problem the garbage is to their health or to the environment. The waste consists mostly of organic waste from cattle. It might spread diseases and it attracts rats. There are also dead animals on the landfills. The sanitary system produces human waste, which is transported and dumped at an unknown place, just like the pig waste from the pig farm near the mill.

There are always some small fires burning on the rubbish dumps. In winter people use plastics for lighting the fire in their stoves.

Erosion of the hillsides of the village. The steep slopes of the hill on which Garla Mare is built, show signs of erosion. At some spots people try to stop the loss of land by filling the spot with garbage. *(See fig. 14)*

Fig. 14. *Erosion at the village border.*

Citizens tell that since the 'kolkhozes' (pig farms with lots of corn storage) on the banks of the Danube are closed, the rats from there came to the village. Now they have lots of rats in the village. The villagers dislike this very much.

What does the garbage consist of?

Most of the solid waste in Garla Mare consists of organic waste: manure from pigs, cows, horses and chickens people keep in their courtyards and stables. Every 3 days people remove this waste from their courts, store it there for a short period. They bring it to the rubbish dumps or keep it for use on their fields.

The local food production causes kitchen waste, mostly in late summer and autumn. Most of the kitchen waste is fed to the pigs. The local food production also organic waste from the fields. Citizens grow corn, wheat and sunflowers.
Last year production was 1000 kg wheat per hectare.

The plants from the sunflowers are burned on the fields for fertilizing, collected and burned elsewhere or used for animals. There are large stacks of them in the courts.
The plants from corn are collected for animals.
The plants from wheat are collected and destroyed.
The leaves from wine yards are also burned in autumn on and around the wine yards.

Another important organic waste is ashes from stoves and kitchens. We also found dead animals on the landfills. *(See picture 15).*

Fig 15 *Dead animal near waste dump.*

The non organic waste consists most of non hazardous waste. Because most villagers have to deal with a low income, they don't buy much cleaning fluids, batteries, toxics or other things that produce hazardous waste.

Many bottles are recycled, beer bottles have to be returned at the shop. Many high quality glass and plastic bottles are used in the kitchen or for storage of home made food. Most iron is collected by the Roman citizens, there is not much of it at the landfills. Paper is used for lighting fires, this is not dumped at the landfills.

An estimation of the non organic waste on the disposal sites around the village by visual inspection:

Unproblematic for groundwater injection:

- Plastic 65 %
- Tinplate 8 %
- Glass 15 %
- Textiles 2 %

This makes 90% of the total solid waste

Problematic for groundwater injection:

- Engine oil bottles
- Medicine bottles/-boxes
- Insecticide aerosols

- Tubes for adhesive
- Pesticide boxes
- Paint bins
- Dead animals

This makes 10 % of the total solid waste

The ca. 90 % of the non organic waste, which is unproblematic for the groundwater, represents primarily a cosmetic problem in the landscape.

The 10 % of the non organic waste that is problematic to the ground water, comprise basically tins of hazardous material, mainly car oil bottles. From this waste, toxics can be transported by rain and groundwater to drinking water sources such as Sipot.
Wolters, A., 2005