



## THE IMPORTANCE OF TECHNICAL INFRASTRUCTURE IN TERRITORY. CASE STUDY: DRINKING WATER SUPPLY IN DÂNGĂU MARE, CLUJ COUNTY

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**ABSTRACT.** - **The importance of technical infrastructure in territory. Case study: drinking water supply in Dângău Mare, Cluj County.** Water represents an important element in life. Accessibility, water quantity and quality show the standard of living of one community. This article presents a case study, the one of water supply in Dângău Mare from Cluj County. The purpose of this analysis is to reveal the benefits of applying some measures regarding water supply in the rural area, as well as the dysfunction abilities which derive from a bad management (eg. lack of sewage system). Dângău Mare lies near the Gilău Mountains and possesses important and rich resources of surface and underground waters varying under qualitative ratio. The hydrological resources of Dângău Mare are made up of river/rivulet networks (Mireş, Blidaru, Agârbiciu), phreatic waters and natural springs. The identification and delimitation of the Dângău Mare territory represents the first stage of this study, followed by the consultation of bibliographic and cartographic sources, field surveys, to obtain the qualitative and quantitative pieces of information. The second stage consists in the analyzation and classification of information, the integrated study of phenomena and elaboration of cartographic models using GIS. At the end of this study we have made the SWOT analysis to emphasize the characteristics of favourability, the anomalies and the opportunities to improve and develop the territory of Dângău Mare from Cluj County.

**Key words:** supply, hydrographic resources, management.

### 1. INTRODUCTION

There are major problems in using the hydrological resources in the world as well as in Romania. This is due to the fact that there are inconsistencies between distribution, requirements and the existing resources in time and space. In accordance with the Directive no. 2000/60/CE to establish a union politics environment regarding water, "water does not represent a commercial good, but a patrimony which has to be protected, defended and treated as such". Therefore it is required to establish some suitable measures in using the hydrological resources in the analyzed territory as well as on national and international level. The hydrological resources management consists in an integrated approach which exists between the components of the hydric system and environment.

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Accessibility, water quantity and quality highlight the level of development of one community. This article presents a case study concerning water supply in Dângău Mare from Cluj County. Although Dângău Mare lies near the Gilău Mountains and possesses important and rich hydrographic resources of surface and underground waters varying under qualitative ratio, these are poorly exploited because there are only 4 km of supply networks with drinking water and with no sewage systems.

In the following part we shall present the characteristics of Dângău Mare and the proposed measures to improve and develop the analyzed territory. The purpose of this analysis is to reveal the benefits of applying some measures regarding water supply in the rural area, as well as the dysfunction abilities which derive from a bad management (eg. lack of sewage system).

## 2. LOCATION

Dângău Mare is part of Căpușu Mare Commune in Cluj County, which gathers nine villages: Agârbiciu, Bălcești, Căpușu Mare, Căpușu Mic, Dângău Mare, Dângăul Mic, Dumbrava, Pâniceni, Straja (fig. 1). The main landform of the commune is that of hill and mountain, realizing the bond between the Căpușului Hill and the Gilău Mountains. The hydric resources of the commune are formed by a series of rivers and rivulets: Crișul Repede, Căpuș, Mireș, Blidaru, Agârbiciu, Caselor Valley, Râștii Valley (Pop, 2007), to which we can add phreatic waters and springs.

The Dângău Mare village is bounded to the south by the Gilău Mountains, to the north by the Bălcești village, to the west by the Fânaț Hill (871 m) and to the east by the Pleșu Hill (861 m). The natural resources are poor, peculiar to the hills areas – fields with average fertility, prevailing grasslands (due to the development of agriculture based on vegetables and raising animals). All these are corroborated with hill climate - annual temperature range 7°C in the lower areas of Gilău Mountains, precipitations between 800–1000 mm and moderate winds; the presence of average and high inclination slopes is favourable to the development of winter tourism (existence of an arranged ski track and of other undeveloped yet) as well as of the summer one (hiking, riding etc.); the existence of rich surface and underground hydric resources.

