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ABSTRACT

This paper analysis the disparities between Romanian Counties regarding the spatio-temporal evolution of rural population acces to sanitation services for pre-accession period (2003-2006) and the first two years since Romania is part of the EU-27 (2007-2008) highlighting positive or negative changes occurred in this period.Romanian counties were mapped and divided into five typological classes,using multivariate analysis such as hierarchical cluster analysis method.Each class has different values of rural population served by waste collection services related to the Romania average (expressed in standard deviations).Limited access to sanitation services from rural areas lead to uncontrolled waste disposal.Despite improvement of public access to sanitation services in rural areas compared to 2003 most of population still lack access to waste collection services in 2008.In this context, implementation of the acquis communautaire on municipal waste management is difficult to achieve in rural territory.

Keywords: spatial analysis,sanitation services,rural territory,waste management

INTRODUCTION

The waste management problem has a complex spatial pattern of waste arisings[1]. These flows should be analyzed taking into account the peculiarities of territory concerned [2].First of all,full coverage of urban and rural population to sanitation services is a basic condition for a proper waste management system.Partial access of population to waste collection services lead to illegal dumping of uncollected waste [3].Waste collectors had to change their patterns of behaviour and their way of thinking, but they were institutionally locked in the existing routines[4].The development of these services is very slow in Romania particularly in rural territory,considering the fact that Romania was obliged up to July 16, 2009 to close all rural dumpsites and to provide full collection of waste generated[5].This paper highlights the disparities between Romanian counties regarding the spatio-temporal evolution of rural population access to sanitation services from 2003 to 2008 reflecting the poor solid waste management systems from rural territory. EU acquis compliance imposes the improvement of sanitation services in urban and rural territory and local authorities are resposable to provide these services for their community.Private sector involvement and cooperation

between local authorities can provide viable solutions for waste management issues from rural areas [6].

METHODS

Statistical data regarding the access of the rural population to waste collection services were processed by hierarchical cluster analysis method resulting a map that divided Romanian counties in 5 classes with various evolution than Romanian average,these values being expressed in standard deviations and arithmetic average (chart).Data was provided by the 8 Regional Environmental Protection Agencies for all 41 counties. Also,paper performs a comparative analysis between 2003 (first year for which data are available at county level) and 2008,concerning the share of rural population without access to sanitation services.Thematic maps show the percentage (%) and absolute values (number of people) necessary for a proper interpretation due to demographic differentiation between Romanian counties.

RESULTS AND DISCUSSION

Rural population had a limited access to waste collection services (<10%) in 2003 and usually of these services benefited villages in the close proximity of large cities.In most counties,the share of rural population without access to sanitation services were over 90%.Also,in counties where rural population is majority the number of people without access to waste collection services were very large (Neamț,Bacău).Absolute values (number of people without sanitation services) are intended to help in interpreting the results due to demographic differentiation between Romanian counties (fig.1)

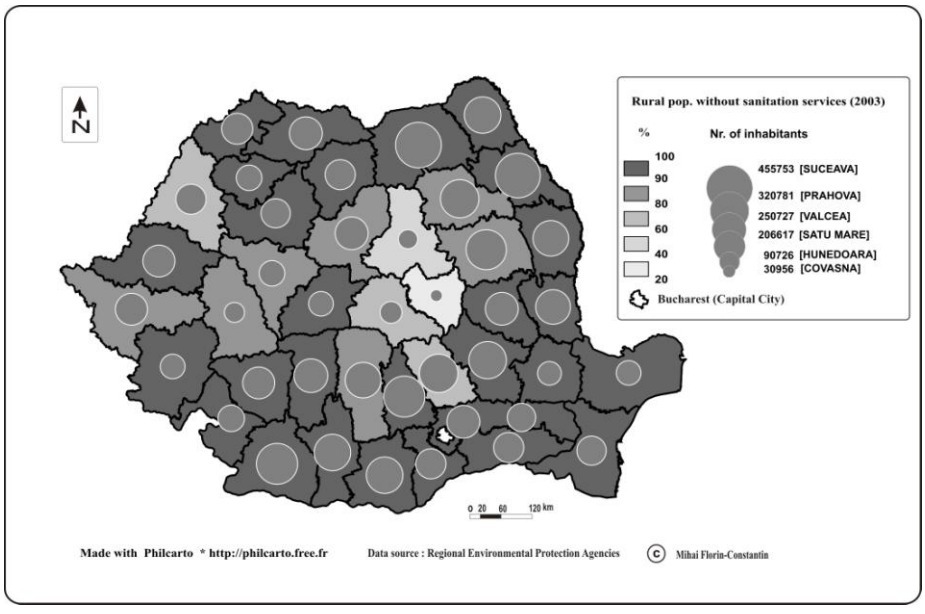

Fig.1 Rural population unserved by waste collection services in 2003

A well-populated county like Prahova,although the share of unserved rural population is 70.53%,the number of people (320781) is higher than in counties without sanitation services in 2003 such as Giurgiu (200364 inhab.),Călărași (195773 inhab.) etc.

