

## MANAGEMENT OF THE ECOLOGICAL RECONSTRUCTION OF URBAN HABITATS (CASE STUDY BACAU COUNTY)

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**Abstract:** Bacau County is rich in mineral resources but is polluted, by a historic pollution due to mining and manufacturing industry; over the last years it was increased by heavy road traffic and the spatial, not rigorously planned, expansion of cities. The paper presents the ecological state of the county's cities, an evaluation carried out in the first phase of the research-project "Research on a systemic approach of sustainable development at administrative-territorial level" and based on the proposals concerning ecological reconstruction, namely: increasing urban metabolism through recycling and re-use of domestic waste, reducing air, water soil and phonic pollution, an integrated management of natural and antropic risks on the whole territory of the county.

**Keywords:** pollution, risks, planning, maps, reconstruction

### 1. INTRODUCTION

Urban areas in Bacau County consist of three municipalities – Bacau, Moinesti, Onesti - and five towns – Buhusi, Comanesti, Darmanesti, Slanic-Moldova and Targu-Ocna. Of the overall urban population (of about 46% of the total population of the county) 54% are concentrated in the Municipality of Bacau, followed at a great distance by the municipalities Onesti, Moinesti and the other towns of the county.

The main pollution sources in the urban settlements of the county are: industry (chemical, petro-chemical, mining and manufacturing industries) and road traffic that has considerably increased over the last years. Even though many productive capacities (mining and manufacturing) have disappeared, the historic pollution of soil and surface and ground water is still present.

Meanwhile, the uncontrolled increase of urban settlements and the still unchanged principles of design, building and management, are being reflected in a great pressure on the environment, as exerted by transport, sewage, water-supply, waste collection and processing systems, all of these contributing to the decline of population's health.

### 2. THE ECOLOGICAL STATE OF URBAN HABITATS

Air pollution in Bacau is due to pollutants of the chemical industry by ammonia, sulphur dioxide, natrium dioxide and in Onesti by chloride, hydrogen chloride, sulphuretted hydrogen. Dirt-heaps from companies such as Sofert, Letea and from thermo-electrical stations pollute water, air and soil and areas around the companies Chimcomplex Borzesti, Rafo-Onesti, Carom-Onesti; Petrom – Moinesti branch and Compet-Moinesti branch pollute surface waters also. Soils in the Magura Park – Targu Ocna are deteriorated due to rock-salt mining and those in the Hangani, Lucacesti, Gazarie, Vasainesti neighborhoods are affected by hydrocarbons.

Landslides occurred in the towns of Moinesti and Lucacesti. In all urban areas of the county, urban infrastructure is obsolete (its wear and tear reaching 50% in Buhusi, Moinesti, Comanesti) and thermo-electrical stations are also obsolete and inefficient. Waste-water treatment plants are obsolete and lack the necessary equipment, polluting the surface waters of the county. Urban waste is deposited on dumping sites with their capacity largely exceeded, are not impermeable and their location do not comply with the compulsory sanitary distances to residential areas.

Therefore, they are major sources of water, air and soil pollution; moreover, valorisation chains are lacking. The towns of Darmanesti and Slanic Moldova lack both dumping sites and waste-water treatment plants. All towns with the exception of Slanic Moldova and Targu Ocna are at flood risk, due to the configuration of the hydro-graphic network and the uneven relief.

### 3. PROPOSALS FOR AN ECOLOGICAL RECONSTRUCTION

#### *Increasing urban metabolism through domestic waste-recycling and re-use*

Domestic waste include domestic waste collected from the population, waste from commercial activities and street litter. Irrespective to their origin, all the wastes represent polluting factors, and their very presence and the various ways of dumping and treating waste contribute to the pollution of the environment on local, regional and global scales (Table 1).

The effects of waste. Table 1

| Effects                                                                                                                                                                                                                                                                         | Scale of pollution                                                                                                                                                                                                                                          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Pollution <ul style="list-style-type: none"> <li>- hothouse effect</li> <li>- toxicity</li> <li>- eco-toxicity</li> <li>- acidification</li> <li>- photo-oxidants formation</li> <li>- radioactivity</li> <li>- thermal pollution</li> <li>- noise</li> <li>- smells</li> </ul> | <ul style="list-style-type: none"> <li>- global</li> <li>- continental/regional</li> <li>- continental/regional</li> <li>- continental/regional</li> <li>- regional</li> <li>- regional/local</li> <li>- local</li> <li>- local</li> <li>- local</li> </ul> |
| Disturbances <ul style="list-style-type: none"> <li>- landscape degradation</li> <li>- eco-systems degradation</li> </ul>                                                                                                                                                       | <ul style="list-style-type: none"> <li>- regional/local</li> <li>- regional/local</li> </ul>                                                                                                                                                                |

The issue of urban domestic waste should be approached in its whole at county level, in order to implement those treatment channels that have the minimum impact on the environment and which would entail the lowest costs.