Thus, due to the previously presented characteristics, the analyzed territory fits to an average potential of development.

## 3. METHODOLOGY

The identification and delimitation of the Dângău Mare territory represents the first stage of this study, followed by the consultation of bibliographic and cartographic sources, field surveys, to obtain the qualitative and quantitative pieces





of information (The Căpușu Mare Hall, interview with the locals, Department for the Regional Statistics Cluj).

The second stage consists in the analyzation and classification of information, the integrated study of phenomena (the Regional method) and elaboration of cartographic models using GIS. In the realisation of the cartographic supports we have used topographic maps (1:50000), orthophotograms and appropriate programmes – ArcView, ArcGis.

At the end of this study we have made the SWOT analysis to emphasize the characteristics of favourability, the anomalies and the opportunities to improve and develop the territory of Dângău Mare in Cluj County.

#### 4. WATER SUPPLY OF DÂNGĂU MARE

Drinking water supply in Dângău Mare is part of the water supply project for six villages in Căpușu Mare Commune (Căpușu Mare, Căpușu Mic, Agârbiciu, Dângău Mare, Dângău Mic and Bălcești), project realized according to the Government Ordinance no. 7/2006 and ran between 2007-2010. There were made 15 km of sewage systems in Căpușu Mare and Căpușu Mic (the rest of the localities do not have such facilities) through SAPARD funds obtained between 2004-2007. The authorities also want to supply with drinking water and create sewage systems in Dumbrava.

Thus, from the total supply network of Căpușu Mare Commune (35 km), the Dângău Mare locality has a 4 km long network and with Dângău Mic and Bălcești has 10 km.



**Fig. 2. Storage tank**

Because of the hill landforms and the presence of the Gilău Mountains (high altitudes, inclined slopes etc.), as well as of the great apport of water in the analyzed territory, water abstraction has been made using three springs located on the northern side of the “Curmătura” Hill. Water is being collected into a 75 mc storage tank (fig. 2) from the base of the slope to a 900 m altitude. Water filtration is made through gravel and sand filters. The quality of drinking water is not damaged and it is not required the

presence of other types of filters because there are no crops to pollute the phreatic layer through chemical fertilizers in the catchment area as well as on a 3 ha perimeter. In the past this area was used as grassland but now because of the diminishing of livestock it is used only for hay harvesting. From the main catching reservoir water is being pumped on a 750 m long distance and a difference in height of 63 m between the tank from the school and the one on the “La Grajduri” Hill (963 m). The pipe between the two tanks has a 100 mm diameter. The