Waste generated and uncollected from rural areas are uncontrolled disposed being pollution sources on local environmental factors (surface water,groundwater,soil,agricultural land, protected areas etc.).Lower share of rural population without access to sanitation services of Harghita and Covasna (sparsely populated) limits the illegal dumping from these regions.Unlike 2003,improvements on the extension of sanitation services in rural territory have occurred mostly in the counties of Transylvania (Cluj-significant decrease of rural population without access to sanitation services from 92.7% in 2003 to 18% in 2008;Năsăud, Alba Mureș, Sibiu, Hunedoara).

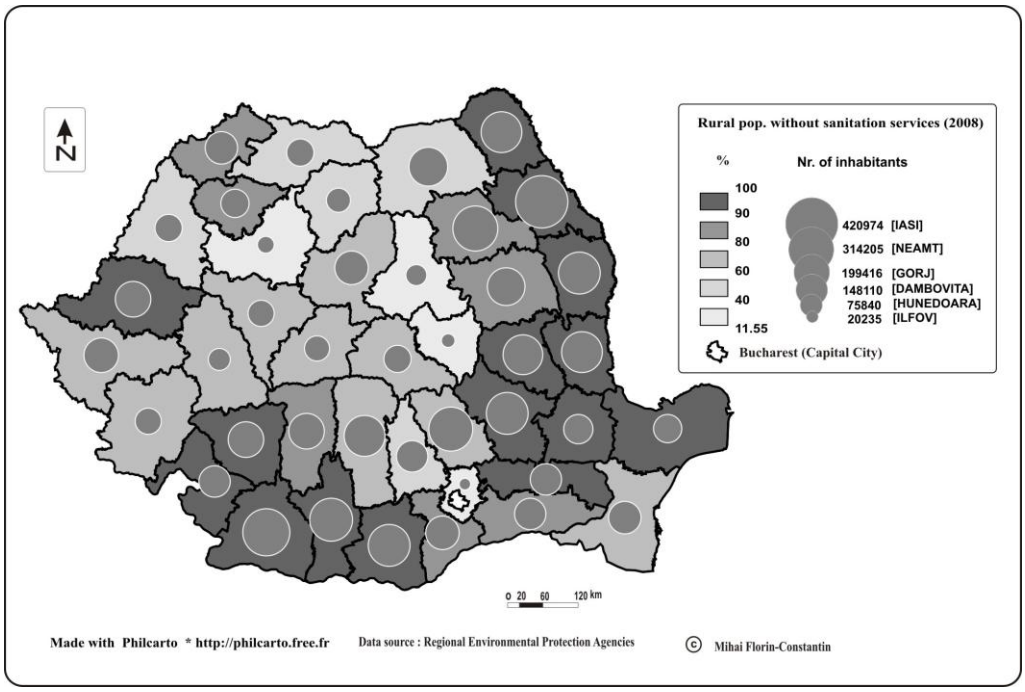

Fig.2 Rural population unserved by waste collection services in 2008

In 2008 the situation has improved but not enough.The adoption of the EU acquis,creating the regional and local waste management plans were the first steps in the development of waste management facilities. In addition, pre-accession funds such as ISPA and PHARE financed the integrated waste management projects for cities and rural areas in proximity.Local authorities are obliged to provide collection and transport of waste generated or to sign contracts with private operators,especially since July 16, 2009 (deadline for closure of rural dumpistes).Until then,rural localities served by sanitation services,collected and disposed the waste generated in open dumps,these sites being established by local agreement or in best scenario the amounts of waste were transported to a non-complliant urban landfill in the neighborhood.The most common and "convenient" disposal method of waste were open dumping ussually in the proximity of villages or on river banks particularly in mountain regions.In this backdrop,in 2008,the share of rural population without access to sanitation services was more than 90% in 15 Romanian counties (from which 8 completely lacking of sanitation services) including counties outside the Carpathian arch in North-East,South-East and South ofRomania and counties with a varied landscape (Buzău,Vrancea,Gorj,Mehedinți, Arad).Furthermore,significant share of rural population without access to sanitation services (80-90%) were in counties Neamț,Bacău,Sălaj,Satu Mare,Giurgiu and Călărași.Insignificant changes in Brasov and Prahova suggests that development of

