

DISFUNCTIONALITIES OF THE WATER SUPPLY SYSTEMS FOR CITIES IN THE MURES PASSAGE BETWEEN REGHIN AND THE CONFLUENCE WITH THE ARIES RIVER REFLECTED IN THE WATER PRODUCTION DYNAMICS

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ABSTRACT. – **Disfunctionalities of the water supply systems for cities in the Mures passage between Reghin and the confluence with the Aries River reflected in the water production dynamics.** As a general feature of the entire urban system of the passage, concerning the system of generating drinkable water, a ascendant orientation was established until '90, aboard with the positive evolution of inhabitants, in terms of a sustained industrial development. In the last decade of the XX century and in the last years – especially in small cities (Iernut, Ludus) – corroborated with the speeding proces of private registration, in terms of a financial instability of the population but also of a “enfranchisement of consume”, aboard with a descendant orientation or, in some places, relatively constant of the evolution of population, giving as an excuse the descendant course of water production and the decreasing amount of water distributed in the system. To all this, the partial blemished condition of the water suply system is added – outdated in many places –, the programs of progress and cutting down the lost being in the middle of the process.

1. Introduction

By the progressive analysis of the ratio between the *entrapped water* (from the Mures river by plants), *repressed water* (the production of drinking water by water plants that correspond to the distributed water in the network), *consumption water* (drinking water provided, sold for consumpition, corresponding to the water reduction, that doesn't include losses), *losses in the network* and *the demographic evolution* of the 4 urban systems from the Mures passage between Reghin and the confluence with the Aries, on certain periods, it is noticeable, using the analogical method (the comparative one), a close inherent connection but also one that determined by external factors like the social economic status (the population's living standard).

2. The relation between the urban population's demographics and the water production

Regarding *the town of Targu-Mures*, it can be seen, on a period of 33 years, that until 1990, an increased pace of water production in line with the population's demographic increase. On average, the consumed water per inhabitant, per day, had high values. The losses and the network recorded certain fluctuations but at low levels. After 1990 the dynamics of the aforementioned

parameters record a whole new curve of evolution, the trend being recessive. Even though the population recorded a mildly distinguishable recessive pace, when it comes to production and water consumption, the situation has exacerbated.

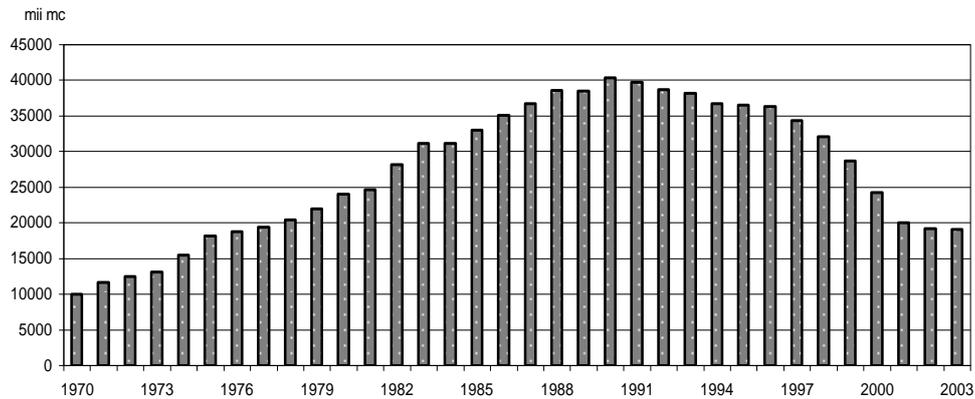


Fig. 1. The evolution of water production of Targu-Mures's plant during the 1970 -2003 period

The main causes of the decrease in consumption, which has been the main stimulus of the negative trend of the last 14 years, are: reduction of the number of industrial units in the town of Targu-Mures in the last decade (an effect associated to the current economic flow of our country) and the private metering which reaching increasing values. Amongst these causes, the insufficient maintenance of the drinking water network (as is the sewages) justifies the very high values of network losses; cumulated the aforementioned causes, have determined a pronounced decrease of water production after the 1990 time threshold.

As a result, after the ascending trend marked an increase from 9966000 cubic meters in 1970, to 40344000 cubic meters (maximum value on the considered period) in 1990, representing 30378000 cubic meters, in other words an increase of over 4 times registered in 2 decades, justified by the increasing water necessity in predecembrial social economic conditions, after this moment the water production's pace becomes recessive until now, reaching 19120000 cubic meters (2003), which means a split by half per decade. A rate of production decrease is noticed after 1990 as equal to the one of increase beforehand. Although we cannot ignore a slight retrogressive move of the entire water provision system, behind this process there are positive elements of the town's current economic state hidden, such as economic restructuring on principles of functionality and private metering, fortified by attempts of loss reduction through continuous accomodation of the water provision technology to EU standards.