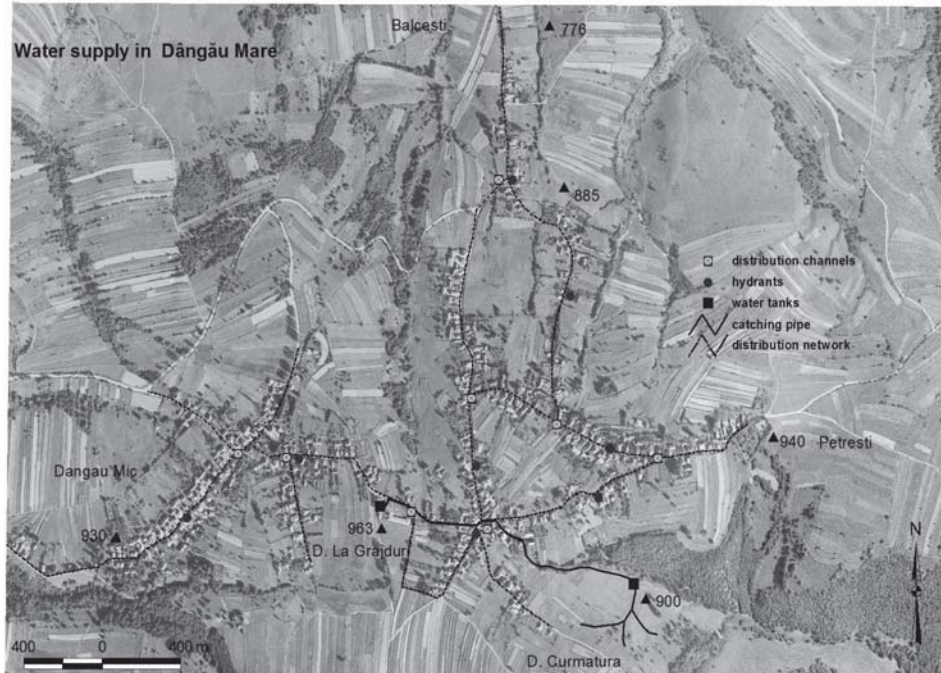
**Fig. 3. Storage tank**

pumping process is automated through pumps-hydrophore-level sensors installed in both tanks. At the school the capacity of the tank is around 300 mc (fig. 3). The implementation of the tank on the highest point of the village (963 m) has led to the development of water distribution network through freefall, the difference in height between the reservoir from the school and the edges of the network ranging between 885 m and 940 m (fig. 4).

Water distribution pipes are made of high density PVC and have a diameter of 70 mm. In the branch points there are mounted distribution channels

having pressure adjustment valves and hydraulic

shock. Each household has a connection channel to the main network. Where it was possible, from a physical point of view, one connection channel could supply up to three houses. In Dângău Mare can be connected 160 houses, but also the network supplies the Dângău Mic and Bălcești villages. At the same time each lane is provided with hydrants, which are very important in the case of a fire because of the relatively high distance of Cluj-Napoca City (36 km) and the 40 min intervention time of the fire-fighters.



**Fig. 4. Water supply in Dângău Mare**



Unfortunately, regarding the distribution network we can say that because there has not been made the connection of the houses to the network using water meters, some consumers joined to the connection chambers and began using water without paying any money (August 2010 – January 2011). Metering process is planned to be accomplished beginning with February 2011.

The greatest dysfunction met in Dângău Mare was the lack of a sewage system which denotes a bad management. This technical problem (a water supply system without a sewage system) leads to a discharging of remaining wastes into rivers and groundwater polluting water and soil.

The implementation of the sewage system in the locality (as well as in the whole commune) is a measure that will lead to the improvement of life and to a minimal standard of living required in this century.

## 5. SWOT ANALYSIS

The SWOT analysis of Dângău Mare is a useful instrument in showing the aims of development of the territory. We shall emphasize favourability and dysfunctions, threats regarding the territory if there would not be taken a series of measures as well as the existing opportunities.

### *Strengths:*

- presence of varied land forms (meadows, hills, mountains) which ensure geological diversity
- presence of water resources which ensure a long term needs (rivers, rivulets, springs, phreatic layer)
- realization of the water supply system
- modernization at a high level of installations
- automatization of the system
- the infrastructure assigns a good accessibility
- there are no regional problems regarding the environment (pollution of phreatic layer)
- weak collaboration with Cluj County Council

### *Weaknesses:*

- lack of a sewage system
- locals preferring to use traditional methods in collecting water
- lack of connections from the main supply network with the houses (finalisation 2011)
- lack of ecological education
- the territory does not benefit of any support from the authorities

### *Opportunities:*

- possibility of accessing European funds to develop the infrastructure
- post-adhesion programmes to access grand funds
- partnerships between local authorities and economic agents



- establishment of bindings with the areas inside and outside the commune
- development of winter tourism, winter sports, tracking etc.
- development of the real estate market
- the building of secondary residences

*Threats:*

- the loss of some funds from tax collection
- degradation of the landscape
- the maintenance of the area in a relatively isolation

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