waste management facilities was limited.Unlike in 2003,improvements on the extension of sanitation services in rural territory have occurred mostly in the counties of Transylvania (Cluj - significant decrease of rural population without access to sanitation services from 92.7% in 2003 to 18 in 2008; Năsăud,Alba Mureș,Sibiu,Hunedoara).Rural population without access to waste collection services decreased in some counties from North-West and West (Satu Mare,Bihor,Timiș) or in counties Dâmbovița, Argeș and Vâlcea.Harghita and Covasna maintain their decreasing trend and it noticed that in Ilfov county,population without access to waste collection services has decreased significantly from 97.21% in 2003 to 11.55% in 2008!

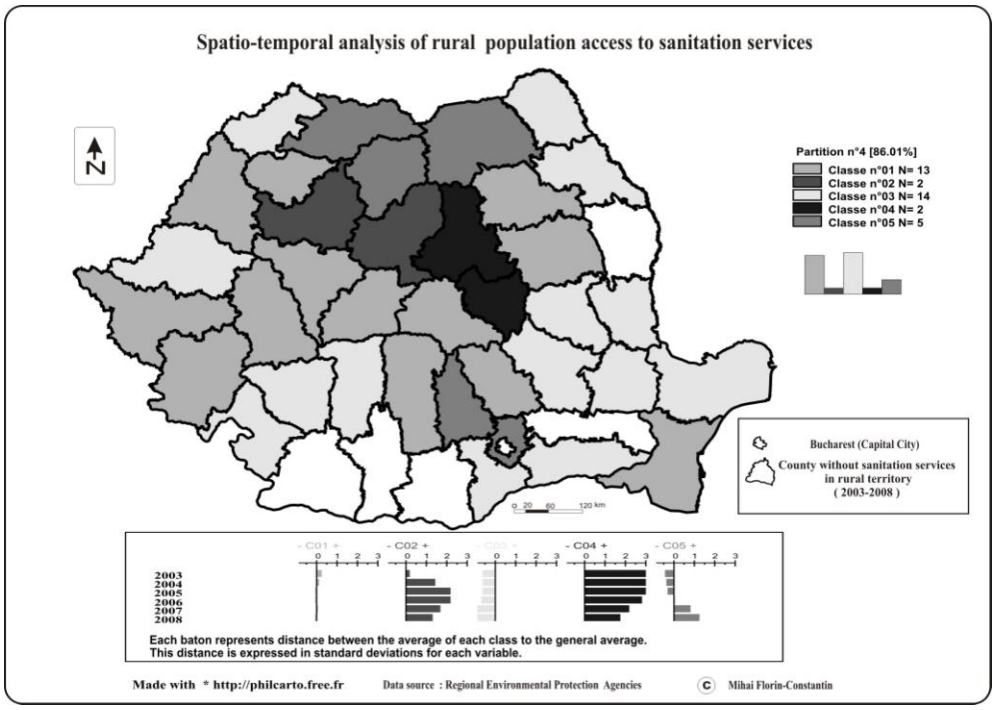

Fig.3 Disparities in rural population acces to sanitation services (2003-2008)

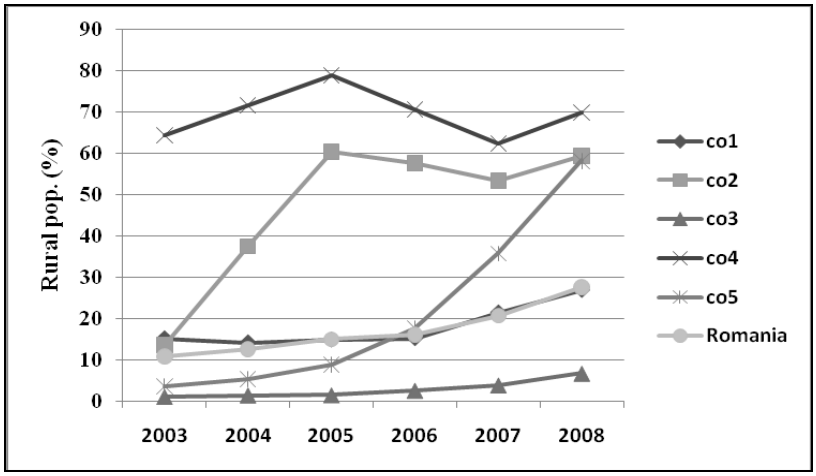

Fig.4 Multiannual average of represented classses (fig.3) related to Romanian average