Analyzing progressively as with the Targu-Mures town, the entrapped water, repressed water, consumption water, losses in the network and demographic increase in the town of Reghin ratio for a 30-year period shows ,using the same analogical method (the comparative one), the close inherent connection and the impact of the social economic of the town reflected in the population's living standard.

Also as with the Reghin town the same ascending pace of water production in line with the population's demographic growth is noticed with highlighting the fact that the maximum values are registered in slightly different time thresholds. Therefore, the peak of water production was recorded in 1988, as a result the trend has gained a recessive pace (slightly noticeable until 1990) despite the continuous increase of the population's number which reached paroxysm in 1993. The parallelism of the two curves (water production and population) is explained by the high values of water consumption per capita per day compared to the conditions of continuous socio-economic development, large industrial units needing water (the beer industry, metallurgy etc.). The 1988-1993 period was one of slight decrease in the production of water (and in line consumption), reflecting the beginning of problems that will worsen in coming years. The main causes of decrease in water consumption which argue a mutual pace in the corridor of urban systems are: the reduction of number of industrial units and increase in share of private metering. Besides these, the insufficient maintenance of drinking water and sewage network justify high level of losses in the network, problems that will be detailed in the next subsection.

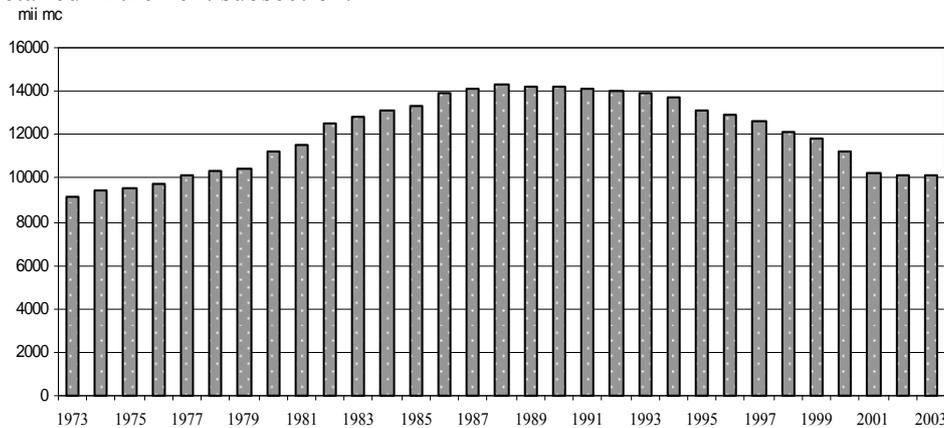


Fig. 2. The evolution of water production of the Reghin plant between 1973-2003

Water production has risen from 9125000 cubic meters in 1973 (production of water in the town of Targu-Mures has now exceeded 13000 cubic meters, showing for the moment some industrial momentum towards Reghin and greater development later proven by an obvious polarizing function down the passage ways access) to 14300000 cubic meters in 1988 (at which Targu-Mures was reaching, regarding water production, 40000000 cubic meters. Not even Reghin can escape of a profound socio-economic post-revolution transformations which in similar determinations, under a neighboring town, generates a negative trend of the curve of water production 10123000 cubic meters in 2003.

The situational parallelism, in terms of water production, and determinatively in regard to the overall cause for the origin of the trend before and after the time threshold in 1990 (or close), at different levels given by socio-

economic status (and therefore the water demand) between the two cities, Targu-Mures and Reghin, is underscored by figure 3.