The decision on choosing a waste-treatment channel should take into consideration not only reducing the negative impact on the environment but also to achieve other objectives such as: energy valorization, turning to account organic and mineral materials, valorization for agriculture, phasing out of waste. The choice of the most suitable channel of treatment should be based on the spatial-temporal dispersion of waste (annual flows of waste). An appropriate management of waste requires:

1. compliance with legislation on the collection, transport, depositing and treatment of waste;
2. the development of a data base at county level, for each locality, including all categories of waste that have to be managed in an integrated way; the data base will provide useful information concerning the choice of locations and the valorization channels;
3. establishment of contacts and collaborations with foreign companies specialized in waste treatment, with a view to creating new recycling, re-processing and re-conditioning industries, and developing waste-cremating plants through thermal or electric energy producing channels, producing bio-gas or fertilizers;
4. closing down all dumping sites which do not comply with current legislation and standards;

5. ecological reconstruction of the abandoned dumping sites and of their adjacent areas, through afforestation with resistant and rapidly growing species of trees and brush.

#### ***Mitigating air, water and soil pollution and phonic pollution***

In order to reduce pollution it is imperative, in the first place, to create a data base of maps, which would evaluate soil, water, air quality and noise levels; these should substantiate decisions for environment reconstruction.

Air pollution is due to industry and traffic. In order to reduce pollution, air and climate planning are imperative, so as to identify climate-tops (areas with specific climates dominated by one of the main meteorological phenomena or components of air: heat, humidity, gases, air-flows etc.) based on measurements and maps and create green climate-tops (green areas, forests, parks) for the reconstruction of air.

Such green climate-tops with forest vegetation for air reconstruction and air-flow corridors should be created by the companies of the industrial compound of Onesti Municipality (Fig. 1A) and by the industrial plants on the industrial compound of Bacau Municipality (Fig.2A).

Meanwhile, it is imperative to create in each neighborhood of the county's towns green climate-tops of forest vegetation for recreation purposes, for dust and CO<sub>2</sub> absorption, for humidification and temperature-balancing.

It is also imperative that spatial planning of towns and cities creates corridors that would allow air circulation (airing) in localities.

Other polluting factors are domestic and industrial waste-waters polluting the soil. On the one hand, sewage networks in all towns should be re-dimensioned and extended, and on the other hand rain-water drainage should be re-dimensioned in order to cope with the maximum flows that had been registered in the last 50 years.

Increasing the treatment capacity of domestic and industrial waste-water treatments plants, their building and modernization are also important, with a view to reducing surface water pollution. Reducing phonic pollution due to transport (rail, road and air) and industrial activities, based on measurements and maps, requires measures of mitigating pollution, as follows:

1. Gradually reducing traffic by 1/10 and then by 1/5 and redirecting it through corridors created at some distance to the areas sensitive for air pollution.
2. Avoiding heavy traffic and substantial decrease of car-traffic in sensitive areas.
3. Building buffer zones (fences, tree-curtains) that would absorb or block transfer from the emissary to the recipient.
4. Reducing the speed of means of transport in sensitive areas, including motor ways.
5. Technological modernization of means of transport and eliminating the noisy ones from traffic.
6. Modernizing economic and industrial installations, with a view to reducing all kinds of emissions.
7. Creating a buffer zone – forest curtains that would absorb air-traffic noise in Bacau Municipality, i.e. in the areas between the airport and the residential areas (Fig. 2B) and the development zone of the international airport (Fig. 2C).
8. Creating protection forest-curtains along roads all over the county's territory.

Ecological renewal of degraded land requires to follow the steps below:

- to identify ownership on land;
- to establish who is responsible for the de-pollution of industrial sites which have been privatized, closed-down, demolished and put in preservation;
- ecological renewal requires investment in technologies for improvement, decontamination, treatment, neutralization of dangerous substances; these investments should be supported both by the state and local authorities as main beneficiaries of reclaimed land entering the economic circuit.