There are some major disparities at county level compared to the Romanian average regarding the access to sanitation services because of several factors such as:socio-economic level,various geographical conditions,rural population share of county total

population,access to national or EU funds for the development of an integrated waste management system, policy makers etc.Unfortunately in the period 2003-2008,five counties of Romania (Vaslui,Ialomița,Teleorman,Olt and Dolj) did not provide waste collection services in rural areas.These counties have a predominantly rural population,located in hilly and plain regions with low living standards due to a less developed agricultural sector,being most vulnerable to waste dumping.Lack of sanitation services as well geographical conditions (plain and hilly landscapes) have favored the waste disposal in open dumps reflected in the large number and occupied ares (ha) of these dumpsites inventoried in 2009.In 2007-2008, in three counties there were no sanitation services in rural territory such as Tulcea, Brăila and Vrancea their number reaching in 2008 to 8!

Class 1:includes counties that have less access to sanitation services below the Romania average,with a slight increase during 2003-2008, from 15.2% in 2003 to 26.96 % in 2008.Waste collection infrastructure is poorly developed,only periuban villages have access to waste collection services provided by urban operators.In mountain regions from Neamț, Bacău and Caraș-Severin counties waste is often dumped on rivers banks in the proximity of human settlements, summer floods playing the role of "collector" for different types of waste.Uncontrolled dumpsites are more common,compact and stable over time in the plains and plateau regions which have a lower risk to flooding.Also this class inlcludes counties with a lower share of rural population of the county's total population (Brașov, Hunedoara).Usually based on field observations made particularly in Neamt County,recyclable waste are disposed in open dumps (paper/cardboard,plastic,PET,wood) construction and demolition waste to which are added agricultural wastes (garden wastes,sometimes manure, etc.).Food waste and others biodegradable are commonly used in households as a source of food for livestock or individual composting.

Class 2: Cluj and Mureș counties have a significant expansion of sanitation services in rural areas during 2003-2006,the values are far above the Romanian average.In 2007-2008, the share of sanitation services decreased significantly in Mureș county unlike Cluj where continued its upward trend and reached more than 80% in 2008. Basically,Cluj is the county with the largest increase of public access to sanitation services from Romania, achieving significant investment in this sector.

Class 3: 14 counties of very low access of rural population to sanitation services (<10%) far below the Romanian average having a negative trend from 2003 to 2008.During this period,waste collection served only the suburban villages and uncontrolled waste disposal in open dumps was the most frequent method of treatment.Furthermore, sanitation services were temporary in following counties:Brăiala and Vrancea (2003-2006),Tulcea (2003-2005).Thus, no sanitation services was provided in these 3 counties for the period 2007-2008.Rural areas of these counties were the most exposed to the open dumping.The situation reflects the lack of involvement of local authorities on waste management issue.Some household waste is recovered (especially biodegradable fraction usesd as compost or as source of food for livestock) the remaining waste (including recyclables) are uncontrolled disposed.This is proven by the large number of dumpsites counted in 2009 especially in counties outside the Carpathian arch [7].

Class 4:includes Harghita and Covasna, less populated counties but predominantly rural, half of population already had access to sanitation services since 2003,these counties having the highest share (over 60% for the entire period) although there has

been some decline until 2008.Favorable context has reduced the number of open dumps inventoried in 2009.
Class 5: counties had a positive evolution from low levels under Romanian average (2003-2005) to sharp increase in 2006-2008.Several communes (without sanitation services) were declared as towns in this period,this fact led to rural population decline from country's total population which reflected in the sharp increase of population access to these services. For instance, in Suceava County in the year 2004, 8 communes without sanitation services have become cities: Broşteni, Cajvana, Dolhasca, Vicovu de Sus,Frasin,Liteni,Milişăuţi,Salcea) increasing the percentage of urban population to 43.4 % to 35% in 2001 [8].Satellite cities of Bucharest (fully served by sanitation services) develop these facilities to rural areas in the neighborhood (Ilfov County).

CONCLUSIONS

Despite some improvements compared to 2003,most rural people still do not have access to sanitation services in 2008.Thus,uncontrolled waste disposal were a common bad practice.Geographical distribution of rural population (%) access to sanitation services reflects the regional disparities between Romanian counties.Quality of these services is still rudimentary,it provides mostly traditional collection of waste (mixed) and transport to urban landfilles after the closing of rural dumpsites. It is expected a more rapid development of waste management facilities in rural areas otherwise illegal dumping can not be restricted.

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