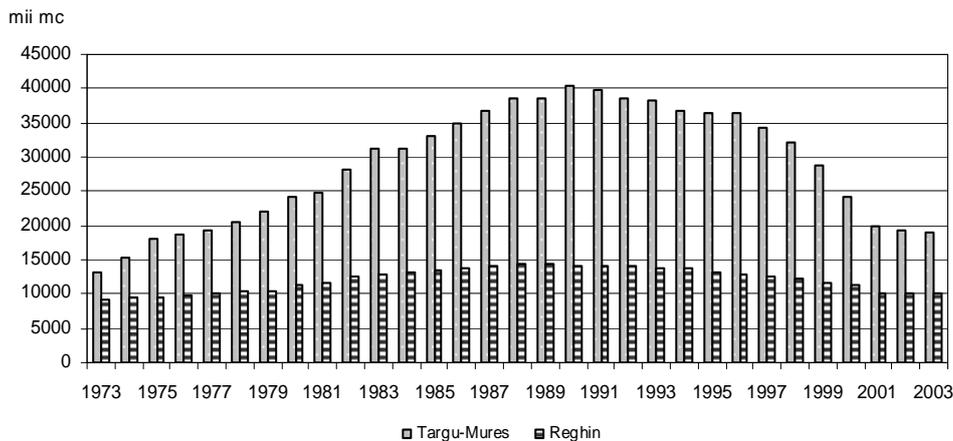


Fig. 3. *The comparative evolution of water production in Reghin and Targu-Mures between 1973-2003*

Analyzing the evolution of the water production plant in Ludus for a period of 16 years, the same generally positive trend is noted until 1990. An exception, 1988, when the maximum quantity of supplied water is reached, a justified fact, due to a continuous increase in the cities' population, the growing water needs of urban consumers. Economic difficulties registered in the city of Ludus, recorded after 1990,

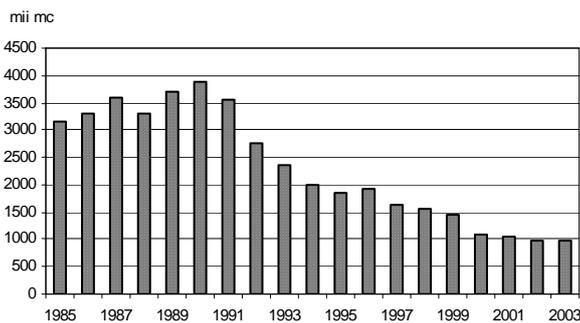


Fig. 4. *The evolution of the water production plant in Ludus, during the 1985-2003 period*

in terms of faulty economic restructuring combined with the disconnection of a large number of consumers and private metering, are factors which explain the negative trend registered in recent years (fig. 4). To all these, there is also the fact that the water supply system of Ludus already had certain failures, thus, due to the network extension in the Rosiori and Gheja

neighbourhoods, during drug periods, water does not arrive continuously in these neighbourhoods due to the underflow of the distribution networks. Also, the maintenance of pressure and flow in the network is made on high energy costs due to the fact that the water plant is located in the Mures river and the city on the river terraces. Water production declined almost 4 times in the last decade and those few years (less than 1000000 cubic meters starting 2002), which requires serious restructuring measures and power system adequacy to local needs.

Also as with *the Iernut city*, there are similar failures in the water supply system, water tanks being located at the Mures river level. Through the pumping stations system, water is repumped under a pressure drive (4,5-5 atmospheres) in the distribution network. These shortcomings are supplemented by newly born

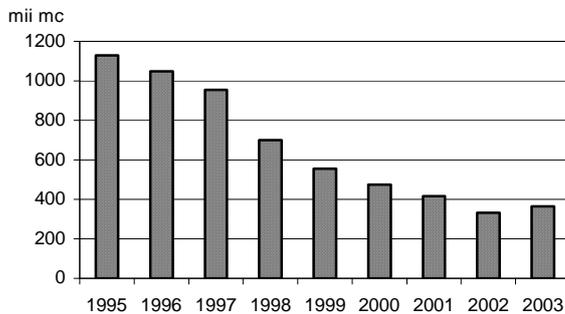


Fig. 5. *The evolution of the water production plant in Cipau, during 1995-2003*

cities economic problems, the number of industrial units being very small in line with the polarising force of the town of Targu-Mures, which absorbs a part of the active population, the quantity of supplied water in recent years having gone clearly downward (figure 5), along with the decreasing population number (water production that declined in the last decade from 1129 to 365 thousand cubic meters, in three times).

3. Conclusions

As a general conclusion for the entire urban system cascaded of the Mures passage between Reghin and the confluence with Aries River, in terms of *drinking water production system*, an upward trend is noticed, until about the 1990², in line with the positive evolution of number of inhabitants, regarding a sustained industrial development. In the last decade of the 20th century, and the final years, economic problems of urban systems, particularly that of smaller cities (Iernut, Ludus), in conjunction with the deepening of the process of private metering in the conditions of financial instability of the population, but also of „consumption emancipation” (embodied by an individualism that is characterised by the desire of total disconnection from centralized systems and the lack of any kind of dependencies) parallel to recessive trend or at times relatively constant of population evolution, justifying the production of water going downward and the decreasing quantity of water that is supplied in the network. To this, add the partially defective condition of water mains – in many places old – programmes of development and loss reduction being underway.