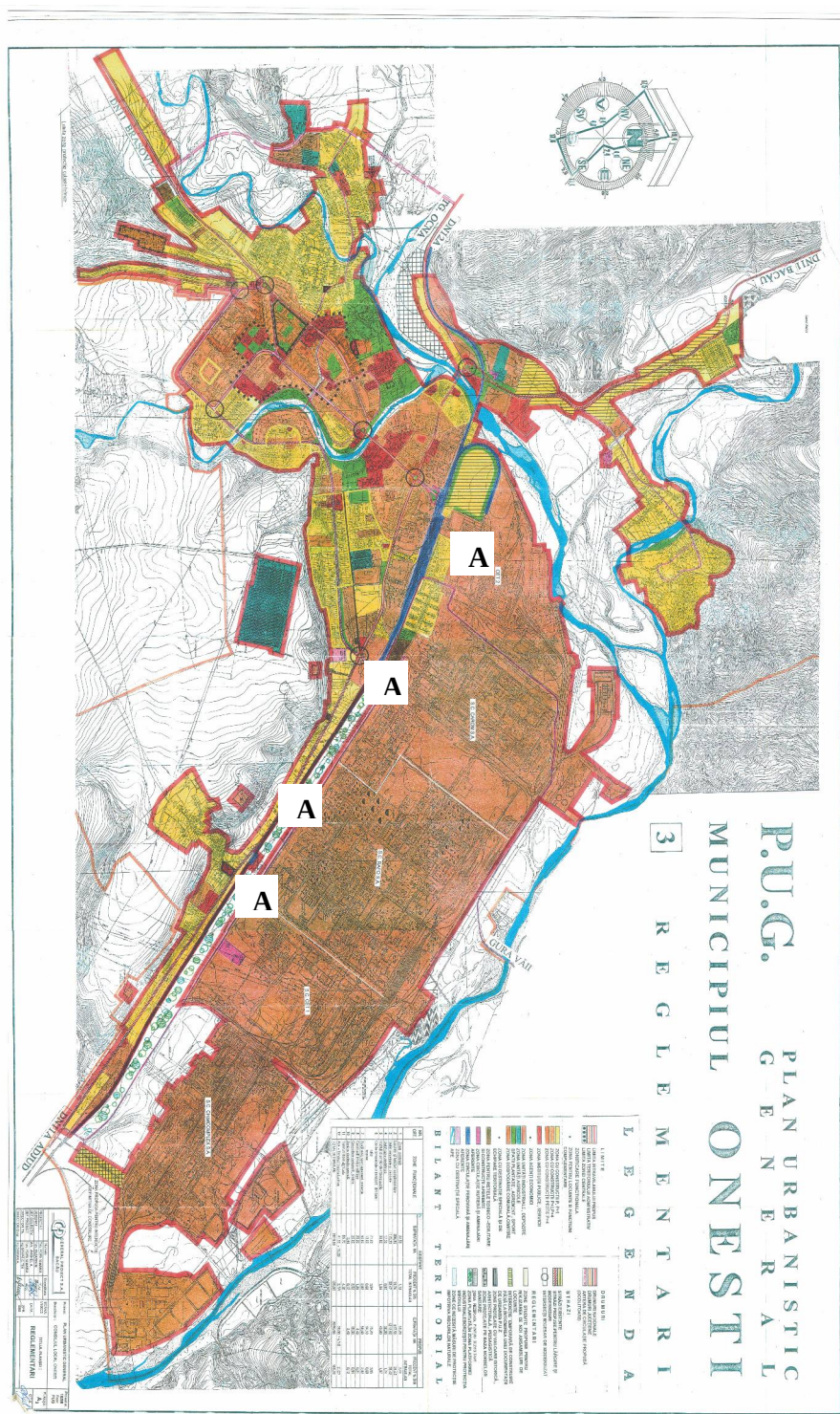


Fig. 1. General Urban Plan of Onesti

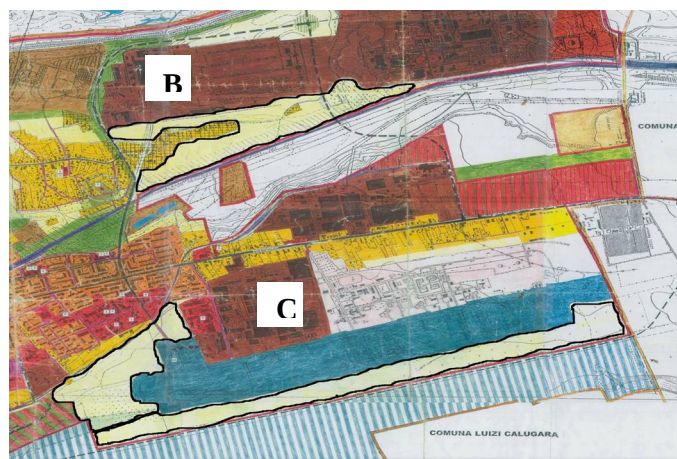


Fig. 2. General Urban Plan of Bacau

The integrated management of natural and antropic risks on the whole territory of the county

- A. Implementing an integrated management system of natural and antropic risks on the whole territory of the county:
  - a. identifying, localizing and geographically delimiting on maps the areas afflicted by natural disasters or being at risk to natural and antropic disasters;
  - b. creating an information data base for each settlement exposed to natural and antropic risks;
  - c. creating an interactive information system between the institutions interested in risk management, local authorities and the County Council.
- B. Temporary and final constructions in areas exposed to natural and antropic risks should not be authorized.

#### 4. CONCLUSIONS

Ecological reconstruction of urban habitats is a lengthy process, which should start with field research and the elaboration of complete data bases thereupon, including maps, as a basis for a rigorous territorial planning and reconstruction of environment factors; these should be followed by the establishment of priorities.

Would the process of reconstruction be postponed, a synergy of polluting factors and risks would be set in motion; this could not be mastered and could have severe consequences on the population, the environment and the built stock.

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