Also, as a common note to the 4 analyzed urban systems, we can point out the hydrographic access of the river Mures which, with the exception of older sources, of groundwater supply, yet partially functional-but with low participation to the amount of input into the water supply system of the aforementioned towns-representing the main source of drinking water supply.

Comparing the four urban systems of the sector of passage way analyzed during the last decade (1995-2003), the generally downward course is noticed, the most „constant evolution” belonging to the town of Reghin (a decrease of just 3000000 cubic meters per production of over 13000000 cubic meters recorded in

1995). Targu-Mures and Ludus have recorded halfenings of water production values, and the newly born Iernut, a decrease of three times, the explanation being given by the measurements listed.

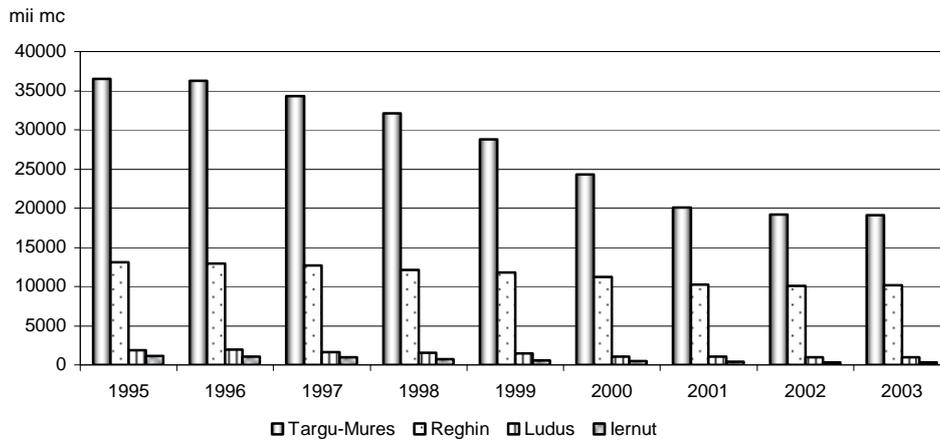


Fig. 6. The comparative evolution of water production of urban systems in the passage way

Also, reporting water production of each urban system to annual production of the passage way (resulted from summing outputs of each city), we obtain evidence of Targu-Mures polarizing function and rule amongst the other urban systems through the production of over 60% of consumed water in the passage way. Together with the town of Reghin, it covers approximately 90% of the water production of the entire passage way, thus proving regional gaps between

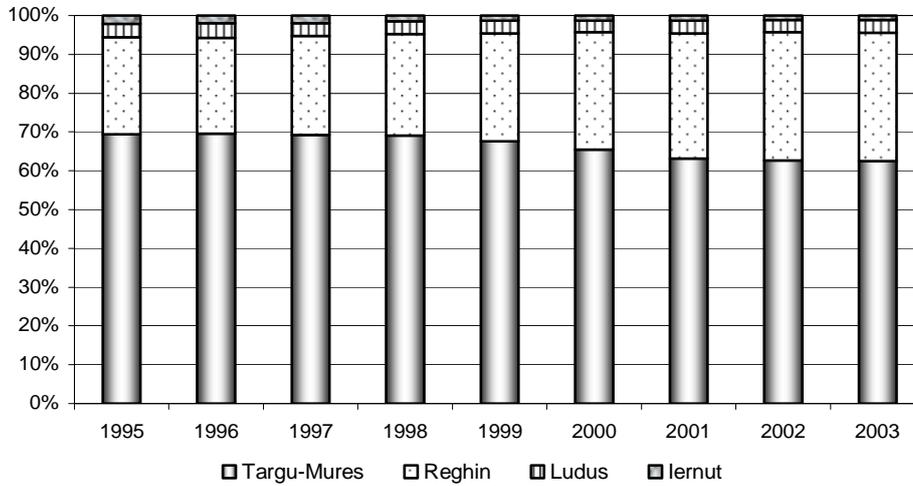


Fig. 7. The comparative evolution of the share of the annual total of water production of urban systems in the passage way

the upper and lower half of the passage way. The lowest intake regarding the distribution and consumption of water in urban environment in the passage way belongs to Ludus and Iernut, marked by the polarization in increase of the town of Targu-Mures; summed up, their production doesn't reach 10%. These aspects reinforce the need for the development of the lower half of the passage way, whose water supply issues must be resolved as soon as possible.

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Annez 1

The map of the density of the water supplying network of the cities from the Mures passage between Reghin and the confluence with the Aries River

